

NETWORK DESIGN AND PLANNING WITH JUNIPER NETWORKS AND WANDL

Junosphere Environment and the WANDL IP/MPLSView Solution Deliver An Advanced Simulation And Design Platform

Challenge

Superior performance and service quality remain top network objectives but are increasingly difficult to guarantee, given the growing complexity and diversity of networks. The importance of network planning is widely recognized, with ad hoc or manual solutions both impractical and error-prone.

Solution

The WANDL IP/MPLSView solution provides an intelligent automation platform that enables planners and engineers to design and optimize networks with ease. Juniper Networks Junosphere Classroom integration module enables users to quickly and easily activate networks designed in IP/MPLSView in the Junosphere environment.

Benefits

- Promotes productivity and operational efficiency
- Optimizes network resources
- Mitigates against unnecessary risk
- Helps plan for future growth
- Uses the virtual Junosphere environment to validate network designs

Superior network service and performance have always been top priorities for service providers, carriers, and enterprise networks alike. But achieving and maintaining these high-performance standards has not gotten any easier due to the increasing complexity of networks—partly from the myriad technologies and service offerings in existence today. This underscores the need for careful network planning and engineering in order to ensure that the same levels of performance and quality can be met.

Today’s network planners and engineers seek intelligent automation tools to assist them with their daily network planning and design tasks. A well-engineered network can help to guarantee service levels, minimize network and traffic disruption during outages, and deliver a fast and reliable overall network experience for customers.

The Challenge

With the complexity of today’s networks, planning solutions are faced with the challenge of being able to optimize the investment in network infrastructure while at the same time ensuring the service levels delivered to customers. These solutions must not only be able to consider varying levels of constraints such as class of service (CoS), service-level agreements (SLA), etc., but also the interdependence of networking layers (i.e., IP over SONET/SDH). Existing solutions have struggled with scalability and performance, employing legacy techniques like discrete-event simulation and “generic” black box modeling.

WANDL IP/MPLSView’s Design & Planning Suite is built around a high-speed path Routing Engine that enables users to perform a variety of computationally intensive tasks such as capacity planning, backbone design, resiliency analysis, and extensive failure simulation of large and complex networks. With IP/MPLSView, network planners have access to a powerful tool that is able to accurately and quickly design their multilayer and multiservice networks. And integration with the Juniper Networks® Junosphere™ environment enables those designs to be easily validated with a real implementation of Juniper Networks Junos® operating system.

The Juniper Networks WANDL IP/MPLSView Solution

IP/MPLSView is WANDL’s multivendor, multiprotocol, and multilayer solution for traffic engineering and management. The integrated software suite uniquely provides a single platform for both offline modeling and simulation and online monitoring (FCAPS) of IP/MPLS-based networks.

The Junosphere environment enables users to create and run test networks consisting of real Junos OS-based network elements. The networks within this virtual environment run the same Junos OS that powers Juniper routers, firewalls, and switches, enabling users to model and emulate networks with an unprecedented level of realism and fidelity.



WANDL's Junosphere Integration Module extends the functionality of IP/MPLSView into network virtualization through the Junosphere Lab and Junosphere Classroom environments. The combined solution delivers a seamless process of designing, creating and modeling, and simulating a Juniper network. With the Junosphere environment, users have a very powerful solution that is able to verify their assumptions and processes with a high level of accuracy and in a minimal amount of time. After a user has designed a network in IP/MPLSView, the Junosphere Integration Module automatically creates a topology file for the user that can be activated in the Junosphere environment a few minutes later.

With the Design & Planning Suite, you can:

- **Promote productivity and operational efficiency** through the automation of many tasks, including automatic report and topology map generation, as well as label-switched path (LSP) generation. With the state-of-the-art IP/MPLSView design engine and heuristics, tasks such as accommodating traffic growth and optimizing the backbone topology are also practically automated.
- **Optimize network resources** with effective designs that pinpoint unnecessary or wasteful placements of hardware and bandwidth resources, and identify where those resources would be better utilized for efficient resource allocation.
- **Guard against unnecessary risk** by assessing the network using IP/MPLSView's intelligent Integrity Checking and Resiliency Analysis, including exhaustive fiber cut simulation. "What-if" scenario modeling enables users to make modifications to the network model and validate changes prior to deployment to accommodate new services, new equipment, and new technologies.
- **Plan for future growth** using IP/MPLSView's superior capacity planning and data forecasting to fulfill new business plans.
- **Easily activate networks within the Junosphere environment** using the integration module, which enables network designs to be quickly activated within the Junosphere environment for modeling, simulation, and validation.

Features and Benefits

Within IP/MPLSView, there are three available suites: (1) Management & Monitoring, (2) Design & Planning, and (3) Service Creation & Provisioning. These three suites support the complete network cycle and handle the varying needs of network designers, planners, operators, and managers.

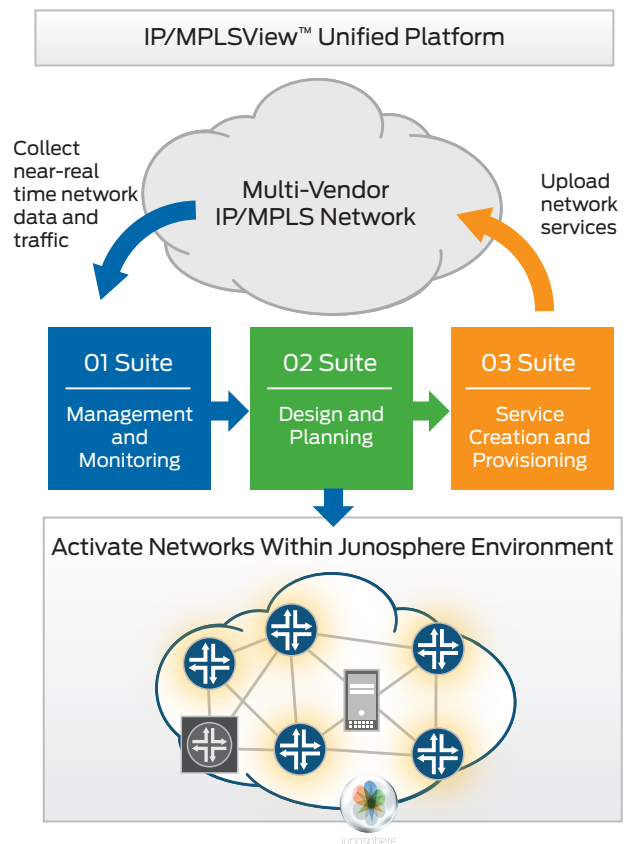


Figure 1: IP/MPLSView for the complete network cycle

Each suite, along with its individual expansion packs (Management, Modeling, or Provisioning Packs), behaves as a "plug-in" to a common IP/MPLSView Unified Platform that in turn runs on top of WANDL's superior carrier-class routing and simulation engine. The Unified Platform facilitates data flow among the suites, providing all of the benefits of a seamless integration. To begin, select the suite(s) you need. Then, for advanced functionality, select from the optional expansion packs available within the respective suites.

Advantages of the IP/MPLSView modular architecture include:

- It's plug n' play. The plug n' play architecture means that regardless of how many suites or expansion packs you buy, there is only one system to install and you only have to install once. Additional expansion packs can be "turned on" at any time via simple license keys. The whole installation process is quick and easy.
- It's customizable. The IP/MPLSView Unified Platform supports a highly modularized architecture. For you, this means that you can tailor your IP/MPLSView solution to suit your own specific requirements. Just pick and choose the expansion packs that are relevant to your network's needs.
- It's seamlessly integrated. The Unified Platform allows seamless integration and data flow among the three suites, which means even greater performance and efficiency. This also eliminates the need for expensive and complex integration among several third-party solutions.

Table 1: Features and Benefits—Key Reasons Why Users Choose WANDL

FEATURE	BENEFIT
One single platform	IP/MPLSView uniquely supports the entire network lifecycle from integrated offline planning to online Fault, Configuration, Accounting, Performance, and Security (FCAPS) management. IP/MPLSView differs from other solutions in the operation support systems (OSS) space in that it is the first integrated traffic engineering and network management solution to address all aspects of the FCAPS ITU model.
Multivendor	IP/MPLSView removes the complexity of a multiple vendor network by supporting multiple devices. It provides a common use experience regardless of vendor-specific implementations, which means less training and a smaller learning curve for network operators.
Excellent visibility into the network	State-of-the-art network graphics provide an instant view of physical and logical relationships, link utilization, paths and routing, and so on.
Superior MPLS-TE management	WANDL is the most comprehensive and advanced MPLS Traffic Engineering (MPLS-TE) management tool on the market, used by carriers and Internet service providers (ISPs) worldwide.
High scalability and performance	The superior speed of IP/MPLSView's design and routing and simulation engine enables many more iterations of designs, simulations, and scenario analyses in the same time it takes others to complete just one. In addition, IP/MPLSView is able to model networks of thousands of devices without any problem.
Extensive reporting	Useful, practical reports and charts are available for every feature.
Junosphere integration	Provides seamless process of designing a network of Juniper routers and activating that same model in Junosphere, enabling users to verify their assumptions and processes with a very high level of accuracy and in a minimal amount of time.

Solution Components

Modeling Essentials are the key components that come standard with every IP/MPLSView Design & Planning package. Capabilities include:

- Automated topology construction
- Advanced network visualization
- Multilayer, multiprotocol routing simulation
- Resiliency simulation (including exhaustive network outage simulation and worst-case utilization analysis)
- “What-if” scenario analysis
- Network modification along with the safe validation of changes prior to deployment

Tailor your own solution with any of these additional modeling packs, depending on the supplementary Design & Planning power features you may need, or the technologies relevant to your network.

Power Features

- Network health audit
- Traffic matrix solver
- Device inventory
- Backbone topology design

Technologies

- MPLS-TE
- VPNs
- BGP
- Multicast

Summary—Juniper Networks WANDL IP/MPLSView Solution for Network Design, Planning, and Modeling

As network operators continue deploying new services and technologies, it will become increasingly important to be able to model and simulate the network to guarantee service levels to both existing and new customers. With potential impact to both CapEx and OpEx, network design and planning is increasingly being recognized as a critical aspect of network management. Together, the integration of the Junosphere environment and WANDL's IP/MPLSView enable users to efficiently and accurately perform all aspects of design, planning, and modeling, promoting productivity and operational efficiency, and avoiding unnecessary risk.

Next Steps

To learn more about the Juniper Networks WANDL IP/MPLSView solution, please contact your Juniper Networks sales representative. For further details about WANDL, please visit www.wandl.com.

About WANDL, Inc.

WANDL, Inc. (Wide Area Network Design Laboratory) is a privately held company, founded in 1986 by a team of experts in network design and analysis. WANDL features network software solutions for design, planning and operations for IP and MPLS networks as well as network solutions for ATM, PNNI/HPNNI, Frame Relay, TDM, Optical Transport, and Voice networks. WANDL has a proven track record and its solutions have benefited approximately 200 service providers, carriers, government organizations and enterprises in over 25 countries across the world in the quest for operational efficiency and cost savings. Headquartered in Piscataway, New Jersey, WANDL also has sales presences in Europe and Asia.

About Juniper Networks

Juniper Networks is in the business of network innovation. From devices to data centers, from consumers to cloud providers, Juniper Networks delivers the software, silicon and systems that transform the experience and economics of networking. The company serves customers and partners worldwide. Additional information can be found at www.juniper.net.

Corporate and Sales Headquarters

Juniper Networks, Inc.
1194 North Mathilda Avenue
Sunnyvale, CA 94089 USA
Phone: 888.JUNIPER (888.586.4737)
or 408.745.2000
Fax: 408.745.2100
www.juniper.net

APAC Headquarters

Juniper Networks (Hong Kong)
26/F, Cityplaza One
1111 King's Road
Taikoo Shing, Hong Kong
Phone: 852.2332.3636
Fax: 852.2574.7803

EMEA Headquarters

Juniper Networks Ireland
Airside Business Park
Swords, County Dublin, Ireland
Phone: 35.31.8903.600
EMEA Sales: 00800.4586.4737
Fax: 35.31.8903.601

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