Network Node Manager i

Network Node Manager i (NNMi) delivers powerful capabilities enabling NOCs to manage modern networks. NNMi Smart Plug-ins expand NNMi into specialized environments, helping your team reduce time to resolve issues. NNMi is a core component of Network Operations Management.

Network Node Manager i Offers the Following:

- Discovery and monitoring of unified physical, virtual, SDN and wireless infrastructure.

- Scalability and device support to manage the largest enterprise environments

- Intelligent automation to enhance real-time issue analysis

- Multi-tenant capabilities to more securely manage multiple customers, departments or sites

Learn more at
www.microfocus.com/nnmi

www.opentext.com

Product Highlights

Modern networks connect all elements of the digital enterprise including cloud services, software defined, virtual and physical networks, wireless and mobile access. Due to this strategic reliance on networks, companies cannot afford network downtime and slow-downs.

Businesses must also stay competitive by making smart network management software investments, including using automation. But, automation is most effective when the network is managed in a known, stable state at all times. Is your network operations team facing any of the following issues:

- Inability to manage new technology such as virtual devices or SDN

- Management-tool sprawl that increases costs without appropriate reductions in MTTR

- Poor performance of business-critical applications

To answer these challenges, leading companies across industries turn to OpenText™ Network Node Manager i. NNMi provides the benefits of an enterprise-class network management solution while delivering scalability, improved productivity, intelligent automation, and virtualization capabilities. This combination enables you to reduce the cost of delivering high network availability. NNMi software includes innovative technology that delivers functionality with real value. NNMi also provides many unique ways to see virtualized relationships.

At its core, NNMi software includes a unique spiral discovery method—continuous, incremental discovery, which keeps inventory and topology up-to-date. Spiral discovery is important because devices and connections change

over time, leading users to wrong assumptions and conclusions. Change is even more dynamic in SDN and virtualized fabric, making manual topology methods obsolete.

NNMi's root cause analysis (RCA) uses topology, events and inferences to determine the cause of issues—a far superior method than products that rely on a single approach. Fast and accurate RCA can not only reduce MTTR, but also educate users as they repeatedly deal with similar problems over time.

In addition, workspaces, dashboards and user-guided workflows help users navigate complex networks including those with mixed infrastructure of physical, virtual, SDN and wireless. Operators can easily navigate these visualizations without losing references to critical information. In addition, NNMi provides many unique ways to see virtualized relationships:

- **Workspaces** provide visualization of groups of managed elements (devices, interfaces, VMs, etc.) to focus users on the right subset of the network when analyzing problems. Common user-defined

groupings include parts or all of remote, access, edge, distribution, and core network infrastructure.

- **User-Guided Workflows** provide step-by-step navigation through a problem for and across managed elements. NNMi's RCA drives these workflows to a logical conclusion.

- **Dashboards** display summarizations of status driven by events and metrics, removing the need for users to compile manually. NNMi tracks that data both historically and in a focused manner when network issues occur so that it's always up-to-date and timely. Waiting for users to perform these actions often results in incorrect or partial information, which makes diagnosis difficult.

SDN and Modern Technologies Complicates Network Management

SDN and virtualization complicates management as connections and relationships are more dynamic. Connections and relationships spin up and down quickly, and therefore, they

need to be managed immediately. When they are no longer needed, they need to be gracefully removed. Further, they can be motioned; a virtual instance might be on host A one moment and host B the next.

NNMi provides out-of-the-box support for visualization and management of SDN and virtualized infrastructure, allowing network operators to have a consistent view across their physical and virtual infrastructure. NNMi software is specifically designed to increase network operator efficiency. Its exception-based management model enhances their productivity.

Exception-Based Management Drives Efficiency

The NNMi graphical user interface (GUI) was designed around an exception-based management paradigm, which enables you to focus on priority incidents quickly.

Features of the NNMi exception-based management paradigm include:

- User roles and node/interface grouping features enable you to focus NNMi views to specific management domains and important nodes and interfaces within those domains.

- Out-of-the-box groupings for critical interfaces and nodes provide immediate visibility to high-priority exceptions and reduce configuration time.

- Key incidents can be aligned with your environment, allowing you to define your relevant, service-impacting events.

- Exception-based incident management enables you to focus on assigned open incidents.

Features

Reporting
NNMi provides detailed reporting to help you keep your network running smoothly for the long run. Scheduled and manually initiated predefined reports include:
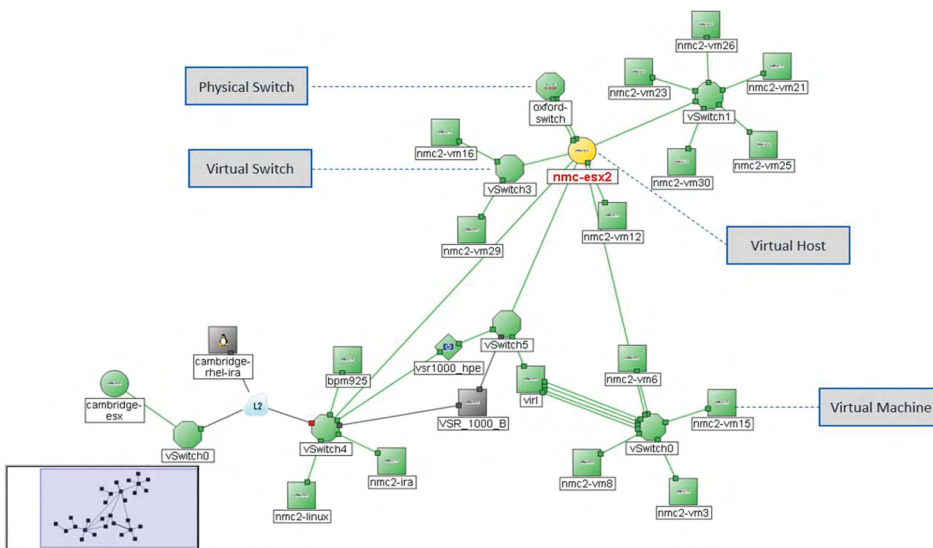

Figure 1. Unified topology across traditional and SDN fabrics

- Capacity planning
- Trend analysis
- Traffic engineering

Ease-of-Use

From installation to operation, NNMi software is easy to use. For example, the NNMi quick-start configuration wizard's guided multistep configuration process enables rapid time to value for most networks. Dashboards provide customizable visual workspaces to make managing specific situations easier and more efficient.

NNMi automates on-demand diagnostics so pushing one button runs a series of diagnostic actions to help determine the problem, and collects data immediately so that no troubleshooting information is lost.

Level 1 operators now have the tools to solve many incidents that were previously passed on to Level 2, increasing the efficiency of your staff.

Business Benefits

- Reduce the cost of delivering improved network availability.
- Consolidate your network management infrastructure (for example, reduce the number of management servers).

- Achieve low total cost of ownership with features such as wizards and a continuous discovery process (for example, there is no need to regularly staff an episodic discovery process).
- Achieve greater staff productivity and efficiency with intelligent automation, an exception-based management paradigm, and a modern GUI.
- Reduce mean-time-to-repair (MTTR) with a deterministic and adaptive RCA and other intelligent automation features.

Wireless Network Management

NNMi supports both autonomous access points (APs) and enterprise-level light weight access points (LAPs). For APs, it monitors their status and connection to the physical network. For LAPs, NNMi additionally provides insight into the dynamic relationships between the wireless LAN controllers (WLCs) and LAPs:

- Support for enterprise-level light weight wireless LAN controllers (WLCs) and their access points (LAPs), at to up to 10,000 LAPs per management station and 100,000 globally.
- Discovery of wireless infrastructure, status monitoring and data collection

of key wireless performance indicators of LAPs, including radio metrics.

- Integrated with NNMi's performance and traffic reporting.
- Delivers visualization of WLC to LAP relationships.
- Ability to track LAP movement from one WLC to another (a common occurrence in wireless networks).
- Removal of LAPs from inventory when they are decommissioned.

For example, as conditions warrant, LAPs will connect to other WACs over time to get it's configurations and firmware updates. NNMi tracks this by continuous monitoring these devices and keeping relationships up to date for operators. Knowing this not only helps diagnose issues faster, but provides important information for network planning such as tuning their wireless and physical connections to optimize traffic flow.

NNM Smart Plug-Ins (iSPIs)

iSPIs are optionally installable modules that bring extra intelligence, functionality, and value to NNMi. Some iSPIs come with the NNMi Premium edition; all iSPIs come with the Ultimate edition. Install only the plug-ins you need for your environment.

The plug-ins are:

- NNM iSPI Performance for Metrics (Premium/Ultimate)
- NNM iSPI Performance for Quality Assurance (Premium/Ultimate)
- NNM iSPI Performance for Traffic (Ultimate)
- NNM iSPI for IP Telephony (Ultimate)
- NNM iSPI for IP Multicast (Ultimate)
- NNM iSPI for MPLS (Ultimate)
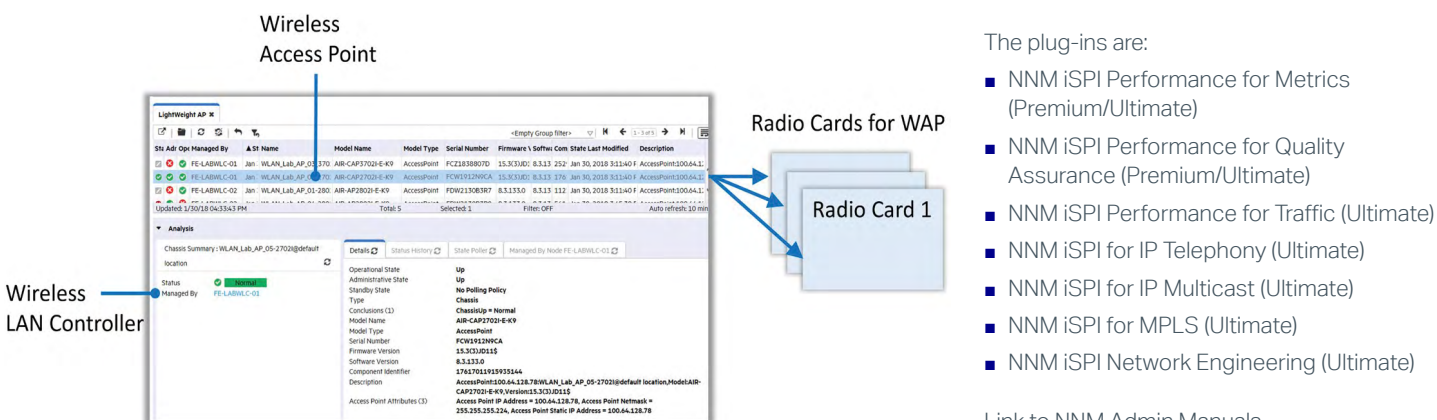- NNM iSPI Network Engineering (Ultimate)

Link to NNM Admin Manuals

Figure 2. NNMi Light Weight Wireless LAN GUI

NNM iSPI Performance for Metrics

With the resiliency of today's IP networks, fault and availability management is not enough. Network performance problems are just as likely to affect a business. Therefore, an effective management solution should incorporate network performance management, encompassing device, interface, and link performance. As important as including performance management is, how you incorporate it into your solution is equally critical. Management solutions must drive increased productivity and efficiency. Disparate fault and performance solutions or loosely integrated point tools require that operators toggle back and forth between separate systems.

Unified fault, availability, and performance management increase operator efficiency and productivity. For example, the NNM iSPI Performance for Metrics allows NNMi to determine and display the status of network interfaces from from multiple aspects in one view. Additionally, you can progress through a unified workflow to the NNM iSPI Performance for Traffic (Ultimate only) to understand what types of traffic are flowing across these interfaces, and then drill down in context to view out-of-the-box performance reports.

Path Health Performance Report

A particularly powerful example of unified fault and performance management is illustrated by the Path Health performance report *(see Figure 3)*. NNMi software calculates and visualizes the Layer 2 and Layer 3 path between any two endpoints within the network. Then in concert, NNM iSPI Performance for Metrics produces the Path Health performance report for all devices and interfaces along that same path. NNM iSPI Performance for Traffic (Ultimate only) provides an understanding of the types of application traffic flowing over these interfaces, and the NNM iSPI for Quality Assurance notifies operators if service assurance tests configured for this path are performing outside of acceptable ranges. This allows a unified workflow to

Figure 3. NNMi performance data GUIs

troubleshoot performance problems between endpoints, sites, and application pairs.

BUSINESS BENEFITS

- Increase network availability by empowering operators with near-real-time and historical performance management capabilities.
- Improve staff efficiency with workflows using contextual navigation between out-of-the-box reports and rich interactive reporting, troubleshooting problems more quickly through unified fault, availability, and performance management

NNM iSPI Performance for Quality Assurance

The NNM iSPI Performance for Quality Assurance (NNM iSPI Performance for QA) monitors quality of network service levels discovered by Network Node Manager to ensure network services are performing to the desired levels.

The NNM iSPI Performance for QA also provides the Intelligent Response Agent (iRA), which monitors performance of these response probes on the Microsoft Windows and Linux systems that NNMi is managing. This allows for more precise source-to-destination tests and prevents additional load on critical network devices.

BUSINESS BENEFITS

- Detect problems even when there are no users on the network so you can fix issues before they affect users, and thereby increase network uptime.
- Discover and monitor QoS-enabled interfaces for exceptions and display them in the NNMi console; reduce training on additional tools.

NNM iSPI Performance for Traffic

The NNM iSPI Performance for Traffic software ("Traffic"; Ultimate only) extends the capability of NNMi to monitor how applications place loads on the performance of the network. It also measures node-to-node traffic. For example, if the network is running slow between point A and B, Traffic iSPI can determine if a system backup is running during normal working hours, instead of at night, clogging the network and affecting other users. Knowing the backup is the problem, you can take action to reduce its impact on the network and users.

BUSINESS BENEFITS

- Receive data for capacity planning and traffic engineering.
- Maximize performance levels or reduce spend on overprovisioned links

NNM iSPI for IP Telephony

NNM iSPI for IP Telephony (Ultimate only) provides comprehensive fault and availability management of your business-essential IP telephony service. This iSPI provides discovery and in-depth monitoring for the critical IP telephony infrastructure, including gateways, gateway endpoints and channels, gatekeepers, call managers, and IP phones. It also improves efficiency by giving telecom and data teams a common diagnostic and monitoring solution. The NNM iSPI for IP Telephony supports Avaya, Cisco, and Nortel IP telephony systems.

BUSINESS BENEFITS

- Increase IP telephony service availability by reducing mean time to identify and repair voice service issues within the converged voice and data network.
- Increase operational efficiency and productivity for both voice and data teams by standardizing on a unified management console.
- Reduce costs by leveraging existing OpenText software investments (i.e., NNMi software) to manage the converged voice and data network.

NNM iSPI for IP Multicast

The NNM iSPI for IP Multicast (NNM iSPI MC; Ultimate only) extends NNMi to be aware of IP multicast environments. It improves fault isolation for IP multicast applications by automatically discovering and displaying views of multicast nodes and interfaces and their relationships, as well as generating alarms based on events related to the multicast environment.

BUSINESS BENEFITS

- Identify service problems early and improve the quality of multicast services through proactive monitoring of IP multicasts and the health of multicast routers.
- Reduce the complexity of managing multicast services with a unified tool-set—

reducing operational costs, and increasing uptime through rapid problem identification.

NNM iSPI for MPLS

The NNM iSPI for MPLS (Ultimate only) monitors multiprotocol label switching (MPLS) service availability and inventory. In addition to traditional Layer 3 virtual private networks (L3 VPN), the NNM iSPI for MPLS handles core, traffic-engineered, and pseudo-wire management (L2 VPN).

BUSINESS BENEFITS

- Improve uptime with continuous MPLS-specific core, Layer 2 and Layer 3 monitoring, and alerting.
- Increase operator efficiency by consolidating MPLS MPLS management within a unified tool-set.
- Reduce training by leveraging NNMi, a tool that your team is already familiar with.

NNM iSPI Network Engineering Toolset

NNM iSPI Network Engineering Toolset ("iSPI NET"; Ultimate only) delivers key tools and workflow automation for both network engineers and operators. It provides workflow automation from an embedded limited-use version of OpenText Operations Orchestration software. iSPI NET also provides trap analytic capabilities and topology export to Microsoft Visio for easy documentation of the network. Both the tools and the workflow automation save operators and engineers time when it is most valuable—during a problem—resulting in faster repairs and less downtime.

Link to NNM iSI NET Documentation

BUSINESS BENEFITS

- Improve time to repair by capturing problem information before the network changes in a way that removes the data.
- Quickly resolve problems by finding where hosts with problems are connected to the network.

- Receive additional visualization and documentation via export of your NNMi topology into Microsoft Visio; no extra tools required.
- Tune your management environment for efficient operations.

Specifications and Advanced Features

NNM iSPI Performance for Metrics (Premium/Ultimate)

The iSPI Performance for Metrics in particular focuses on fundamental network interface (SNMP MIB-II) and device component performance variables. It continuously collects, stores, and manages performance-related metrics from across your network and includes multiple prebuilt reports for exploring that data.

- NNM iSPI Performance for Metrics contains the Network Performance Server (NPS), which is the central component for building and viewing network reports. NPS provides out-ofthe-box and highly customizable reporting across all iSPIs
- The highly scalable architecture of the NPS foundation handles up to 25,000 nodes and 500,000 performance-polled interfaces on a single server, storing the data for two years at the most granular level. In addition, higher scalability can be achieved, with the Global Network Manager (GNM) solution.
- NPS provides baseline metrics that define the normal or expected range of values for any given metric. The baseline metrics enable you to forecast the future value of a metric on the basis of historical data, as well as provide the ability to threshold on deviation from normal situations.
- Tight integration between the NNMi operator console and the reporting interface provides operators with seamless transitions to and from fault data to performance views.

- Reduce network and device loads with unified performance polling. Compared to using disparate collection tools, NNMI collects fault, availability, and performance data through the same polling process.

- Establish the status of network devices and interfaces with unified status calculation and visualization; NNMi uses fault, availability, and performance to determine the state.

- NNM iSPI Performance for Metrics can be installed on the NNMi management server or distributed on multiple servers to share the processing load.

- Support for high availability clusters.

NNM iSPI Performance for QA (Premium/Ultimate)

- Supports IP SLAs

- Discover timestamp-enabled probes on Juniper devices for the following probe types:
  – ICMP-PING
  – ICMP-PING-TIMESTAMP
  – UDP-PING
  – UDP-PING-TIMESTAMP

- Discover and display the device model on which the probes are hosted.

- Consistently present fault and performance information in the context of network topology. (Some features require NNM iSPI for Performance and iSPI Performance for Metrics.)

- Forecast performance metrics.

- Analyze automatic baselines.

- Visualize performance state along with fault and availability state.

- Receive the Path Health report.

- Analyze traffic trends and congestion.

- Isolate performance bottlenecks.

- Monitor threshold-based performance.

- Reduce MTTR though detection of negative trends.

- Support application service delivery with end-to-end monitoring

NNM iSPI Performance for Traffic (Ultimate)

The Traffic iSPI tracks and reports on all network traffic in an enterprise that is being collected via these industry-standard protocols:

- NetFlow

- J-Flow

- sFlow

- IPFIX

It provides aggregated, detailed reports on the volume of traffic flowing between host servers, which can be scoped by individual router interfaces. It can characterize application traffic using powerful configuration rules to present an integrated view of packet flow in the network.

The Traffic iSPI consists of Master and Leaf Collector software. Leaf Collectors gather the IP flow records from different routers and forward the summarized data to the Master Collector. Leaf Collectors can be installed in locations close to your devices configured to advertise flow data. The Master Collector consolidates data from multiple Leaf Collectors and integrates with the Network Performance Server (NPS). Master and Collectors are often installed on different hosts than the NNMi servers.

Traffic reports on LAN, WAN, and VLAN virtualization; port aggregation; and equal cost multipath (ECMP).

NNM iSPI for IP Telephony (Ultimate)

SUPPORTED DEPLOYMENTS

- High-availability clusters

- NNMi application failover

SUPPORTED ENVIRONMENTS

- Cisco

- Avaya

- Microsoft

- Nortel

- Oracle SBC/Acme Packet

ENHANCED CISCO INFRASTRUCTURE MONITORING

- Cisco Call Manager inventory, detail views, and status and incident

- Cisco GK inventory, detail views, and status and incident

- Cisco ICT inventory, detail views, and status and incident

- SRST and CCME support

- SIP phone support

- Voicemail/message store support and unity support

- HTTP to phone

ENHANCED NORTEL INFRASTRUCTURE MONITORING

- Nortel VGMC/MGC/MC, and Nortel SS inventory, detail views, and SNMP trap-based alarm status

- Alarm-based status

AVAYA INFRASTRUCTURE MONITORING

- Avaya Communication Manager

- Monitoring of ICC/ECC/LSP/CLANs/ Circuit Packs and so on

- Port network and media gateways

- All H.248 gateways and media modules

- VoIP engines and DSP cores in gateways

- IP phone monitoring, including soft phones

- Route patterns, trunk groups, members, and signal groups

- Network region: DSP and CODEC activities and elements in the network region

- Processor-occupancy metrics for the Avaya Server

- Usage and monitoring of PRIs and BRIs

- Port network loads

REPORTING

- Call details reporting (Cisco and Avaya)

IP PHONE MANAGEMENT

- Inventory and detail view of Avaya IP phones and their relationship to Avaya Communication Manager
- Inventory and detail view of Cisco IP phones (SCCP/ SIP), their registration status, and their relationship to call managers
- Inventory and detail view of phones and their relationship

DETAILED CISCO VOICE GATEWAY MANAGEMENT

- Cisco DS0 channel inventory, detail view, alarm status, and usage status
- Cisco DS1 (T1/E1 CAS/PRI/BRI, E&M, FXS, and FXO) Circuit Switched Interface inventory and detail view, alarm status/ incident, and usage status/incident
- Cisco VGW inventory and detail view, a larm status/ incident, usage status/ incident, and H323 and MGCP support

DETAILED AVAYA VOICE GATEWAY MANAGEMENT

- Avaya Communication Manager software
- Avaya Local Survivable Processor (LSP)
- H.248 media gateway supports Communication Manager
- Port network media gateway supports Communication Manager software

VOICE QUALITY MONITORING AND DIAGNOSTICS

- CDR-/CMR-based jitter, latency, delay, and MOS monitoring for calls in Cisco IPT networks and incidents
- Voice path draws Layer 2 and Layer 3 path between two Cisco IP phones for media
- Control path draws Layer 2 and Layer 3 path between a Cisco IP phone and its call manager

NNM iSPI for IP Multicast (Ultimate)

ENHANCED VENDOR SUPPORT

- IOS XR
- Juniper (JUNOS-based devices)
- Kompella draft RFC 6624

MULTICAST INFRASTRUCTURE MONITORING

- Discovery of multicast node/interface inventory
- Discovery of multicast neighbors
- Status of multicast interfaces/neighbors
- Multicast group and flow discovery
- Maps: Multicast tree and path monitoring
  - Forwarding tree and reverse path
  - Flow rates
  - Shortest path (S,G) and Sharedpath (*,G) neighbor view
- RP monitoring

- MVPN support
- P(S,G) forwarding trees

NNM iSPI for MPLS (Ultimate)

ENHANCED VENDOR SUPPORT

- Cisco
- Juniper (JUNOS-based devices)

L3 VPN MANAGEMENT

- Inventory view of L3 VPNs
- Detailed views for an L3 VPN, including VRFs

VRF DETAILS

- PE-CE management
- Hub-spoke
- Monitoring of VPN routing and forwarding (VRF) state and incident/status-propagation for L3 VPNs
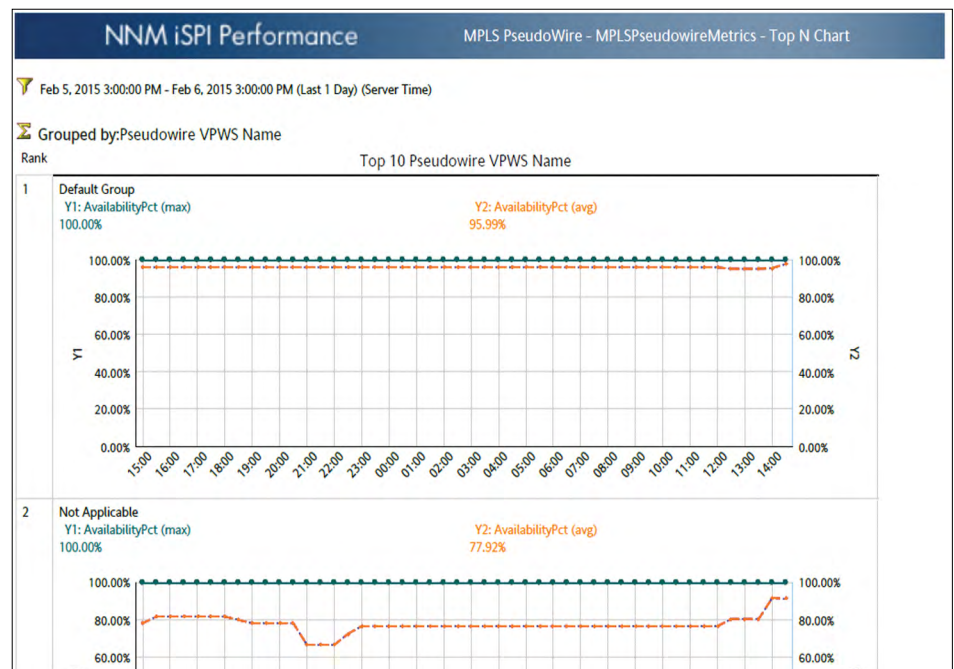
Figure 4. MPLS report

L2 VPN SUPPORT
- Virtual private wire service (VPWS) and virtual private LAN service (VPLS)

LAN SERVICE (VPLS)
- Grouping of PWs to VPN
- Compounding and propagation

LABEL SWITCHED ROUTER (LSR) VIEWS
- LSR core view
- Launch from LSR view to other views showing node-centric MPLS services

TRAFFIC ENGINEERING MANAGEMENT
- Visualize and monitor traffic-engineered hops/path
- Inventory view of traffic-engineered tunnels
- Traffic-engineered tunnel details view
- Monitoring of traffic-engineered tunnel status and incidents

PSEUDOWIRE MANAGEMENT
- Inventory view of pseudowires
- Monitoring of pseudowire status and incidents

VPN MAP AND VISUALIZATION
- MPLS VPN service-centric view

MULTICAST-VPN MONITORING
- Integration with iSPI IP Multicast

LSP VISUALIZATION
- Integration with cross-launch

REPORTING
- LSR reports
- Site reports (VRF)

- Site-to-site QOS reports
- VPN reports

NNMi Ultimate Edition Features

NNMi software gives operators the information they need for these more complex networks. NNMi software includes:

- Geo-diverse architecture (global network management)
- Discovery and monitoring of VMware ESX virtual machines and the physical network connections that support the IPv6 discovery and monitoring
- Monitoring of router redundancy groups (HSRP and VRRP)
- Extended path visualization such as equal-cost multipath visualization
- Support for port aggregation (PAgP, SMLT, and MLT)
- Event-triggered and/or user-driven diagnostic collection
- Interface diagnostics
- Route to node
- IP route
- Spanning tree baseline
- Router baseline
- Switch baseline

Licensing Models to Fit Your Requirements

NNMi Premium Edition	NNMi Ultimate Edition
Network discovery, monitoring and troubleshooting	**NNMi (Premium) PLUS:** monitoring advanced network fabric via iSPIs (see specific descriptions in this data sheet

For more product information: **www.microfocus.com/nnmi**

An Integrated Solution

NNMi software features a web service integration interface, which allows for feature-rich, flexible integrations. Furthermore, NNMi software is delivered with out-of-the-box integrations to other OpenText™ software products (for example, OpenText™ Network Automation software and OpenText Operations Orchestration software) for seamless workflows that increase productivity and efficiency.

NNMi integrates with OpenText™ Operations Manager i (Operations Bridge) by providing a qualified, authoritative network event stream. OpsB then consolidates events across networks, hosts, applications and more.

Link to NOM Support Matrix

Additional product integrations *(see Network Node Manager i Software System and Device Support Matrix for details)*:

- ArcSight Logger by OpenText™
- OpenText™ Service Management Automation
- OpenText™ Network Automation (NA)
- OpenText™ SiteScope
- Systems Insight Manager (SIM)
- OpenText™ Universal CMDB (UCMDB)

NNMi System Requirements

Minimum Hardware Requirements

- Intel / AMD 64-bit, 2.5 GHz
- Entry Tier: 2 CPU Cores, 4 GB RAM, 3 GB Disk, 10 GB DB
- Very large Tier: 12 CPU Cores, 48 GB RAM, 3 GB Disk, 80 GB DB

Operating System Support

- Windows Server 2016 Datacenter or Standard Edition
- SUSE Enterprise Linux
- Oracle Linux Red Hat Compatible Kernel
- Red Hat Enterprise Linux Server

Optional External Database for Configuration and Compliance Core

- Oracle RAC Enterprise Edition
- Oracle Standard Edition
- Microsoft SQL Server Enterprise Edition
- Microsoft SQL Server Cluster Enterprise Edition
- Microsoft SQL Server Standard Edition

Optional External Database for Performance and Monitoring

- Oracle RAC Enterprise Edition
- Oracle Standard Edition

Web Browser

- Microsoft IE, Mozilla Firefox, Apple Safari, Google Chrome
- Pop-ups, cookies, and Javascript enabled
- Adobe Flash (for real-time graphs)

Languages

- English, French, German, Japanese, Spanish

Important Note

- System requirements and localization compatibility can vary. Please see the detailed support matrix for each component before installing.

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Connect with Us

Network Operations Management

NOM delivers a single platform that brings robust depth and breadth, unlocking efficiencies across operations and engineering by breaking down silos of management and reducing tool sprawl. NOM includes and builds upon NNMi and Network Automation delivering a comprehensive network management solution.
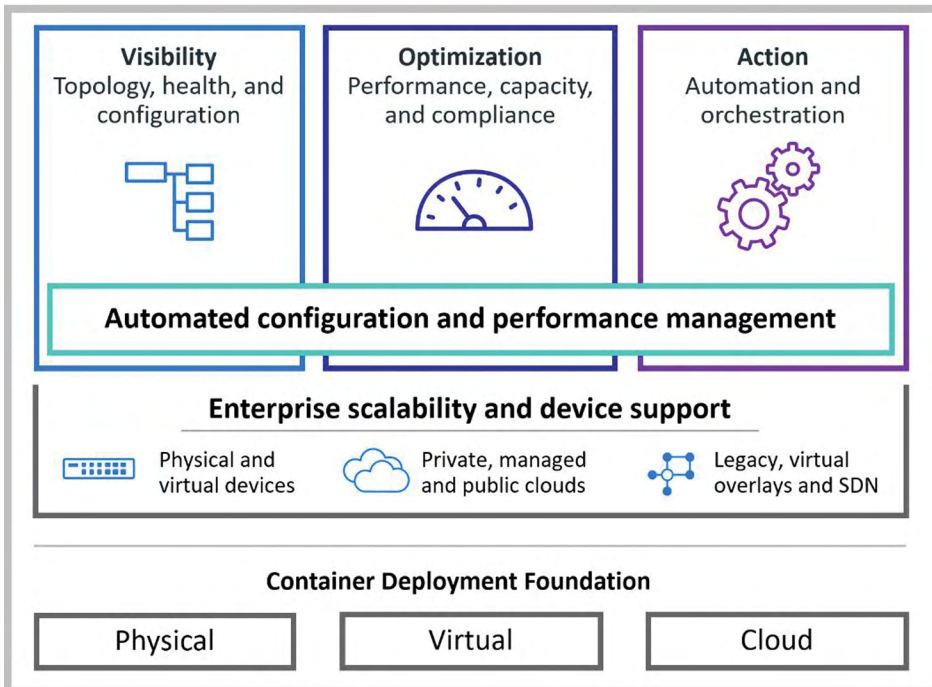
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Figure 5. NOM Comprehensive Solution **docs.microfocus.com/nom**

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