

# Intent-Based Network Optimization with Juniper Routing Director

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Deliver exceptional experiences with closed-loop automation that's simple, reliable, and scalable

Reliable connectivity  
for the AI era

**80%**

of organizations  
say the network  
has become more  
complex in the last  
two years

(TheCube,  
ZK Research, 2024)

## Overcoming the challenges of network complexity and manual operations

Modern transport networks are powered by highly flexible routing platforms, with levels of programmability that can unlock increasingly tailored connectivity services managed entirely remotely. When combined with advanced traffic engineering capabilities, this enables the delivery of SLA guarantees at scale based on KPIs like latency and bandwidth.

With the rapid emergence of new applications like generative AI, that are highly sensitive to latency, reliability and bandwidth, network operations teams today need to rapidly gain granular control over the connectivity they provide. Maintaining optimal performance in large networks, supporting these increasingly diverse and demanding applications, often involves thousands of tunnel path updates per month.

Intent-Based Network Optimization with Juniper® Routing Director (formerly Juniper Paragon Automation) solves this problem by enabling closed-loop automation of traffic engineering, at scale, based in user intent.



**FIGURE 1**

Path intents are created or updated by selecting from the available tunnel, optimization and endpoint options

## The capabilities you need

## Repeatable, scalable, autonomous networks built for the real world

Intent-Based Network Optimization with Juniper Routing Director quickly creates new value from modern programmable WAN networking technology while reducing the impact of changing network conditions on critical services.

Our approach to IBN addresses the shortfalls of traditional configuration automation that does not abstract away complexity and therefore cannot easily scale to large networks. It lets you separate the complexity of intent design from day-to-day operations and provides the automation of traffic management needed to maintain user intent under rapidly changing network conditions.

### Model-based, verified intent profiles for reuse at scale

Your network experts can specify a wide range of routing configuration options when designing intent models, such as tunnel symmetry, protocols, provisioning methods, priority, maximum delay, packet loss, bandwidth, and others. They can then simulate how these models would behave in a live environment. Once published, these verified intent models are maintained under version control and can be reused by operations teams as many times as they want. This reduces human error by maintaining careful control of intent profiles, reduces time-to-activation by eliminating repetition, and ensures consistent experiences for end users by including consistent 'quality checks' as part of the design process itself.

### Flexible, reliable connectivity services

The underlying technologies that enable AI for Networking are rapidly evolving, with new AI-native approaches to detecting complex routing issues like blackholes emerging all the time. By separating optimization policies from tunnel profiles, Intent-Based Network Optimization from Juniper Routing Director allows operators to rapidly leverage these innovations to enhance performance and resilience, delivering increasingly strict SLA guarantees over time.

### Geospatial view for explainability and continuous improvement

Routing Director provides you with filterable, zoomable mapping views. Logs change over time, so you can quickly analyze connectivity, inspect and explain when and why the network has been automatically reconfigured in the past, and keep track of individual customers' networks, even among thousands of physical nodes and links. This also gives your engineers important insights on how intent profiles can be further optimized to deliver even more predictable, reliable services to end users.

**The answer: Intent-based  
network optimization with  
Juniper Routing Director**

## Intent-based network optimization with Juniper Routing Director

Easily create high performance networks that deliver to your exacting requirements while making the job of operations teams simpler and more intuitive. Free your skilled experts to focus on high-value activities such as improving efficiency, enhancing reliability, and creating high-value guaranteed services instead of day-to-day network management.

With Intent-based Network Optimization from Juniper Routing Director, you can accelerate time-to-value with a 'design once, deploy many times' approach to network connectivity, while maintaining precise, flawless user experiences with a network that self-optimizes to maintain user intent.

**How it works**

## Design and deploy exceptional services while maintaining user intent with closed-loop automation

Intent-based Network Optimization with Juniper Routing Director provides advanced path computation, intent modeling and geospatial visualization. Like all Routing Director use cases, it is based on the cloud-native Routing Director platform, which scales to even the largest global networks and is deployable on premises or on public cloud instances for high availability.

### Advanced path computation and optimization

Leveraging our decades-long experience in building sophisticated SDN controllers, at the core of the use case is a powerful path computation engine (PCE) that blends a range of optimization capabilities. This is used to recompute network tunnels based on user-defined triggers, such as utilization levels, link delay, packet loss, or failure events. This allows for fully autonomous, closed-loop networking use cases, such as congestion avoidance, latency-based routing, and autonomous capacity optimization. The path computation engine is the critical component of intent-based network optimization that enables the network itself to adapt to changing conditions and unexpected events.

### Precision intent profile modeling

Engineers can make network intent profiles available to operations teams based on three elements:

- **Tunnels:** End-to-end connections in the transport network that exhibit predictable (sometimes guaranteed) performance, including speed, latency, packet loss, and priority, among others
- **Optimization:** A description of the conditions when the associated tunnels will be recalculated, including specific triggers, threshold crossings, and time periods
- **Endpoints:** A collection of endpoints that a selected tunnel and optimization profile apply to (for example, all edge routers servicing a specific enterprise customer)

Operators can then select combinations of these intent profiles and provision them in the network.



**Dynamic network visualization**

Operators can visualize any combination of active intents running in the network to monitor how they are performing against the stated intent.

**Core capabilities**

Model-based intent profile management	Only authorized users can create, validate, publish, and update intent profiles, consisting of tunnel profiles, optimization profiles, and endpoint groups. Your operations teams can deploy intent instances by selecting from the available published profiles. This helps maintain the integrity of the connectivity you deploy while separating network configuration from day-to-day operations.
Automated reoptimization	Optimization profiles can include time-based or event-based triggers, including, for example, KPI threshold crossings that indicate a risk to the delivery of user intent. So, if events outside of your control (such as power failures, cooling failures, or traffic spikes) cause a degradation in performance, the network will self-optimize and reroute all connections in the live network to maintain all user intents.
Predeployment dry run	As part of the deployment of new instances, your operations team can visualize how they will be instantiated alongside existing services in your network. This helps to identify unexpected or unusual paths that may indicate potential capacity issues in the network that may require further investigation before committing the deployment.

**Our advantage**

**One integrated use case based on deep domain expertise**

Intent-based network optimization is part of the Juniper Routing Director portfolio of use cases. It brings the flexibility your expert engineers need to design connectivity that delivers diverse user intent while offering the drag-and-drop simplicity that enables your operations teams to quickly and confidently validate, deploy, and modify connectivity in minutes.



## How we deliver



Consortium GARR is using Routing Director to deliver high-performance connectivity to 1,000+ research and education institutions across Italy.



Dimension Data uses Routing Director to manage service quality across its IP core network, spanning the U.K., Germany, and South Africa.

## Why Juniper

### Decades of industry leadership in one simple solution

With intent-based network optimization, you get Juniper's decades of expertise at the forefront of WAN routing in a simple to use package designed to optimize business outcomes. You can leverage your Routing Director instance to deploy any other use cases without additional system implementation.

## More information

### Find out how you can quickly and easily leverage intent-based network optimization

To learn more about Intent-based network optimization, visit <https://www.juniper.net/us/en/solutions/sd-wan.html>

For technical data sheets, guides and documentation, visit [Juniper Routing Director Documentation | Juniper Networks](#)

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