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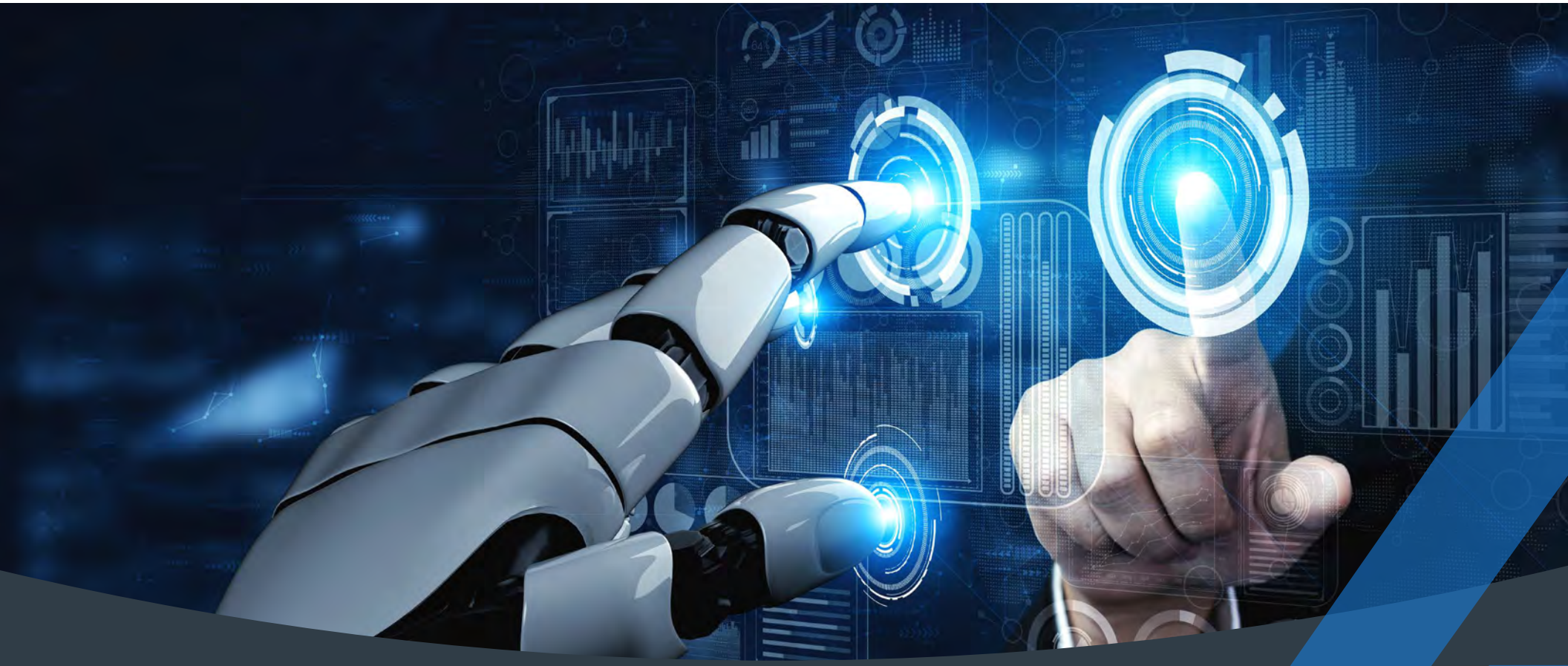

Problem Diagnosis Automation

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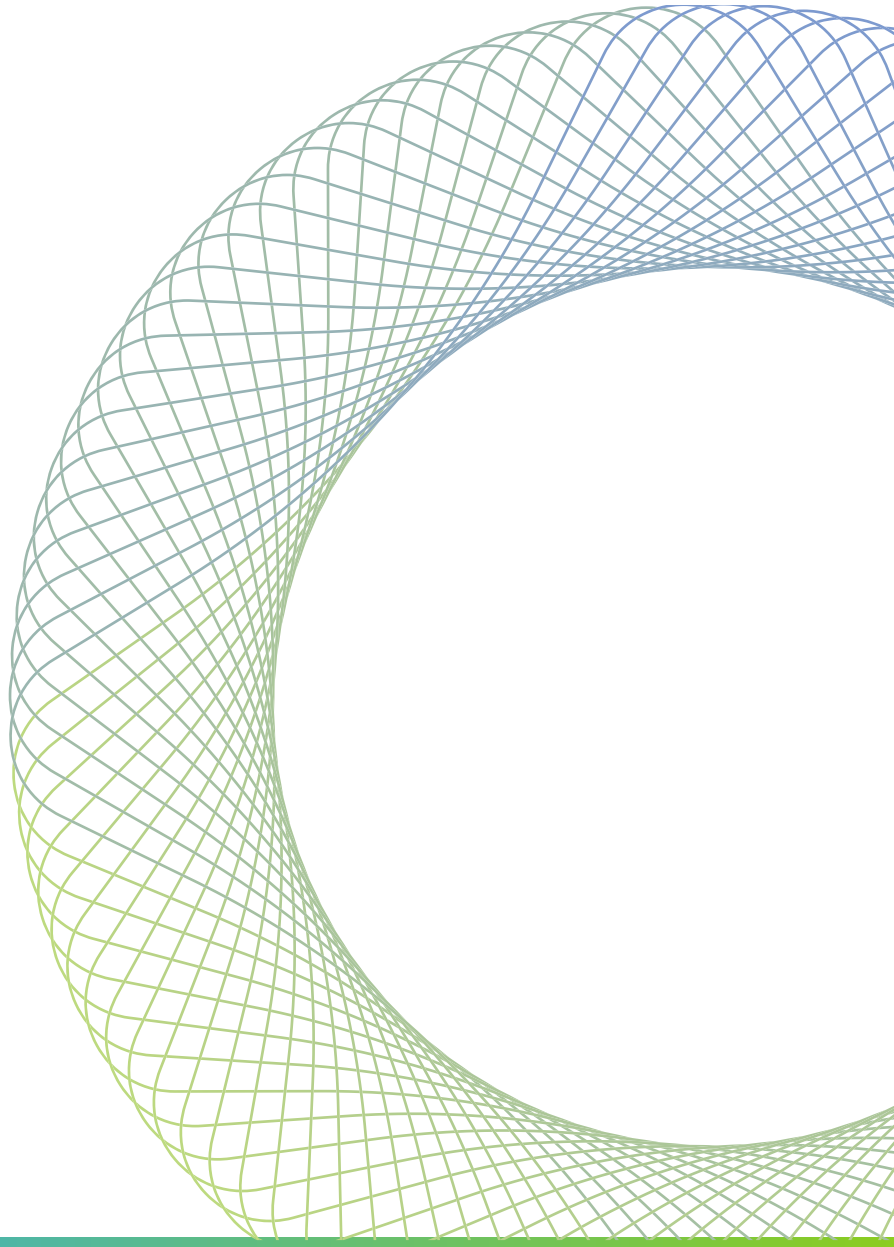


Transforming NetOps Through Intent-Based Automation

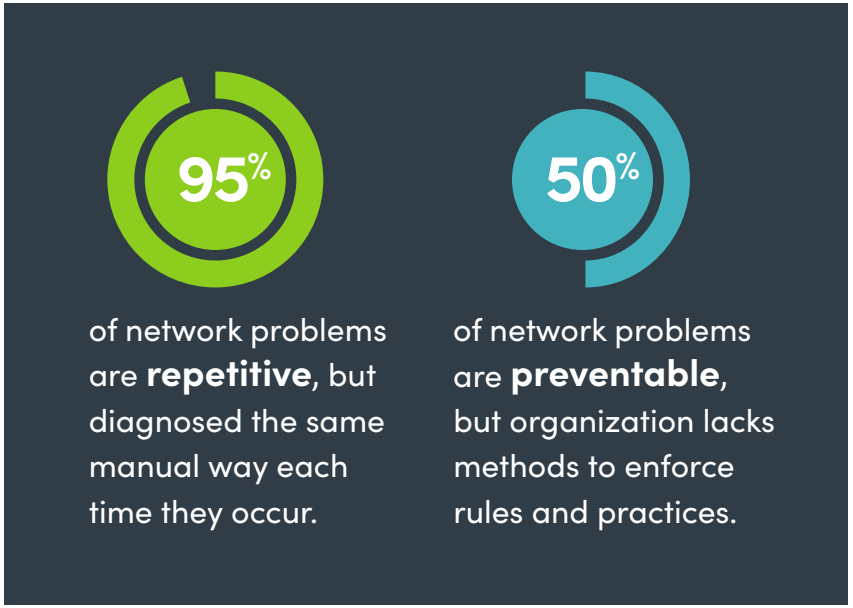
As enterprises scale their hybrid networks through the adoption of new technologies, organic growth, and mergers & acquisitions, keeping the business running while minimizing operational overhead is more critical than ever. These hybrid networks must support remote work, cloud-based services, and a litany of software-defined networking technologies, each of which dramatically increases the complexity. The result? More operational service tickets. And these service tickets may number into the hundreds or thousands per week – many of them solving the same issues that have already been resolved countless times before.

Continuously troubleshooting the common issues is tedious, repetitious, and inefficient. Adding more service desk personnel is a common and tactical solution to this growing problem, but it fails to achieve the desired results of lower operational costs, shorter task duration, and more consistent ticket resolutions. And the varying skill levels of operators and engineers negatively impacts the ability to effectively and rapidly solve problems.

The most successful IT leaders realize that their operational plan must not only scale, but be smarter. With more than 80% of all service tickets categorized into less than a dozen types of similar issues, collectively solving this small set of common problems at scale can be transformational to the business. That's where network automation comes in.

There have been two major challenges to implementing an automation-centric approach to scalable network operations.

1. **The limited visibility of the entire network,** with all of the performance and configuration detail needed for every network component and their context.
2. **The lack of a suitable no-code automation console** that can address the simplest and most complex operational issues without the need for rigid development projects or programmers and associated costs of software engineering.



Understanding Your Network Automation Maturity

While IT professionals generally accept that automation can be a highly transformational technology, it may be surprising to realize that the vast majority of organizations have remained at "Level 0" (No Automation) since their IT operations function was created! These organizations 'grew up' on much simpler networks which they managed manually and, even as the world around them changed, the ways in which they approach network operations has not. Even with the drastic increase in operational service tickets that comes with infrastructure growth, both in scale and complexity, these modernization projects have not yet become a priority. But adoption is starting to increase.

In the 2021 Gartner I&O Leaders Survey, a majority of respondents selected **automation implementation as a key driver for I&O cost-efficiency,** with 23% ranking it as the top driver to cost optimization in their organizations.

Source: Gartner®. **"Market Guide for Service Orchestration and Automation Platforms".** Chris Saunderson, Manjunath Bhat, Daniel Betts, Hassan Ennaciri, August 10, 2021

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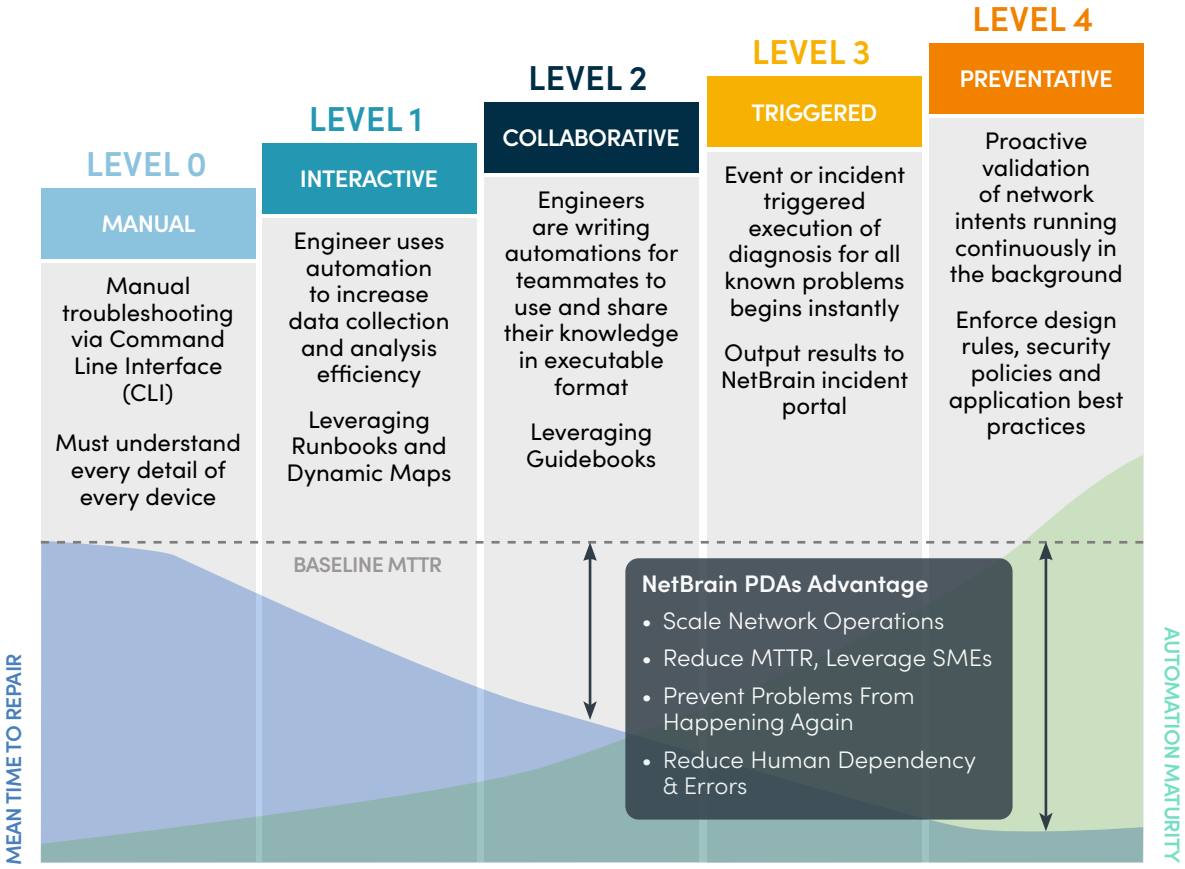
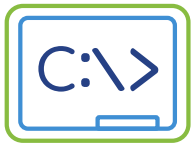
Consider network automation as a journey that can be broken down into highly achievable steps over time.

Referring to the chart, you can see that as your maturity progresses from one level to the next, you derive greater value and operational scale. Mean-Time-To-Repair (MTTR) can be used as a proxy for maturity as it forms the baseline case for a completely manual operational plan. In the chart, we see that as the use of automation increases, MTTR decreases. The net difference between the two curves is the true and very tangible value of migrating to an automation-centric network operations approach.

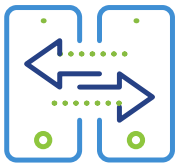
You can see from the chart why MTTR is used as a proxy to understand the value of automation. Most organizations can articulate their average MTTR. These organizations have manual processes, so their MTTR can be used as the baseline in their automation journey. As organizations become more mature in their automation, it is quite easy to determine the tangible savings being realized through automation. In simpler terms, the four hours that you typically spend manually executing a service ticket with CLI, may be reduced to two hours through automation, a savings of 50%. And with large organizations reporting 5,000 or more service tickets per month, this yields a monthly aggregate savings of about 10,000 hours (or approximately 60 operators), which at prevailing engineer hourly rates can be estimated at almost $1 million per month!





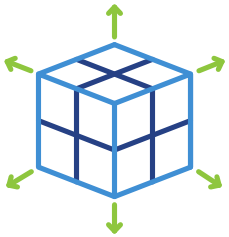
Level 0 is considered the traditional approach to network operations. It is largely based on traditional CLI-based manual operational tasks and is tightly coupled to and reliant on the operator or engineer's skills and experience. There are no economies of scale, execution is inconsistent from ticket to ticket, and each task requires subject matter expertise which may be quite limited in availability.

The first step **"Level 1"** or "Interactive" is when intelligent tools are used to make more informed decisions. These tools provide more information in one place, the context of all aspects of connectivity, enabling network engineers to be more productive. Level 1 offers guardrails for any operator or engineer to help them make more informed decisions based on the real-time status of the network.



In **"Level 2"** automation, the "Collaborative" stage, is where engineers and operators leverage the knowledge of their peers. Software captures subject matter experts' knowledge to create automation units available to any user regardless of their own knowledge or experience. In this stage, their expertise is available even when the expert is not.

"Level 3" is where automation responds to external events, such as those from ITSM solutions. This is where significant automation appears as the software begins automatically taking actions required by service tickets before engineers or operators get involved. Level 3 shifts the operational paradigm from human-centric to automation-centric, and in the process, further reduces MTTR and provides significant savings at scale.



Lastly, **"Level 4"** introduces the concept of enforcement of in-production conditions running tasks continuously in the background. Engineers create these tasks based on the enterprise architects' goals such as assuring the network infrastructure delivers bandwidth as needed or that ACLs or other protocol filters are in place for security reasons. As you introduce new applications, it is common to change network conditions in support of the new application, but to the detriment of one or more of the existing applications. Preventive automation assures that each of the application requirements are respected and continuously validated.

What is NetBrain Problem Diagnosis Automation System?

NetBrain Problem Diagnosis Automation System (PDAs) is the industry's only *intent-based* hybrid network automation and visibility platform focused on automating network problem diagnosis at scale. Now in its fourth generation, NetBrain is used by thousands of customers worldwide, managing millions of network nodes and automating millions of network service tickets each year.

Network operations teams rely on NetBrain to help them deliver business-critical IT services more reliably, with fewer human errors, more consistency and at a lower cost. Simply put, NetBrain reduces the overhead associated with managing network through the deep understanding of network intent, reducing the number and duration of network service tickets.

NetBrain's Problem Diagnosis Automation System includes rich visualization of any end-to-end network, while providing the foundation to build and apply network automation to any operational task, by anyone, through our unique no-code approach.

The NetBrain PDAs solution is built on four core technologies:

1 Intent-Based Automation:

The infrastructure design and production requirements are abstracted to allow management intents to be automated.

2 Executable Knowledge:

Transforms experience and SME knowledge into automation units using a no-code environment making it available collaboratively.

3 Dynamic Maps:

A real-time visual representation of any portion of the network topology including status, connectivity paths, and performance levels.

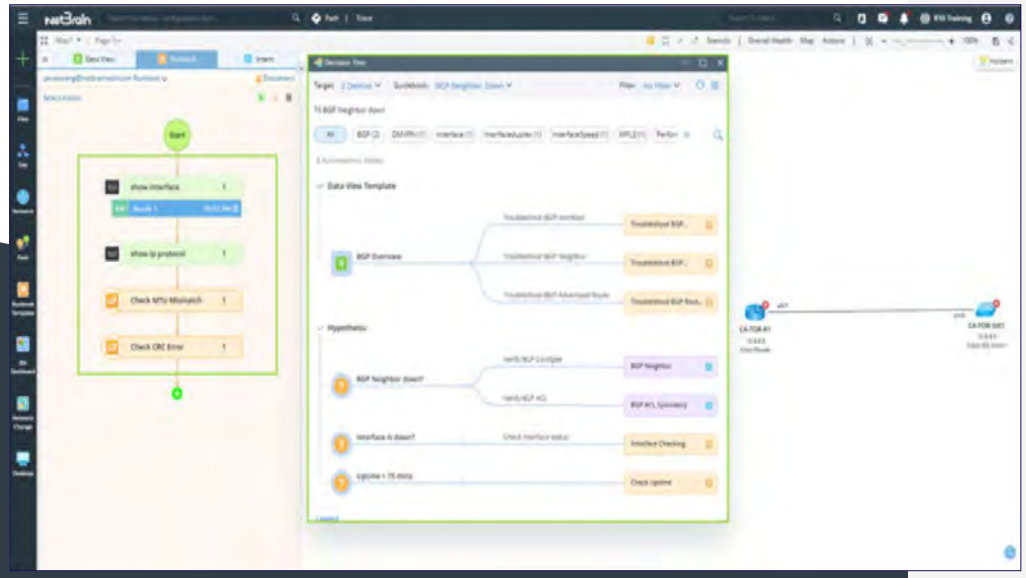
4 Digital-Twin:

Auto-discovers your hybrid network and maintains that real-time toplogy and relationship data to create an exact digital twin of your network.

Automating Problem Diagnosis

The network operations paradigm must change. As modern infrastructures grow in scope and complexity, they generate hundreds or thousands of service tickets per month, which seems overwhelming, but consider that the vast majority of these service tickets share common issues. It turns out that network operational teams spend most of their time repeating the same diagnostic and remediation tasks, which is highly inefficient.

The entire operation function must get smarter in order to enable existing teams to automate these repetitive problems and reduce their overhead. NetBrain PDAs makes network automation intelligent by understanding and managing the *intents* of the network. PDAs enables you to solve any problem once by capturing the diagnostics and remediation workflows without any programming, and then re-using that knowledge for each subsequent occurrence of the same or similar problem.



NetBrain PDAs scales network operations using automation to:

- Reduce the number of required operational resources by handing most tedious and repetitive problem diagnostics automatically at the moment a service ticket is created
- Transform subject matter expertise into reusable executable automation units for use by anyone on-demand or to run automatically
- Equip operators and engineers with a highly intelligent, network-aware visual management platform enabling them to solve complex problems in a more consistent and repeatable fashion.

Problem diagnosis begins the moment a ticket is created

NetBrain PDAs begins working the moment an external event occurs. Any service ticket can trigger NetBrain PDAs to begin mapping and diagnosing the network vicinity involved. NetBrain then programmatically executes any set of best practice tasks, records the results and then sends the detail back to the ITSM provider. By adding this critical diagnostic detail to every service ticket, operators and engineers become more productive when they start working, reducing the upfront time spent on repetitive diagnostics and investigatory tasks.

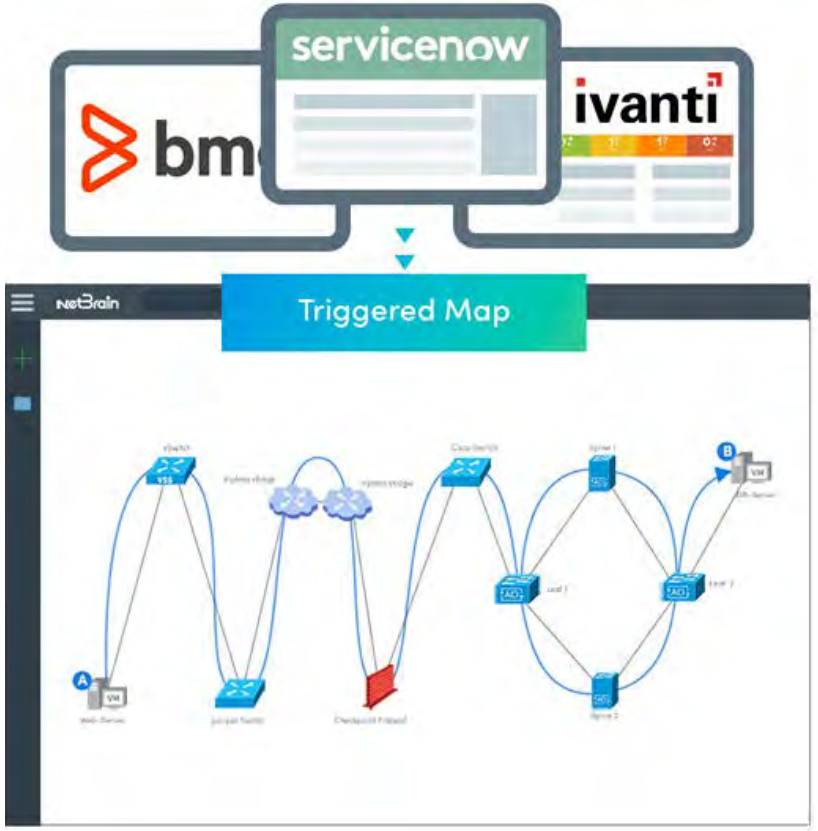
Transforming knowledge into automation

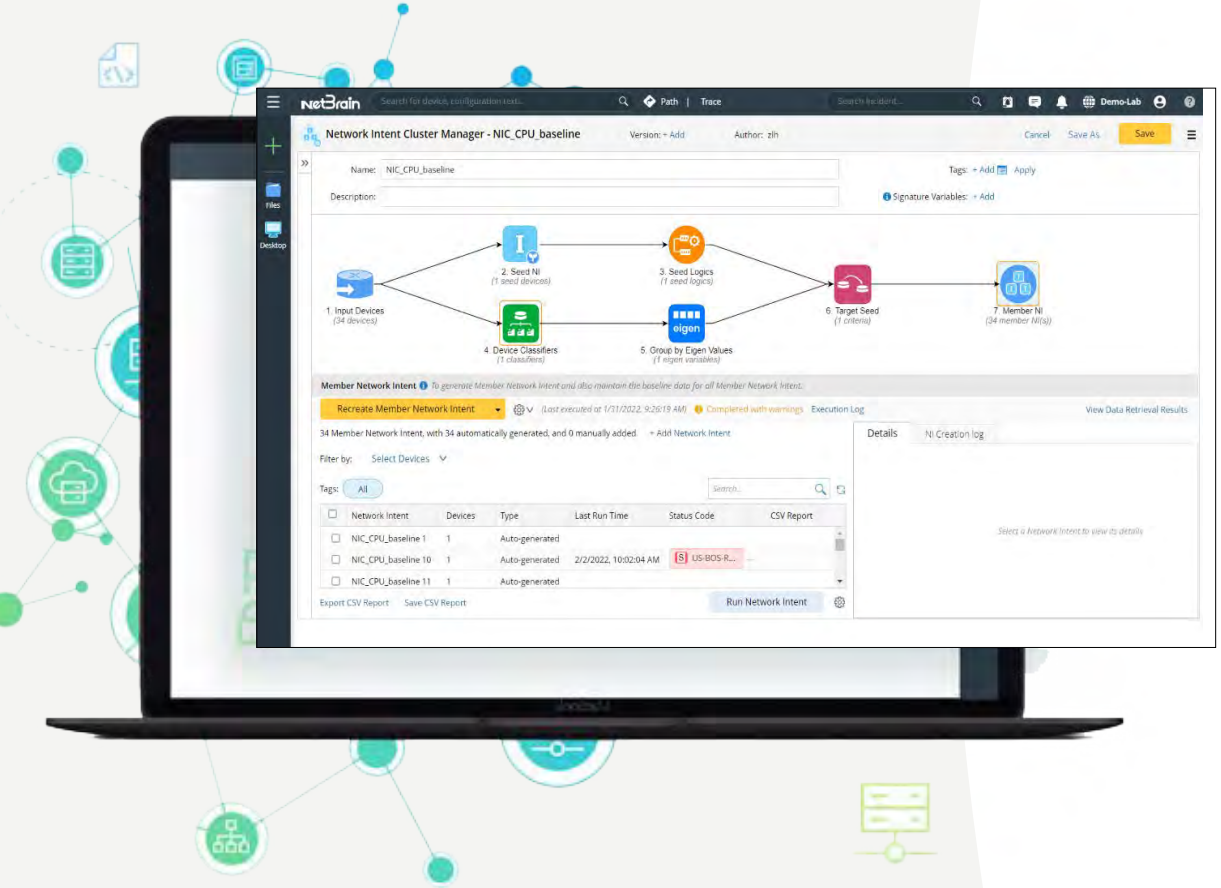
NetBrain PDAs enables the knowledge and experience of subject matter experts to be converted to executable automation without the need for software engineers or code development projects. By reusing previously created automation, operators and engineers can gather, analyze and resolve problems that before would have required the attention of other subject matter experts or specialized operational staff.

Now, everyone can get online at the same time, interact and make updates and remediations to reduce or eliminate hand-offs and escalations to DevOps, SecOps, NetOps, CloudOps, automation teams.

Automation to enforce the intents of your network design

Intent-based automation (IBA) ensures your network continues to provide the required levels of service your applications require. Network intents can enforce network design constraints, quality of service, bandwidth expectations, security policies, and application path preferences. These rules (or intents) can range from the purely technical (e.g., assuring packet size) to domain specific (e.g., access policy) to business-driven (e.g., throughput levels for a customer-facing network application). IBA allows network operations teams to increase the autonomy of their networks and reduce service ticket volume.





With NetBrain PDAs you can create any number of network design enforcement intents. Most commonly these enforcements are set to run in the background without any operator intervention for intelligent and preventative network monitoring, compliance, and policy and best practice enforcement of the entire network. This prevents new business application services from stepping on deployed business services. NetBrain's intents detect and address abnormal network behaviors prior to them becoming a bigger problem.

Alleviate the stress of change management

NetBrain PDAs empowers you to make highly informed changes interactively, execute commands automatically, and then proactively verify the impact of these changes to the rest of your business applications. It gives network engineers a single place to keep track of changes in a way that is fully auditable and adherent to existing business protocol and approval processes. NetBrain PDAs provides the ability to take benchmarks before and after each change to ensure that the designer's intentions are preserved. And in cases of conflict, you can easily execute rollbacks.

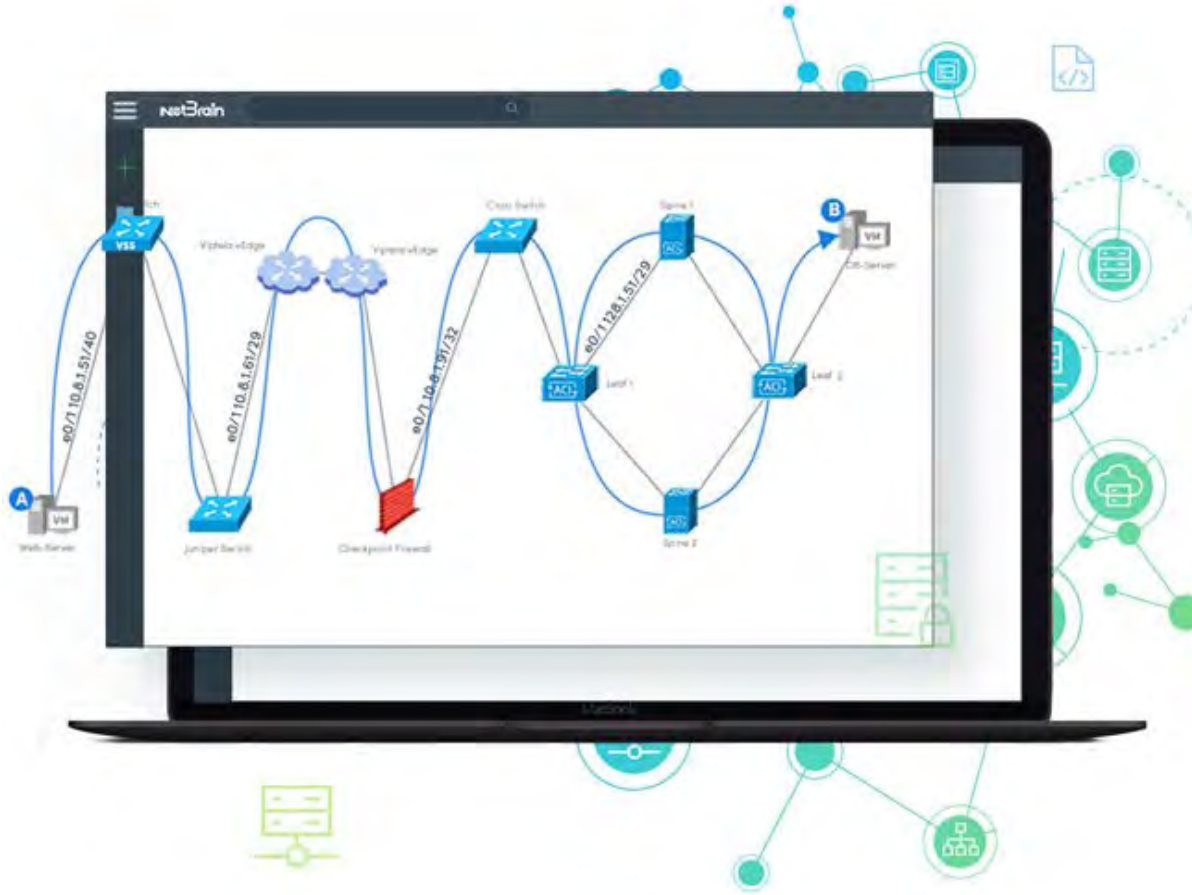
Take Control with Edge-to-Cloud Network Visibility

NetBrain PDAs is the perfect platform to aid in the servicing of network tickets because it understands every *intent* of your digital infrastructure in real-time. NetBrain's advanced discovery engine inventories all devices, their configurations, the connectivity, and the protocols in transit of the end-to-end network—every device, every platform, every version as well as the status and performance of each. And it maintains this operational knowledge continuously, to ensure it is up to date and available to ease change management and ticket diagnosis.

Intuitive UI and data visualization for network configuration, topology, state and condition, displaying both real-time and historical data.

Improve productivity and efficiency

NetBrain PDAs dynamic mapping capability is based upon a mathematical model generated by a powerful discovery engine. It generates a "digital twin" of the network by collecting and aggregating data from multiple sources to create a map of the network. Unlike static diagrams, NetBrain PDAs creates living visual representations of your hybrid network - from the public cloud to the network edge - in real-time. Operations teams can then visualize, navigate, investigate, and troubleshoot network issues in a more informed fashion.



Quickly resolve application performance issues

Diagnosing application "slowness" requires understanding of the application's traffic flow. NetBrain PDAs helps engineers visualize both forward and reverse traffic paths. A Path Calculator instantly maps an end-to-end traffic flow from one endpoint to another, or from a receiver to a source (multicast network) so you can troubleshoot or monitor your network traffics based on the visualized path.

Maintain compliance always

NetBrain PDAs makes it easy to maintain compliance of the entire production network, either with a standard Architecture/Design or Security Regulation. Templates make it easy to standardize configuration with IT asset management and configuration standardization.

Speed audit preparation

NetBrain PDAs ensures audit preparedness of the entire production network with a real-time data model of your entire network — including config files, route tables, CDP/ARP/MAC/STP tables, inventory information, and more. A recurring network discovery benchmark ensures that the "digital twin" of your entire network remains accurate and up to date. From the benchmarks, you can reference a repository of log data during audits to demonstrate compliance over time.

Simplify network capacity planning

NetBrain PDAs creates real-time network maps and inventory reports of all devices and links and highlights current production capacities. It simplifies identification of transient bandwidth-

intensive hotspots to help uncover devices that may be periodically operating outside of expected thresholds. NetBrain PDAs visualizes critical application flows to help you understand the business impact of capacity deficiencies.

Assure application availability with path visibility

NetBrain PDAs displays all application paths in a consolidated dashboard so you can ensure consistent connectivity and health of all application paths. If there is a link outage, hardware failure,

network configuration problem, or anything that causes a failover to a secondary path, NetBrain PDAs identifies it and alerts you while providing detail on the root cause of the path failure. It provides a detailed side-by-side comparison of the before and after state of a path. And, NetBrain PDAs can keep track of thousands of business-critical paths by proactively checking path conditions at regularly scheduled intervals.

Facilitate network consolidation due to M&A

Dynamic Maps allows you to visualize and assess multiple networks as if they were merged before any potential conflicts arise. NetBrain PDAs makes it easier to identify duplicate addressing, protocol conflicts, and many types of non-compliance before network are joined. With dynamically mapping, design teams can better understand critical application flows so they can accommodate these applications with the new design and minimize disruption when the merged network goes live.

Get true end-to-end visibility of your multi-cloud and software-defined infrastructures

NetBrain continues its visualization all the way from the endpoint to the public-cloud and everything in between. NetBrain PDAs has native support for your multi-cloud infrastructure (Amazon Web Services, Google Cloud and Microsoft Azure), traditional networking infrastructures, along with your software-defined WAN and SDN deployments. Everything you consider network infrastructure is captured by NetBrain PDAs.

The NetBrain PDAs Difference

The NetBrain PDA System has been designed from the ground up to work like business works, from the top-down and based upon results. By detailing the intents of every component of the network, without the need for programming, the PDA System enables its users to align the network with the needs of the business more directly, rather than trying to manage networks using a device-by-device bottoms-up approach, so prevalent throughout the networking industry.

The PDA System offers a comprehensive automation engine which interacts with the intent-based digital twin data model. It's Intent-based automation can be applied; 1) automatically in response to external events, such as those from ITSM system ticket creation, 2) interactively, such as when an operator is resolving problems, or 3) proactively to assure desired network intentions are preserved.

By leveraging its library of pre-built automation units, the PDA System addresses up to 95% of the most common network service types. And this library can be expanded by any subject matter expert to allow additional situation-specific best practices to be captured and shared easily.

Key Capabilities of NetBrain PDAs:

- **Top-Down network management** by establishing the intention of each component
- **Intent-Based Automation,** which can be triggered, interactive and proactive.
- **Network intent and executable automation** created without the need for programming
- **Establishes baselines,** and compares subsequent observations to that baseline
- Complete Edge-to-Cloud **automation and visibility**

NetBrain is Proven

More than 2,500 NetBrain customers have taken a strategic step to optimize the operations of their modern hybrid networks through automation, eliminating the need for repetitive and ineffective troubleshooting that rely on manual processes and dated documentation. By deploying NetBrain, customers are leveraging their subject matter experts more effectively, reducing hand-offs and escalations, and enjoying faster MTTR.

With NetBrain PDAs you get a scalable, end-to-end solution to strategically address all your network operational needs—by leveraging automation throughout. Organizations that use NetBrain realize significant reductions in service disruptions, shorter outage durations, and lower remediation costs. They have less business risk. They are more informed about how their network is directly supporting their business applications and they can defend their actions with configuration detail, performance documentation, and historical data of their end-to-end infrastructure.

Start the Journey to Network Operations Efficiency

NetBrain PDAs is designed to bring intelligence to your hybrid network to ensure it performs as you intended. NetBrain PDAs redefines network automation, making it more intelligent, more available, and more responsive to supporting the business. Let us help you explore the possibilities.

About NetBrain

Founded in 2004, NetBrain is the market leader for NetOps automation, providing network operators and engineers with dynamic visibility across their hybrid networks and low-code/no-code automation for key tasks across IT workflows. Today, more than 2,500 of the world's largest enterprises and managed service providers use NetBrain to automate network problem diagnosis, generate real-time documentation, accelerate troubleshooting, and enforce enterprise architectural rules.

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