

FEATURE HANDBOOK

NetBrain® 8.0



Contents

NetBrain Overview.....	5
1. Data Modelling.....	6
1.1 Deep Network Discovery	6
1.2 Single-Source-of-Truth via CMDB integration	6
1.3 Scheduled Network Benchmarks.....	7
1.4 Golden Network Baseline	7
1.5 Scale for Enterprise Networks and Big Data	7
2. Dynamic Map	8
2.1 Creating Dynamic Map	8
2.1.1 A-B Path Mapping.....	8
2.1.2 Search and Map	9
2.1.3 Create Maps with Smart CLI	10
2.1.4 Create Maps from Network Events and Tickets	10
2.1.5 Create Map for Hundreds of Sites All at Once.....	10
2.1.6 Pre-define Context Maps.....	11
2.2 Use Dynamic Map for Everyday Tasks	11
2.2.1 Dynamic Zoom	11
2.2.2 Intelligent Auto-Layout.....	12
2.2.3 Use Static DataView to Document Entire Network	12
2.2.4 Use Dynamic DataView to Organize Network Data	12
2.2.5 Use Network Baseline to Accelerate Root Cause Analysis	13
2.2.6 Drill-Down Actions	13
2.2.7 Use Map as Single-Pane-Of-Glass View	13
2.2.10 Export Map to Visio, Word & Excel	14
3. Runbook Automation	14
3.1 Types of Runbook Automation Actions	14
3.1.1 Ping + Traceroute.....	15
3.1.2 Execute CLI Commands.....	15
3.1.3 Overall Health Monitor	15
3.1.4 Retrieve Live Data	16
3.1.5 Compare Data	16
3.1.6 Data View	16

3.1.7 Qapp.....	16
3.1.8 Gapp.....	16
3.1.9 Execute A/B Path	17
3.1.10 Verify Application	17
3.1.11 Add Existing Runbook	17
3.1.12 Free Text	17
3.2 Use Runbook to Document Network Know-How	17
3.4 Trigger Runbook Automation by External Events	18
3.5 Advanced Automation with Qapp	18
3.6 Advanced Automation with Gapp	19
3.7 CLI Automation with Instant Qapp	19
4. Platform Expansion.....	19
4.1 Expand NetBrain to Multi-Vendor Network	20
4.1.1 Multi-vendor Driver Support	20
4.1.2 Advanced Path Support with Expandable Path Library	20
4.1.3 Expand Variables To be Tracked with Parser Library	21
4.1.4 Apply Variable Mapping to Automation	21
4.2 Integrate NetBrain with Existing Toolsets	22
4.2.1 Triggered Automation.....	22
4.2.2 Use Map as a Single Pane of Glass.....	22
4.2.2.1 Visualize Data from Multiple Sources.....	22
4.2.2.2 Integrate with Ticketing Systems.....	22
4.2.2.3 Integrate with Monitoring Systems	23
4.2.2.4 Access 3 rd Party Tools from a Map	23
4.2.2.5 Automate Advanced Diagnostics with Cisco TAC Integration	23
4.2.3 Trigger External Tools from NetBrain	24
4.2.4 Embedded Map Integration	24
5. SDN Support Module	25
5.1 SDN Mapping and Troubleshooting Automation	25
5.2 ACI Mapping and Troubleshooting Automation	25
5.2.1 ACI Overlay and Underlay Map	25
5.2.2 Diagnose the Underlay Network	25
5.2.3 Logical Structure	26

5.2.4 End-to-End Path.....	26
5.2.5 Trigger Diagnosis from APIC Event	26
5.3 NSX Mapping Automation	27
6. Change Management Module	27
6.1 Overview	27
6.2 Define Change.....	27
6.3 Execute Change.....	28
6.4 Verify Impact.....	28
6.5 Integrate with Existing Approval Processes.....	28
6.6 Change Archive	29
6.7 Ansible Task Integration	29
7. Application Assurance Module.....	29
7.1 Overview	29
7.2 Baseline Traffic Paths.....	30
7.3 Analyze Impacts to Key Traffic Paths.....	30
7.4 Monitor and Verify Traffic Paths	30
8. Additional Features	31
8.1 Create Inventory Report	31
8.2 REST API	32
8.3 One-IP Table.....	32
9. Workflow Integration with NetBrain	32
9.1 Integrate NetBrain with Troubleshooting Workflows	32
9.2 Integrate NetBrain with Security Workflows.....	33
9.3 Integrate NetBrain with Change Workflows.....	33
9.4 Integrate NetBrain with ITIL Workflows	32

NetBrain Overview

NetBrain is a network automation platform designed to support any multi-stage task on any scale network regardless of technology complexity.

There are four key use cases for NetBrain's automation:

- I. Automate network documentation via Dynamic Maps
- II. Automate network diagnostics via Executable Runbooks
- III. Enable team collaboration
- IV. Enhance existing IT workflows and toolsets with "just-in-time" automation

A typical NetBrain rollout includes four stages:

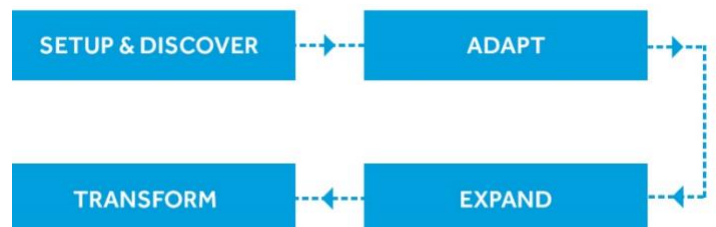
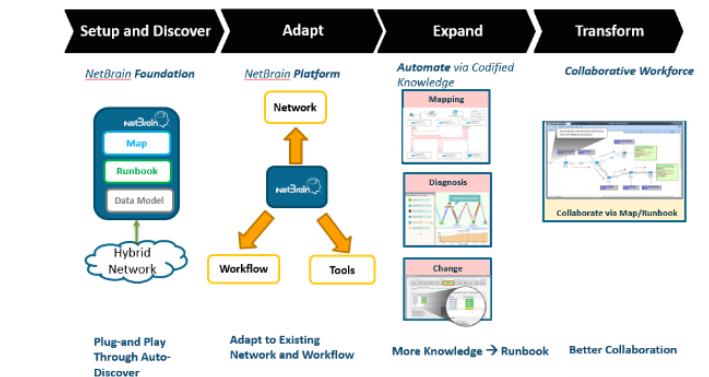
1. Setup and network auto-discovery
2. Integration to existing tools and workflow
3. Expand NetBrain with Executable Runbooks and dynamic Data Views
4. Transform IT with everyday automation and map-driven collaboration

From a high level, there are 2,000+ distinctive features of NetBrain product which can be grouped into the following categories:

1. Data Modelling
2. Dynamic Map
3. Executable Runbook
4. Platform Expansion
5. SDN Support
6. Change Management
7. Application Assurance
8. Misc. Features

In practice, NetBrain functions **as an Operating System for the total network.**

Automation Platform - Adapt and Expand with Your Network



1. Data Modelling

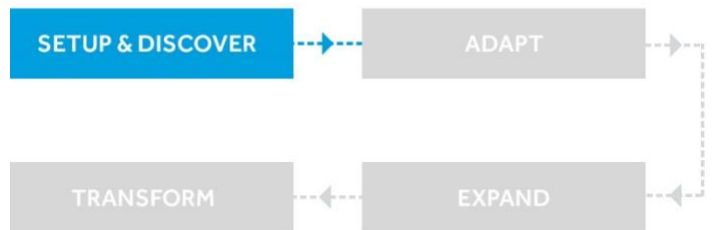
NetBrain begins by building a data model of the entire network, including the full control plane logic with more than 12,000 variables per device (e.g. route tables, BGP peers, etc.)

The building of this robust data model provides the foundation for the end-to-end visibility and programmability necessary to power network automation. Based on this model, Dynamic Map and runbook automation is enabled across any part of the multi-vendor network.

Platform technology allows this model to be extended dynamically. Out of the box, NetBrain supports network hardware from over 150+ vendors.

Network Discovery at a Glance

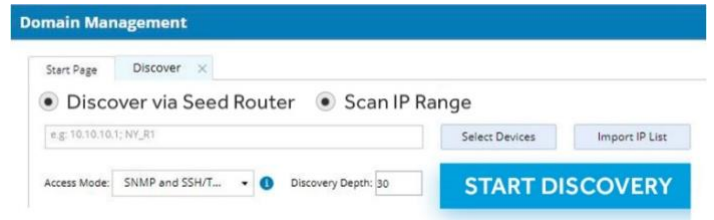
- Discover thousands of devices an hour, for 150+ vendors
- Use CLI/API/SNMP for live network analysis
- Build model for network inventory, topology, design and baseline



1.1 Deep Network Discovery

NetBrain's auto-discovery engine supports a variety of different network technologies, using live data collected via API, CLI, and SNMP. For example, traditional IP networks, SDN, and SD-WAN have different discovery methods, and the results are knitted together to build a consistent view of the entire network. **This comprehensive view enables the network operator to manage their heterogeneous network as one.**

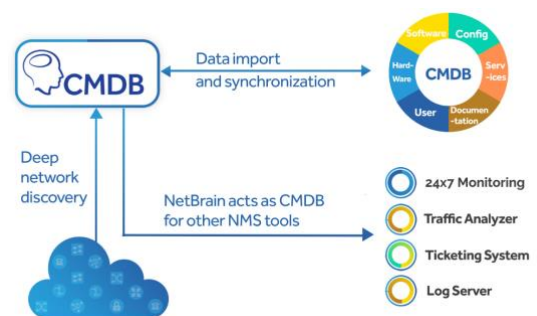
The more data fed into the discovery engine, the faster and more comprehensive the data model is. NetBrain also possesses plug-in technology to fix any discovery anomalies, if needed. Through auto-discovery, everything about a running network and its condition - including inventory, multi-tiered topology, network design and network baseline - is modeled and ready to be used with NetBrain's main features – the Dynamic Map and Executable Runbook.



1.2 Single-Source-of-Truth via CMDB integration

Customers often have a Configuration Management Database in place. NetBrain has a plug-and-play functionality with most existing CMDBs.

Through REST API, NetBrain can sync up with other data sources, serving as either Master or Slave CMDB with additional features and capabilities.



1.3 Scheduled Network Benchmarks

It is challenging to keep your network documentation updated to reflect dynamic changes. NetBrain catalogs these changes automatically by taking routine snapshots, or 'benchmarks' of the network. The basic system benchmark can regularly collect live data as baselines to build topology, calculate paths, device groups, sites and MPLS Virtual Route Tables.

The network data to be retrieved is predefined in the task, and the task will be executed on all your domain devices by default.

FREQUENCY	Start Date: 5/24/2019 00:00, End Date: unlimited, Time Zone: Pacific Standard Time Run Once: Start Time: 11:23 AM
DEVICE SCOPE	
RETRIEVE LIVE DATA	
CLI COMMANDS	
PLUGIN	

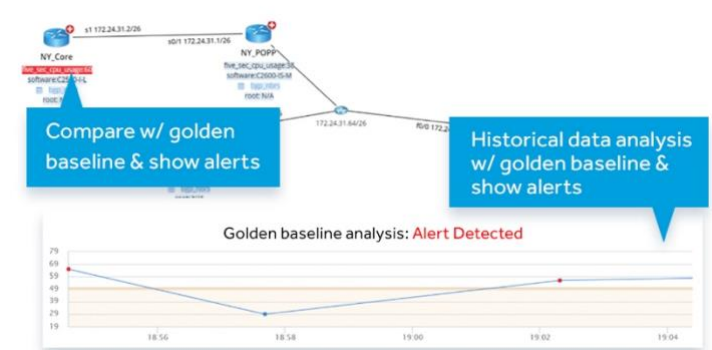
1.4 Golden Network Baseline

Over a series of network benchmarks, NetBrain develops its own understanding of healthy or nominal network conditions. As part of this process, NetBrain can discover and interpret over 12,000 variables such as cpu utilization, memory usage, routing tables, duplex settings, collisions, BGP peers, etc.

Powered by persistent AI analysis, the Golden Baseline answers the question of "what's normal" for a complex network. Once the golden baseline is complete, it can generate alerts on deviations from specified variables or patterns. It can also be used as a basis for network management analysis and troubleshooting.

This feature is utilized heavily within NetBrain's automation framework and is critical to understand "Is this expected?" during any network problem investigation.

(See section 2.2.5 for how Golden Baseline is used by Data Views.)

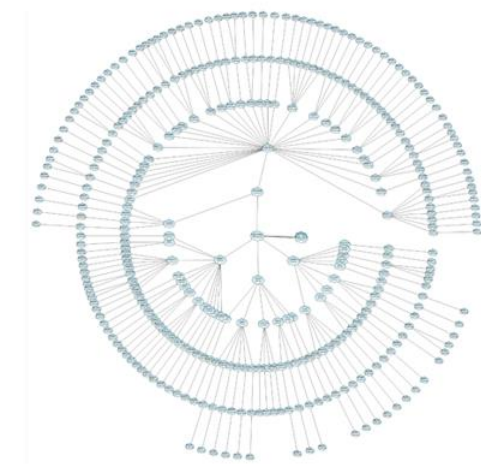


NetBrain's golden baseline alert triggering on a map

1.5 Scale for Enterprise Networks and Big Data

NetBrain is designed to handle the largest of networks, scaling to 100,000+ network nodes with thousands of concurrent users. This scalability is achieved by modular software architecture that can scale horizontally.

NetBrain can be deployed across multiple data centers and supports full disaster recovery.



The site hierarchy of a large, enterprise network

2. Dynamic Map

Dynamic Map represents the evolution of visualizing and documenting the network. Each Dynamic Map is created on-demand to help define the scope of an issue, assist in reviewing or understanding a network design, and ensure you always have accurate up-to-date network documentation.

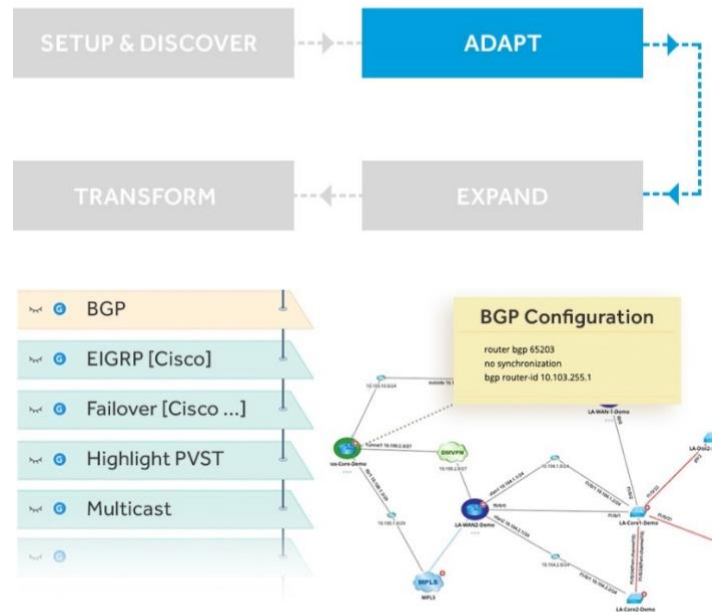
Everything about a network can be discovered and continuously documented through NetBrain's interactive media. This data includes:

- Network inventory
- Network topology (L2, L3, MPLS, IPSEC, SDN)
- Network design
- Network baseline and changes
- Data and functionality in 3rd party toolsets (via API)

Unlike static diagrams, Dynamic Maps can be created on-demand, updated automatically, and shared with full data structures intact – ensuring that your documentation is always effective and relevant.

Dynamic Mapping At-A-Glance

- Map the network on-demand.
- Map everything about a network.
- Map any data.
- Maps are updated automatically.



A Dynamic Map superimposed with device data

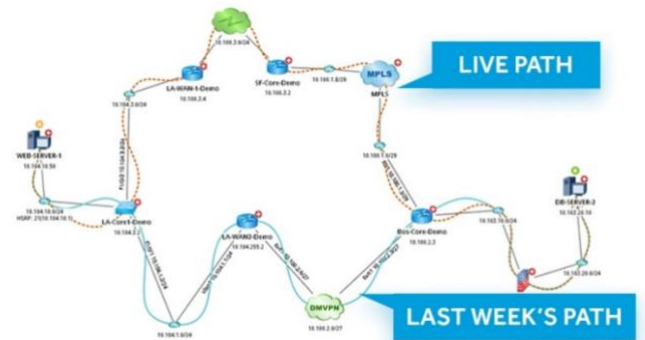
2.1 Creating Dynamic Map

With NetBrain, a Dynamic Map is the primary user interface to the network. Each unique task may require a unique map to provide the foundation for visibility and automation. Each map is typically created on-demand, through one of several methods:

2.1.1 A-B Path Mapping

NetBrain has programmed the control plane logic of hundreds of network hardware models. Through this logic, any A→B path can be calculated end-to-end, across any complex technology including:

- Live A→B Path Discovery
- Historical A→B Path Reference
- Golden Path Calculation - for determining what the “normal” network path looks like (e.g. for a given application)

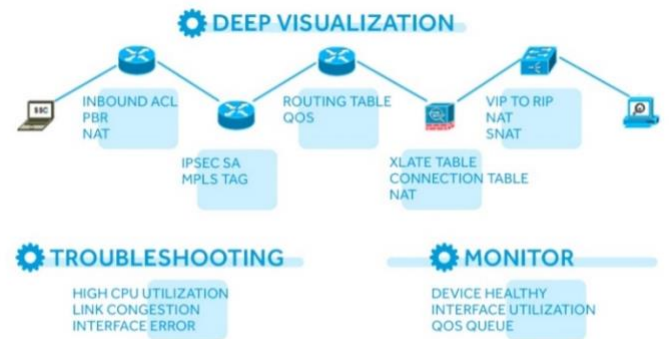


Mapping a traffic path is as simple as entering two endpoints (via IP or hostname). A hybrid L2/L3 map of the traffic flow is automatically calculated and drawn, in real time.

Path logic assess many traffic-forwarding characteristics across routers, switches, firewalls, load balancers, and more.

In addition, NetBrain's enhanced path framework will automatically calculate based on the topology dependency of the outbound interface at each hop and calculate path types such as L2, L3, IPsec VPN, VPLS, OTV or VXLAN.

This feature can be utilized to isolate the critical network components to investigate network or application problems, as part of design review projects, or to proactively assure application availability.



2.1.2 Mapping from a Search

The Search bar in NetBrain acts like a Google search for any data within your network. Search helps you leverage the power of big data to ensure you can quickly find and visualize any relevant network information. Simply entering a free text string into the bar will run a search across your domain for matching any data element.

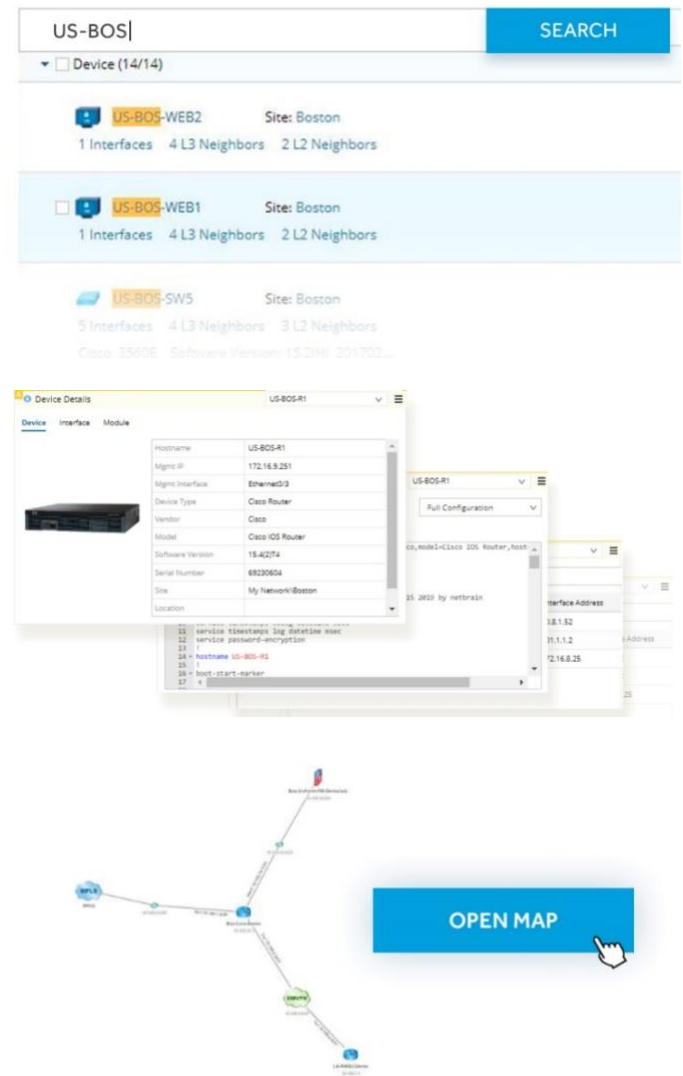
For example:

- Type hardware model number "Nexus 9000" to search for a list of existing Cisco Nexus 9k switches
- Type IOS 15.5. to see all devices that currently run this firmware
- Search "Area 0" to discover all area border routers.
- Searching for an identified SDN Application will return all overlay and underlay dependencies.

You can also combine multiple search criteria to execute a complex search, like mapping logical groups of devices, or identifying underlay/overlay devices for software-defined solutions.

Once the search bar identifies a device, you can create a map of the device and its immediate neighbors.

To expand the field of view on the resulting map, simply use the red (+) sign on each device to add its neighbors to the map..



2.1.3 Create Maps with Smart CLI

It was reported that 75% of network engineers use CLI (command-line-interface) as the only troubleshooting tool. NetBrain provides a Windows-based, Telnet/SSH tool that contains the flexibility and debug-level diagnostics of a CLI. It is capable of:

- Accessing the CLI of every device currently active on a Dynamic Map
- Creating a Dynamic Map directly from the CLI console
- Documenting activities inside CLI directly into the map, for sharing with peers
- Comparing the output of any live CLI command to history



2.1.4 Create Maps from Network Events and Tickets

An effective map is essential when a network problem or change occurs. NetBrain can autonomously create a Dynamic Map of the problem area at the time of the incident via API integration with existing tools.

This is referred to as “triggered automation” - where any incident, ticket, or alarm can trigger an API call into NetBrain. Its input parameters are used to trigger map creation.

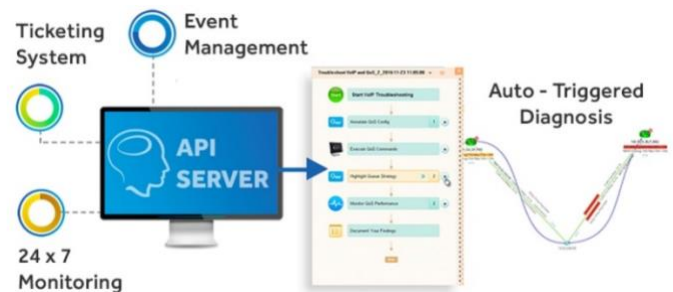
An Executable Runbook (See Section 3) can also be executed at the same time to automate the initial diagnosis of the issue.

Triggered Dynamic Maps enrich each ticket with a contextual map and collected diagnostics, which can significantly reduce the time spent troubleshooting and improve organizational MTTR.

Typical events which may trigger a map creation include:

- Network Alarms (e.g. from SolarWinds)
- Incident Tickets (e.g. from ServiceNow)
- Security Event (e.g. from Splunk)
- Device Changes

For more information, refer to Section 3.4 (Triggered Runbooks) and Section 4.2.1 (Triggered Automation)



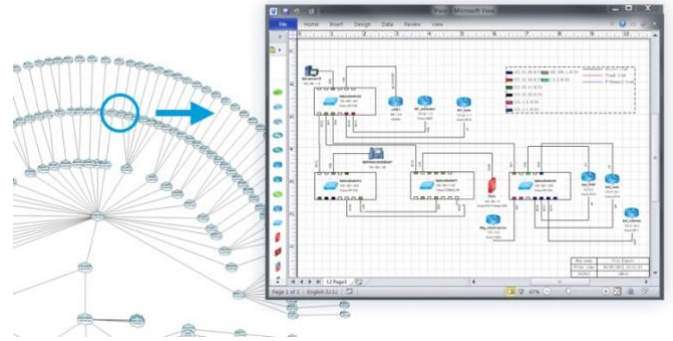
How would you like to create the map?

A screenshot of a dropdown menu with the title 'How would you like to create the map?'. The menu options are: 'Open Existing Map' (selected and highlighted in blue), 'Map Device and Its Neighbors', 'Open Site Map of the Device', and 'Map a Path'. A mouse cursor is pointing at the 'Open Existing Map' option.

2.1.5 Create Map for Hundreds of Sites All at Once

Sometimes you need documentation for an existing site or branch office. NetBrain can create these maps automatically. Once NetBrain has discovered and created a digital twin of your network, it can also automatically identify different geographic sites within your environment.

The logical relationships between sites can be visualized from a single overview map (e.g. North America → United States → Boston → Boston DC 1). You can then drill into any site by double-clicking the site name to see the L2 or L3 relationships of devices within that site.



2.1.6 Pre-defined Context Maps

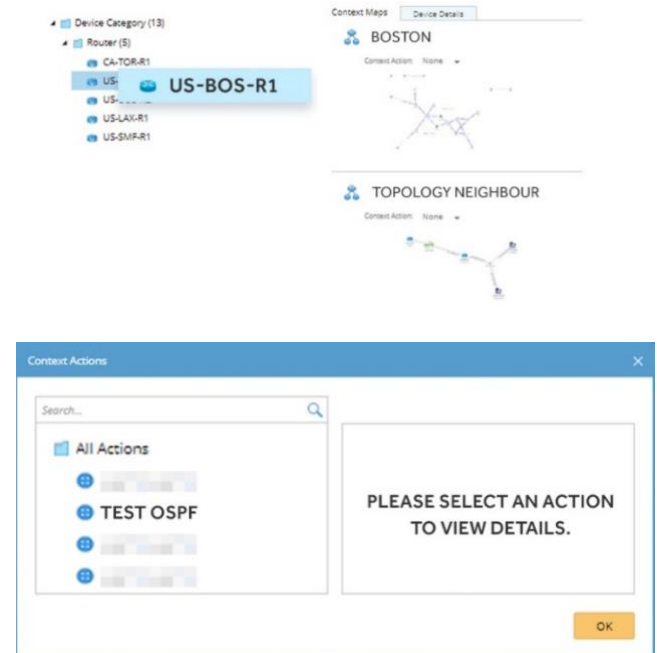
Site maps are one example of a type of “context” map. You can access these predefined maps and immediately execute actions on top of them.

Selecting a device from the Context menu provides a list of maps that the device is associated with (e.g. a geographic site, an application path, or a list of vulnerable devices that require an OS upgrade). NetBrain provides several built-in context maps for devices, such as:

- IPv4 L3 neighbor topology
- IPv6 L3 neighbor topology
- L2 neighbor topology
- Geographic Sites
- Device Groups

Every context map can have a context action associated with it, and this can be programmed through the Context Action Manager.

For example, if you have a context map of your backbone routers, you could have a pre-defined context action to highlight routing protocols on the device.



2.2 Use Dynamic Map for Everyday Tasks

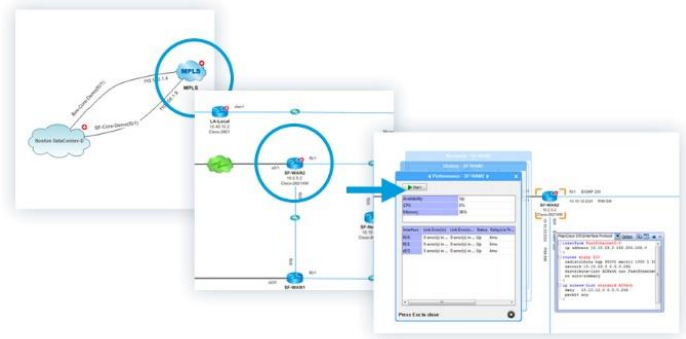
Once you have mapped a specific part of the network, that map can be used as the user interface for automating network operations – e.g. for troubleshooting, pushing a change, or responding to a cyber threat.

There are several tools built into each Dynamic Map to help you access information quickly.

2.2.1 Dynamic Zoom

One element that makes NetBrain maps dynamic is the amount of detail present on each device. Each icon on a map is actually a smart object, with potentially thousands of attributes associated with it. As a user zooms in on the map, more configuration data will be presented to the user beneath the device and on the links.

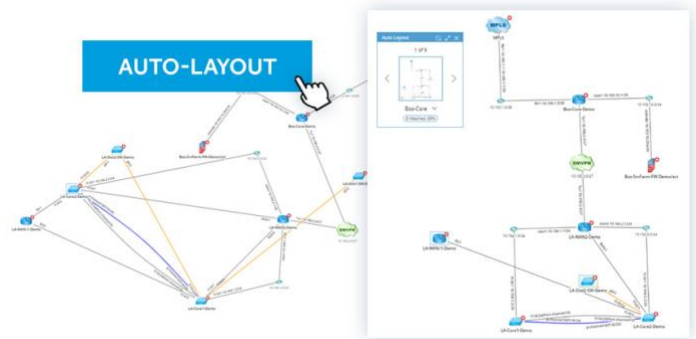
If a user hovers over the network element, a configlet will appear with the corresponding section of the device's configuration file. This explains where the link information comes from.



2.2.2 Intelligent Auto-Layout

When new elements are extended to the Dynamic Map, keeping the result in order is important.

NetBrain provides auto-layout topologies that will organize the devices into a clearly structured flow, such as hierarchical, orthogonal, or a custom style that the user creates themselves.

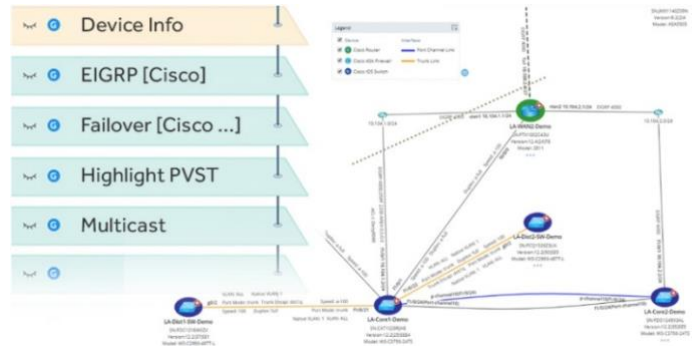


Organizing the map into a pre-defined topology template.

2.2.3 Use Static Data View to Document Network Design

Static Data Views are containers of device information that can be used to document and share data across different maps. This is particularly useful for decoding network design, such as identifying active routing protocols.

When a map is loaded, all static data views related to the devices are displayed within the Data View toolbar.



2.2.4 Use Dynamic Data View to Organize Any Network Data

Dynamic Data Views are customizable data containers, which can serve as an engineer's primary tool for scaling diagnostics across an entire map, network, or site.

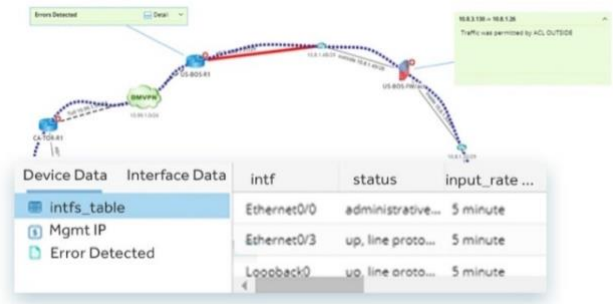
Dynamic Data View Templates offer users the ability to visualize network data on a Dynamic Map, compare data with established network benchmarks, and prompt alerts or drill-down actions.

For example, with access to a Data View Template, a user could highlight all routing protocols, and create alerts wherever BGP is



not configured. A user could also overlay QoS policies per device, and drill down to each interface to see what traffic is being matched, and where.

Dynamic Data Views represent codified operational expertise that can be written once and executed anywhere, providing the collaborative framework to ensure that documented operational handoff occurs with any new technology or design implementation.



A Data View executed on a Dynamic Map

2.2.5 Use Network Baseline to Accelerate Root Cause Analysis

Each Dynamic Data View can also utilize NetBrain’s Golden Baseline as part of its execution. This can quickly reveal anomalies in network conditions related to the variables within the Data View.

When discrepancies are found, users will not only be given the live variable information but also historical data for the variable counter. This can be used to identify when an issue began.

Network Baseline assures that you will always know of any network deviation from healthy or nominal conditions. Over time, it is recommended to add more and more data variables to the golden baseline (e.g. after lessons learned in troubleshooting)

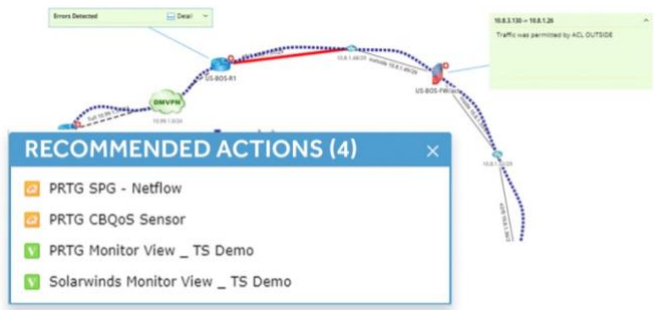
Golden Baseline Analysis: Alert Detected



2.2.6 Drill-Down Actions

Within a Data View, users can also define drill-down actions that can be used for further diagnostic efforts. These tasks can be immediately added to the map and executed once they appear in the recommended actions pane.

This provides another way for senior engineers to digitize their expertise and give actionable insights – providing next steps for junior operators that empower them to work more independently and scale troubleshooting automation capabilities.



A Data View recommending next steps

2.2.7 Use Map as Single-Pane-Of-Glass View

Data View Templates can be configured to interact with your third-party IT tools, via API. This enables you to pull any relevant data onto a Dynamic Map, minimizing the need to log into multiple tools to find the right information.

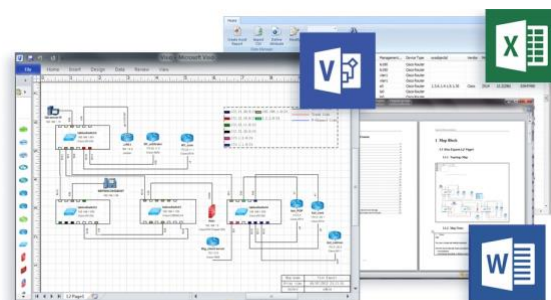
With NetBrain, you can truly map and visualize any and all data. In this sense, NetBrain turns its Dynamic Map into a Single Pane of Glass, acting as the primary user interface for accessing any network data.



2.2.8 Export Map to Visio, Word & Excel

Users can save their existing Dynamic Map, and export it into Visio format with the click of a button. The amount of detail on the map at the time of the export will be reflected in the file.

Exports to Microsoft Word can also contain all associated design and inventory data with the map including diagnostic data, full configuration files, routing tables, etc.



3. Runbook Automation

Executable Runbooks are interactive panels within each Dynamic Map. They contain actions which can perform complex network tasks, providing the user:

- Command Line Automation
- Enhanced Incident Collaboration
- Streamlined Knowledge Sharing

Using both new and familiar tools, any network task can be automated into a few clicks.

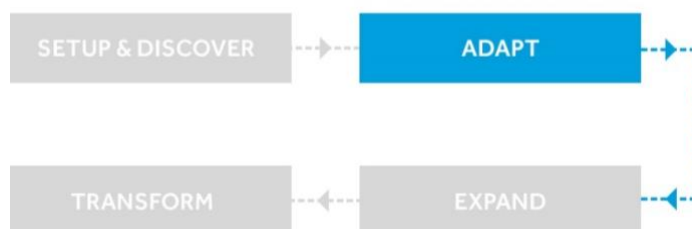
NetBrain's automation tasks are designed to be vendor-agnostic, so the same action can be executed across heterogeneous, multi-vendor networks without incident.

Executable Runbooks can leverage datasets from third-party tools, enabling users to visualize information from all their existing tools into its Dynamic Map.

Once Runbooks have been executed, the results can be shared with anyone else within the organization, facilitating collaboration and enabling higher level engineers to encode their advanced knowledge into reusable tools.

Executable Runbooks At-A-Glance

- Automate Network Operations at a massive scale
- Effortlessly collaborate with multiple engineers on the same Dynamic Map
- Share and save network insights as groundwork for future troubleshooting workflows.

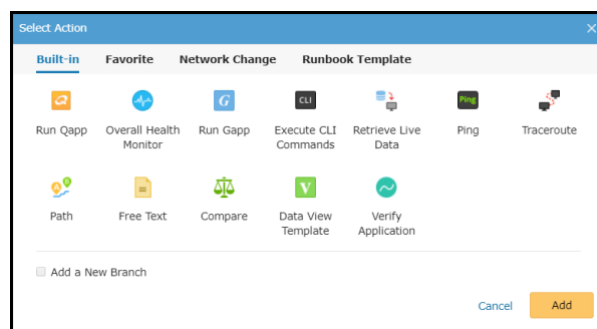


An Executable Runbook your team may use in their workflow.

3.1 Types of Runbook Automation Actions

Executable Runbooks provide automation tasks within a visual programming environment – engineers can automate their manual network tasks at scale and get to the heart of their problems more quickly.

Note: There are additional runbook actions under the 'network changes' category that will be covered in *Section 6: Change Management*.



3.1.1 Ping + Traceroute

Two possible actions in a runbook are commands most engineers are familiar with – Ping and Traceroute.

NetBrain will log into the CLI of whichever device is being utilized, execute the command with the appropriate parameters, and display the output in a pane for the user to verify.



3.1.2 Execute CLI Commands

NetBrain can execute individual CLI commands on any number of devices inside of its Dynamic Map and display the output via its execution log so the user can verify results.

NetBrain logs into each of these devices to perform CLI commands simultaneously, removing the need for users to hop through individual devices to troubleshoot issues.

Multithreaded and real-time, this capability is a critical component in scaling troubleshooting automation.



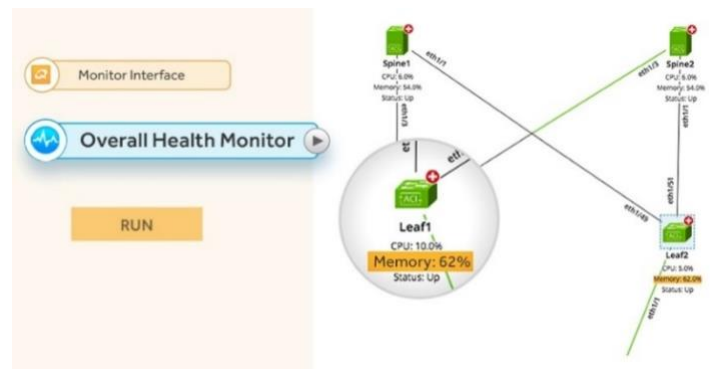
3.1.3 Overall Health Monitor

The overall health monitor is a pre-loaded application that performs a basic diagnosis of every device on a Dynamic Map.

Its purpose is to identify common causes of device failure, eliminating time spent manually troubleshooting – one of the more time-consuming tasks in NetOps is the initial investigation to rule out possible root causes.

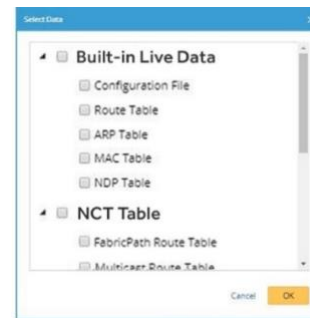
Specifically, the OHM analyzes and highlights the following variables:

- CPU Utilization
- Memory Utilization
- Interface up/Down Status
- Input/Output Traffic Utilization



3.1.4 Retrieve Live Data

While NetBrain auto-updates at set intervals, via recurring benchmarks, it can also retrieve a wide range of live data on-demand from any network devices active on a Dynamic Map.



3.1.5 Compare Data

Between 30% and 50% of outages are caused by a network change. Therefore, understanding *what's changed* is half the battle during troubleshooting. NetBrain's benchmarking process will collect and capture any pre-defined data, on a specified schedule. Using the 'Compare' tab, you can put live and benchmarked data side by side to see what's changed.



3.1.6 Data View

Data Views are containers of device information used to facilitate and structure the troubleshooting process across a Dynamic Map. By executing a Data View from the toolbar, it's also recorded within the Runbook. Data Views can also be added directly to the runbook from the action bar.

[See section 2.2.4](#) to learn more about Data Views



3.1.7 Qapp™

Qapps are automation tasks that you can execute within NetBrain. They retrieve and parse CLI commands from devices active on the Dynamic Map, and visualize them for the user. Qapps can be created using NetBrain's visual programming environment.

[See section 3.5](#) for more information







3.1.8 Gapp™

Gapps are sequences of multiple Qapps that use a branching logic flow – these are used for complex tasks and for scheduled network checks. The output of one Qapp is used to filter the input of the next Qapp in the sequence. For complex analysis tasks, this makes execution much more efficient.

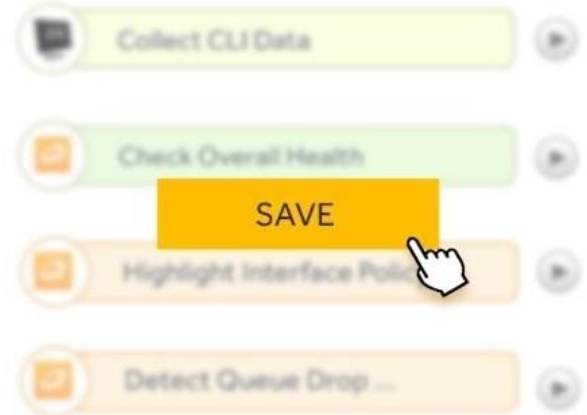
[See section 3.6](#) for more information



<h3>3.1.9 Execute A/B Path</h3> <p>Users can execute an A/B Path between two points and have NetBrain document all of the network hops between the source and destination. This can also be done with historical data, as a means of comparing current network status to a benchmark.</p> <p>See section 2.1.1 to learn more about A/B Path Calculator</p>	
<h3>3.1.10 Verify Application</h3> <p>New in NetBrain v8.0 is NetBrain’s Application Assurance Module, which enables users to save multiple A/B paths in the context of business applications, as well as perform health checks.</p> <p>Use this feature to ensure your applications are following desired paths throughout the network.</p> <p>See section 7 to learn more about the Application Assurance Module</p>	
<h3>3.1.11 Add Existing Runbook</h3> <p>Creating and sharing runbooks is an effective way to share network know-how. Users can add existing Runbooks to a troubleshooting effort in-progress. If the initial diagnosis has revealed, for example, that there is a QoS issue, then users can add a QoS runbook with specific Qapps, DVTs and other automation tasks that will help them identify the root cause.</p> <p>See section 3.2 to learn more</p>	
<h3>3.1.12 Free Text</h3> <p>Users can also add free text notes on the map, in case they need to leave specific instructions for future users, or just want to document some information that they discovered in the process of troubleshooting. For example, if a user finds increasing CRC errors on an interface, the next recommended action “check for bad cable” could be shared as a Free Text node to aid any engineer troubleshooting when that symptom occurs.</p>	
<h3>3.2 Use Runbook to Document Network Know-How</h3> <p>As Network Tasks are executed on a Dynamic Map, the Runbook is automatically populated with nodes and results that can be accessed by any other engineer.</p> <p>This enables them to share maps that contain the exact steps performed by previous engineers, reducing duplication of efforts and creating a sharper focus to the nature of the problem.</p>	

In addition, once users create runbooks for specific processes, they can implement those runbooks as recommended actions in order to share their expertise with other engineers and departments, empowering junior operators to work more independently.

In this sense, NetBrain helps make knowledge executable, by encoding employee expertise into shareable documents that can be rerun by anyone, on any network.



3.4 Trigger Runbook Automation by External Events

Just as NetBrain can trigger a Dynamic Map in response to a network alarm (see section 2.1.4), NetBrain is also capable of executing a Runbook across the problem area at the same time.

A power user can pre-define the runbook that should be executed within NetBrain's API Stub, and when a map is triggered the responding engineer will also receive the results of the initial diagnosis that NetBrain was instructed to perform.

This capability enables users to fully automate the first response of their Network Operations workflow, offloading a lot of the mundane and manual tasks involved with troubleshooting onto a machine that can provide diagnostic data at any time of day, at the moment an event occurs.



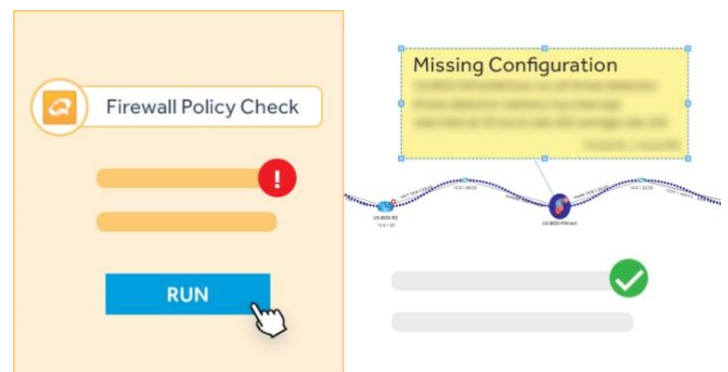
3.5 Advanced Automation with Qapp™

Designed to replace in-house scripts and automate virtually any network task, NetBrain's Qapp technology allows users to create on-demand automation that can be written once and executed anywhere regardless of vendor.

Qapps are customizable programs that pull data from network devices and help engineers draw meaningful insights from the results.

Examples of tasks a Qapp can perform include:

- Checking routing information
- Detecting QoS Queue Drops
- Running security and compliance checks based on configuration data



3.6 Advanced Automation with Gapp

Gapps are advanced automation tasks, able to incorporate multiple Qapps together to handle more complex tasks within the network.

Gapps string Qapps together with if/then logic, determining whether a Qapp in sequence will execute based on the result of the upstream Qapp.

Gapps help narrow down problem scopes with multi-stage automation and are particularly useful for scheduled tasks – their logic enables complex tasks to be executed without the need for a human operator.



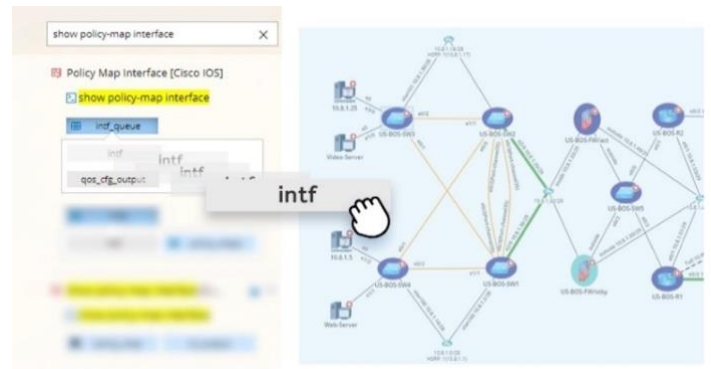
3.7 CLI Automation with Instant Qapp

If you don't have the exact Qapp for your problem, you can instantly create a Qapp from variables associated with specific CLI commands.

You start by entering a CLI command, or any variable which is part of a CLI output, or which has already been collected via API. After you find the data point you're looking for, simply drag appropriate variables from the search results to the map. The system will retrieve and visualize their values, for each device on the map, from the live network immediately.

These values are accessed from CLI parsers in your library, looking for elements inside of CLI output like device properties, interface properties, traffic errors – or anything else that can be pulled from any device's live-access method.

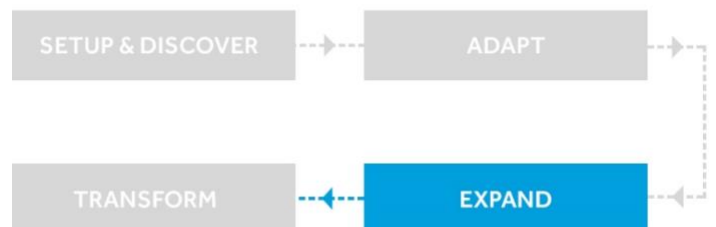
Once the Instant Qapp has been run, you can save it as a regular Qapp for later use.



4. Platform Expansion

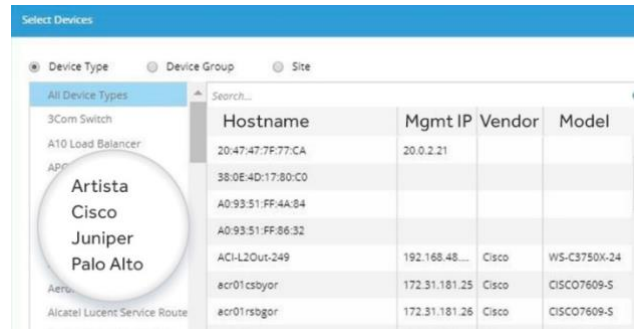
NetBrain's Automation platform is the industry's first scalable network software that can adapt to any workflow, any network, any data, and any tool. NetBrain is a platform for collaboration and is expandable through the following methods:

- Multi-vendor models and driver support
- Rich API Framework
- Integration with 3rd party tools
- Scalable to any size network



4.1 Expand NetBrain to Multi-Vendor Network

Today's networks are made up of many vendors and a mix of both traditional and software-defined technologies. Having end-to-end visibility, regardless of vendor, is crucial. With NetBrain, teams can manage complex infrastructure in a single context, using a Dynamic Map as the user interface to the network.



Hostname	Mgmt IP	Vendor	Model
20:47:47:7F:77:CA	20.0.2.21		
38:0E:4D:17:80:C0			
A0:93:51:FF:4A:84			
A0:93:51:FF:86:32			
ACI-L2Out-249	192.168.48...	Cisco	WS-C3750X-24
ac01csbyor	172.31.181.25	Cisco	CISCO7609-S
ac01rsbgor	172.31.181.26	Cisco	CISCO7609-S

4.1.1 Multi-vendor Driver Support

New device types and vendor models can be easily integrated into NetBrain's multi-vendor framework via new device drivers.

Device Type refers to a group of devices categorized by the operating system for centralized management. Devices that have the same version or similar version operating systems are defined as one device type, to share the same supported feature set.

Device drivers define how to retrieve and parse configuration files, route tables, inventory information and other data tables. NetBrain supports 100+ built-in drivers. Users can add and define the device driver properties manually or import from a file.

In order to add new device drivers, users simply define the new device type, what methods it should use to retrieve data, and specific port numbers for data collection.

Data can be easily retrieved through the following methods:

- **Live Access** – retrieve data from standalone devices via CLI, SNMP or the Global Data Repository (GDR) to retrieve device, interface properties, configurations, route table, MAC and ARP table.
- **Tech spec:** retrieve and parse the data from a controller such as ACI, NSX, Meraki or other controllers.



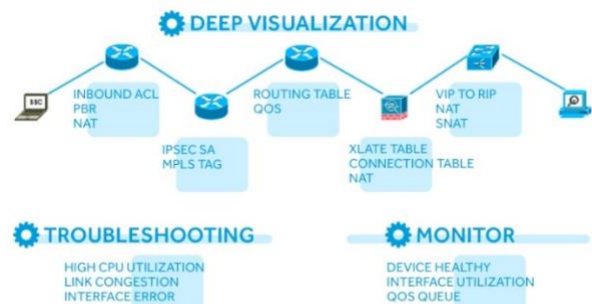
DEVICE TYPE		Device Driver	Vendor Model
ID	DEVICE TYPE	STATUS	CATEGORY
1004	End System	✓	End System
102	Juniper Router	✓	Router
1021	Unclassified Device	✓	Unclassified Device
1025	Cisco WAP	✓	WAP
10327	Dell Networking Switch	✓	L3 Switch
10336	MikroTik	✓	L3 Switch
10339	Xirrus Wireless Array	✓	WAP
10352	Adtran	✓	L3 Switch



4.1.2 Advanced Path Support with Expandable Path Library

NetBrain can discover and map any SNMP reachable devices. The device driver will determine what operations are supported. The high-level operations that are supported are as follows:

- **Tier 1:** Basic SNMP Monitoring
- **Tier 2:** Retrieve live data and analysis, L3/L2 Topology + Traffic Path Discovery
- **Tier 3:** Data Views, special vendor features and path technologies



Unlike traditional path tools, [NetBrain's A/B Path Calculator](#) feature emulates real packet forwarding to analyze how traffic flows across the network. NetBrain provides Tier 3 support for special path technologies across different vendors when calculating a path.

ROUTER				SWITCHES			FIREWALLS			LOAD BALANCER		
Device Type	ACL	PBR	NAT	SNAT	MPLS VPN	IPsec VPN	Pure MPLS	GRE VPN	MPLS TE	Virtual Router	Fabricpath	Policy
Alcatel Lucent Service Router	✓	✓			✓				✓			
Cisco IOS XR	✓				✓		✓		✓			
Cisco Router	✓	✓	✓		✓	✓	✓	✓	✓			
Juniper Router	✓	✓	✓		✓	✓		✓	✓			
Viptela						✓						

4.1.3 Expand Variables To be Tracked with Parser Library

NetBrain can collect and analyze data from many different data sources including CLI automation, API, and SNMP. In total, there are over 12,000 possible data points which NetBrain can analyze for any one device.

Parsers are specialized files that help make sense of the raw, unstructured output of a device's command line interface. With foreknowledge of how a specific device will reply to various CLI commands, NetBrain can identify specific variables within the output that will be valuable to the engineer.

NetBrain leverages its extensive library of multi-vendor CLI parsers in its Qapps – in effect, all automation is essentially an enhanced expression of CLI parsers, as they use identical data. For example, when a Qapp is activated on a Dynamic Map, NetBrain procedurally logs into each device, parses the CLI output, and visualizes that data for the engineer.

Cisco

Parser 1 (CLI)

Var1

Parser 3 (CLI)

Var3

Parser 4 (SNMP)

Var4

Juniper

Parser2 (CLI)

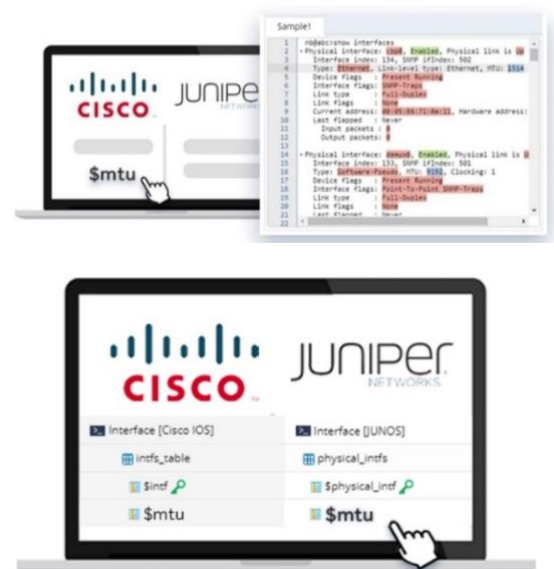
Var2

4.1.4 Apply Variable Mapping to Automation

Variable mapping translates parser variables from one vendor or operating system to another. NetBrain comes with many customizable parsers from different device vendors. Variables that can be mapped include CLI, API and SNMP data.

Variable mapping is applied in many automation functions. This key feature allows engineers to write automation for the vendor platform they are familiar with and NetBrain will automatically translate it to be run on other vendor platforms. These mappings can be applied instantly, on-demand, scheduled, with [Qapp](#), [Gapp](#) or [Instant Qapp](#).

Engineers can easily expand support for multi-vendor environments by simply matching data variables from multiple vendors to a common variable. When variables are mapped together from different vendors, NetBrain will automatically pull the data using the correct syntax regardless of vendor.



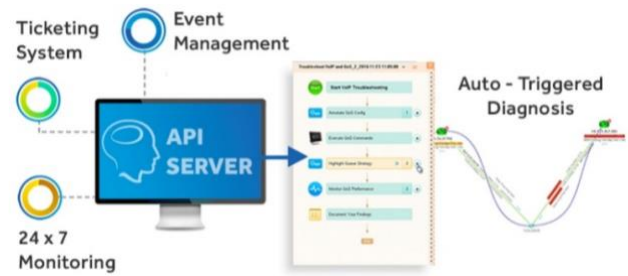
4.2 Integrate NetBrain with Existing Toolsets

4.2.1 Triggered Automation

NetBrain provides an API interface for third-party systems to trigger NetBrain maps and runbooks in the event of a network issue. Event-triggered diagnosis include operations such as:

- mapping problem devices
- collecting live network data
- returning a map link to the third-party system once the trigger is completed

Triggered automation helps you implement NetBrain into your existing Network Operations workflows to scale troubleshooting automation.



4.2.2 Use Map as a Single Pane of Glass

Enterprise network teams use a myriad of tools to manage and troubleshoot their networks. A Dynamic Map correlates and consolidates data from multiple tools and systems.

It unifies all these separate data silos into a single, contextual view; a single pane of glass that serves as a shared analytics console

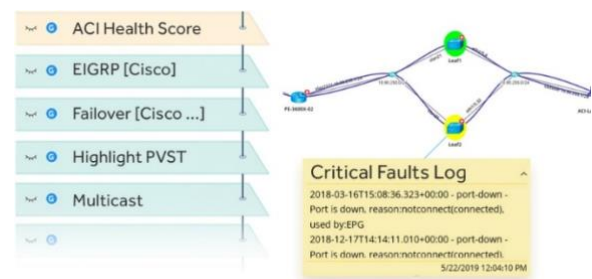
Map and analyze any network data from any source to ensure that you have all the information needed to automate and fully diagnosis your network.



4.2.2.1 Visualize Data from Multiple Sources

As systems and tools become more complex and oftentimes fragmented, finding one piece of data becomes tedious and is often a manual process of issuing CLI commands and jumping between different disparate tools.

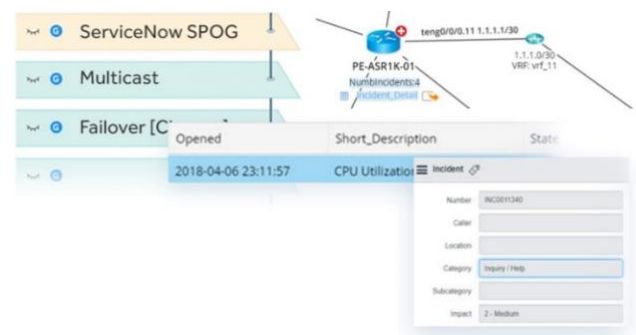
Whether it's visualizing maintenance information or the status of open tickets, any third-party data can be visualized on a Dynamic Map through pre-defined layers.



4.2.2.2 Integrate with Ticketing Systems

Integrate NetBrain with ticketing systems and pull any related data from the ticket such as open/pending cases related to specific devices or if there are similar issues for other devices on the map.

Having one place to check ticketing information based on NetBrain topology speeds up issue verification and troubleshooting by consolidating data silos.



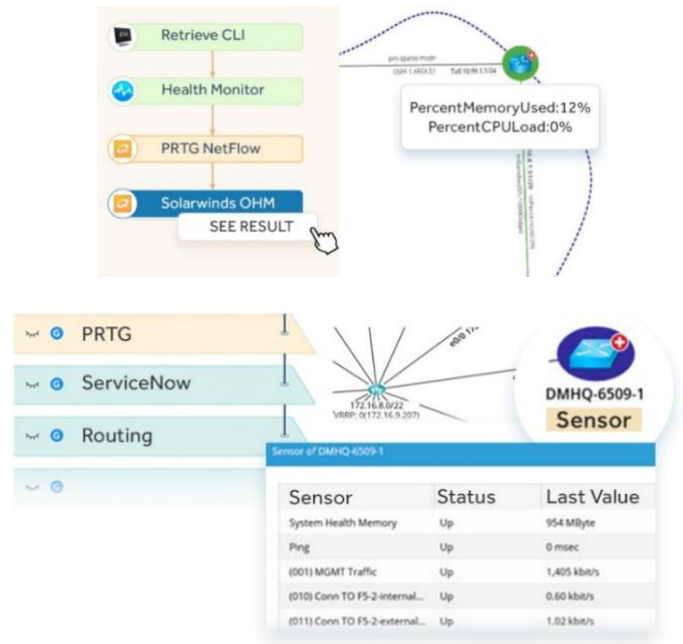
4.2.2.3 Integrate with Monitoring Systems

The process of investigating an alert is often a slow and manual process. Network teams need in-depth visibility and proactive monitoring to maintain optimal network operations.

Today's 24x7 monitoring systems monitor the network for issues and raise alerts when conditions deviate from baselined network conditions.

NetBrain can be integrated with 24x7 monitoring solutions to visually document the results of the monitoring solution on a Dynamic Map.

This seamless integration and visual representation of the problem accelerates troubleshooting and helps network teams reduce MTTR.



4.2.2.4 Access 3rd Party Tools from a Map

NetBrain is a shared console and launching point for teams to visualize, collaborate, identify and resolve any network, security, or application issue.

NetBrain enhances operational workflows and the value of existing third-party tools by linking all of them together via an API framework.

NetBrain able to ingest data from 3rd party systems and display on a Dynamic Map and serve as a single pane of glass for all tools without the “swivel chair” effect.

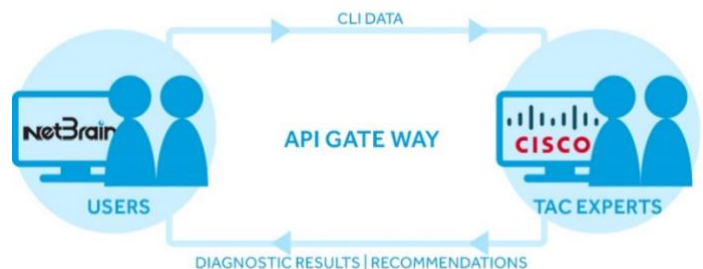
Users don't need to be familiar with the different features and pages of a 3rd party tool. NetBrain can be configured to point directly to the relevant data, straight from the map.



4.2.2.5 Automate Advanced Diagnostics with Cisco TAC Integration

You can integrate NetBrain with Cisco TAC to leverage thousands of scripts from Cisco's TAC experience.

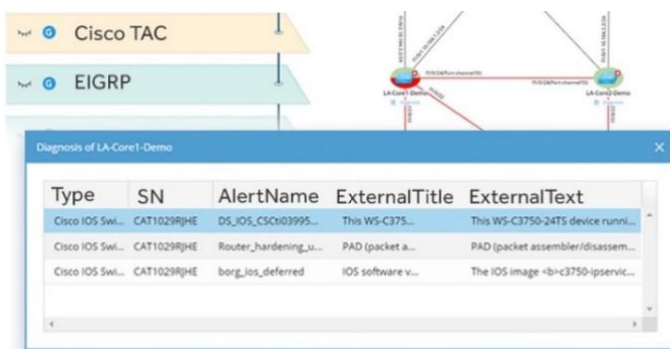
This helps leverage Cisco TAC's existing know-how while also streamlining the analysis of any data via automation. This unique integration brings the power of NetBrain automation with the intelligence of Cisco TAC.



With one click, NetBrain can gain access to Cisco’s intellectual capital via API by issuing and passing on the results of CLI commands such as “show technology” through a secure API link to TAC.

Once it’s been collected, the data will then be passed through hundreds of automated scripts built from knowledge gained from Cisco TAC cases. TAC will analyze the outputs automatically and send back a list of recommendations for each device.

This powerful integration leverages 20+ years of TAC experience to diagnose, troubleshoot and potentially resolve issues directly through NetBrain’s Dynamic Map.

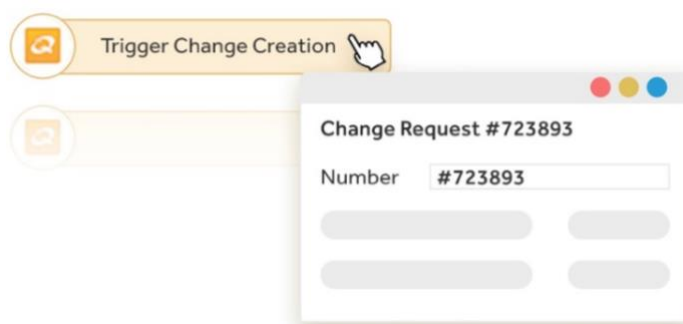


4.2.3 Trigger External Tools from NetBrain

Not only can NetBrain ingest data from 3rd party systems, it can also trigger functionality on a 3rd party system, such as creating a new change request on their ticketing system.

In this example, once this is complete, this ServiceNow request is visible from Dynamic Map.

This feature allows NetBrain to act as a central command console for all of their relevant 3rd-party tools,

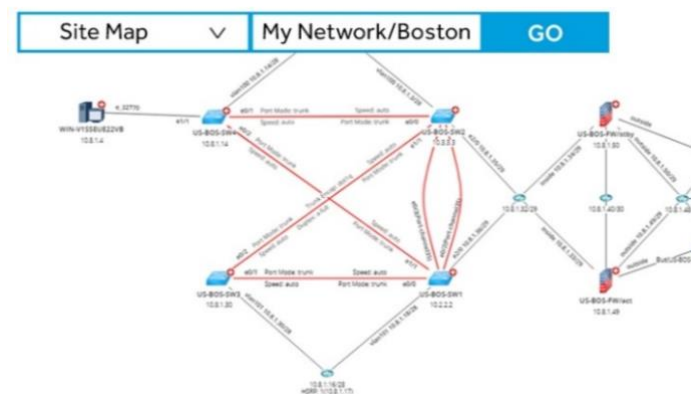


4.2.4 Embedded Map Integration

Many service providers and enterprises offer remote portals, which integrate with different network management systems to provide users with a single point of read-only access to necessary resources.

NetBrain also provides the ability to embed Dynamic Maps directly into portals by utilizing REST API to query NetBrain Map data.

With this resource, users can access Dynamic Maps via their provider’s portal, apply data views, browse various map pages, and calculate critical paths in their environment.

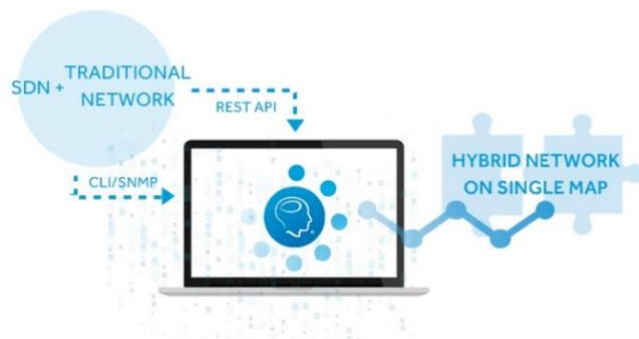


5. SDN Support Module

5.1 SDN Mapping and Troubleshooting Automation

NetBrain's Dynamic Mapping and automation platform provides network teams with end-to-end visibility and automation across hybrid networks. With NetBrain you can use the same set of tools to understand and manage your software-defined networks as you use to manage the rest of your network.

NetBrain supports software-defined technologies, such as Cisco ACI and VMware NSX, utilizing a Restful API framework to discover the software-defined devices through their central controllers.



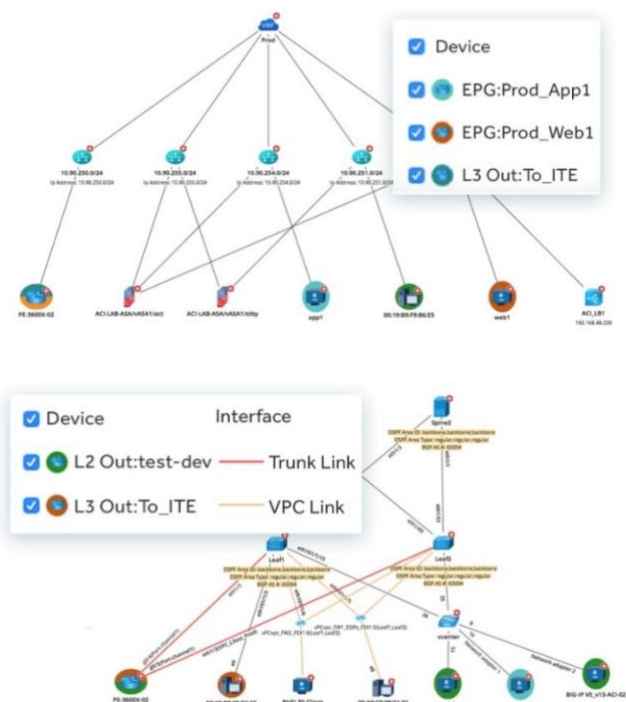
5.2 ACI Mapping and Troubleshooting Automation

5.2.1 ACI Overlay and Underlay Map

NetBrain helps teams understand ACI-enabled networks with overlay and underlay maps. These maps allow you to see what devices, VRFs, endpoint groups and endpoints are part of your ACI fabric.

Overlays provide a layer of software abstraction to allow multiple discrete, separate, virtualized network layers that run on top of the underlay network. Overlays separate the location of the device or endpoint from its identity. Endpoints in your network are identified by a tag allowing them to be located anywhere in the network structure simply by its tag.

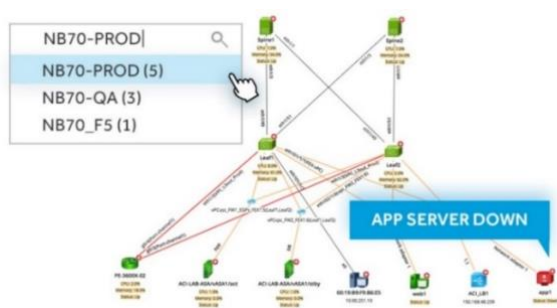
All these layers of abstraction, virtualization, new applications and services overlaid on top of the underlay network are putting more demands on network teams to understand and decode the network design. The ability to visually represent information about the entire network seamlessly, regardless of technology and drill down to the corresponding physical components during troubleshooting is crucial.



5.2.2 Diagnose the Underlay Network

NetBrain can help you abstract and maintain clear visibility of the application context for each individual device. Using NetBrain's search function, you can quickly locate an application context by simply searching for an internal IP address of a webserver.

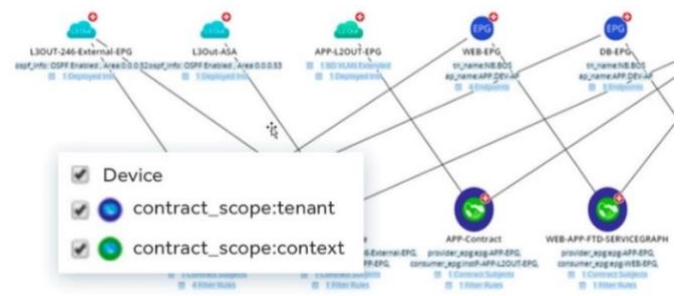
Without this capability the engineer would have to manually troubleshoot hop by hop through the traditional an ACI network to isolate the problem which could be very time consuming.



5.2.3 Logical Structure

NetBrain's Logical Structure visualizes different endpoint groups, switches, firewalls, and contracts associated with the application.

This is very useful when analyzing the SDN infrastructure supporting a specific application, as users can quickly detect underlying hardware errors that may be translating into application issues.



5.2.4 End-to-End Path

With the high degree of abstraction, complex traffic flows and admins being able to deploy new applications, services and virtual infrastructure in minutes, network teams are being challenged to meet the same SLA times and MTTR with all the new complexities of managing a hybrid network with limited visibility into the entire infrastructure.

Engineers are typically faced with troubleshooting a slow application and the troubleshooting workflow is often a time-consuming process.

NetBrain's powerful [A/B calculator](#) will map the flow of any application traversing both ACI and non-ACI environment. To diagnose network slowness, you need to understand the flow of application traffic. NetBrain can map both L2 and L3 application paths based on live or baselined data.

NetBrain emulates real packet forwarding to analyze how traffic flows across the network and considers deep network protocol analysis within your network and visualizes results on the map.



5.2.5 Trigger Diagnosis from APIC Event

NetBrain can be used in triggered mode to perform fully automated diagnostic procedures in real time without human intervention. This means when an APIC controller detects an event such as an interface status change, it will send out notification via Restful API.

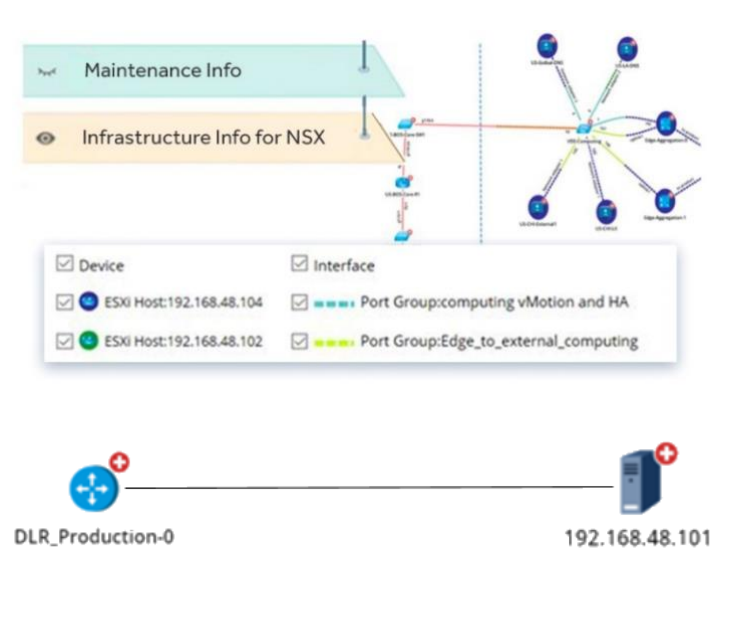
NetBrain can be configured to listen to this event and immediately trigger the generation of a map, run a sequence of customizable diagnostic steps in a pre-defined Runbook. This Runbook will capture all the data analytics in real-time and save the results with the map, giving the engineer a head-start with the troubleshooting process.



5.3 NSX Mapping Automation

NetBrain’s deep discovery and modeling engine creates a data model that serves as a foundation for automation, analytics and workflow enhancement for operational IT Tasks. NetBrain makes it possible to quickly understand and support the deployed heterogeneous infrastructure in the following aspects:

- **Map NSX Alongside the Traditional Network** – Obtain accurate and up-to-date visibility into the NSX environment, and the external network it is connected to.
- **Visualize Data from Multiple Sources on a Map**
 - Turn on and off layers of information with Data View, including data from 3rd party IT management solutions.
- **Understand the Mapping Between Virtual and Physical Components**
 - NetBrain can help you abstract and maintain clear visibility of the virtual object to physical server mapping.



6. Change Management Module

6.1 Overview

NetBrain’s Change Management module is a comprehensive solution for controlling a network change process.

Within a single \ Executable Runbook, network engineers can define a change, deploy the configuration updates, and verify the impact of the changes in a way that is fully auditable and adherent to existing business protocol and approval processes.

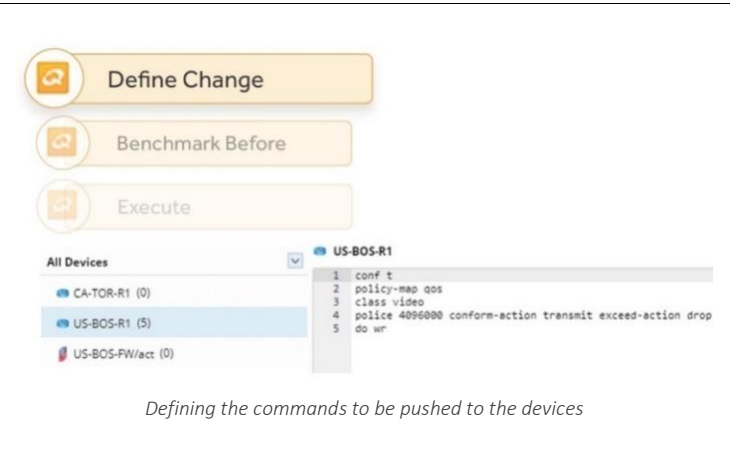


6.2 Define Change

The **Define Change** node enables engineers to formulate and apply configuration changes to whichever devices are currently active on the Dynamic Map.

In addition, engineers can apply a change from a template, or apply different changes to various devices based on specific criteria.

For security purposes, once the change has been defined and approved, Define Change is locked and cannot be modified

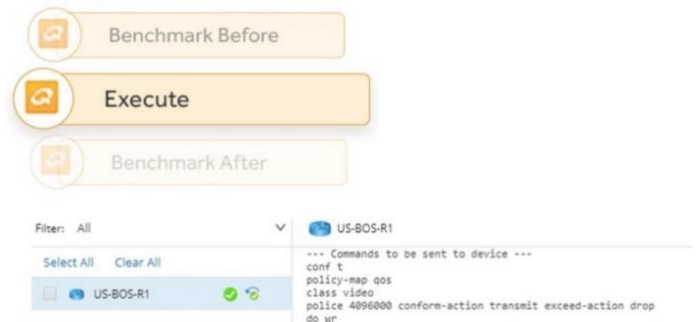


6.3 Execute Change

The **Execute** node allows engineers to sidestep writing complex and unreliable scripts to deliver updates.

When the Execute change node is activated, NetBrain will log into each device and issue commands in real time, in plain sight, for easy review.

If a change goes through inappropriately, it can be rolled back as quickly as it was executed.



The live output of NetBrain pushing changes to the device.

6.4 Verify Impact

As part of the change management workflow, NetBrain can take a snapshot of the network both before and after deploying the configuration changes.

NetBrain becomes your Quality Assurance team, guaranteeing that you immediately spot any unexpected impacts resulting from any change.

These snapshots will provide comparative analysis to routing tables, configuration files, and even show commands – ensuring that no adverse conditions occurred because of the change.

In addition, at any point in the network change the user can add standard nodes into a Change Management Runbook to verify existing application and traffic flows, run diagnostic tools, leave notes for users, etc.

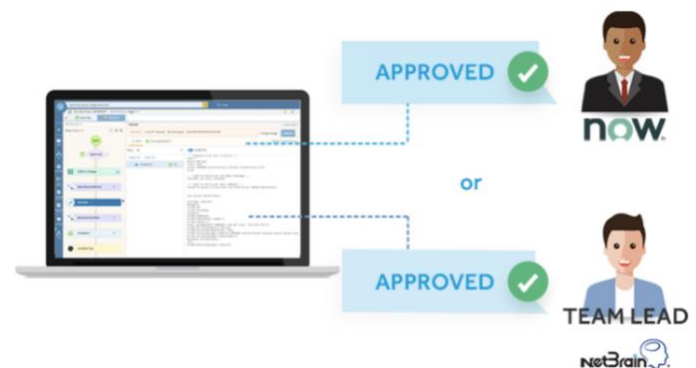
	BEFORE	AFTER
116	class Signal	class Signal
117	police 20000000	police 20000000
118	class voice	class voice
119	police 30000000	police 30000000
120	class data	class data
121	police 40000000	police 40000000
122	class general	class general
123	police 50000000	police 50000000
124	!	!
125	!	!

6.5 Integrate with Existing Approval Processes

For obvious reasons, many changes cannot be done at-will in a large enterprise environment. To accommodate this, NetBrain has included two methods of approving network changes:

First, NetBrain allows users to request approval from inside the application – the authorized user will be notified that a network change should occur via the chat window and is provided a link directly to the relevant map + runbook data.

Second, NetBrain enables third-party authorization tools to trigger approvals for network changes. (for example, a ticketing system like ServiceNOW), linking the ticket directly to NetBrain and updating the ticket as its status changes



6.6 Change Archive

NetBrain improves existing network change procedures by creating detailed documentation with a single click.

Impacted devices, execution logs, benchmark data, and more can be archived and referenced by future engineers should they need to review the change.

Change Name	Status	Creator	Approver	Executor	Last Activity Date
Monthly QoS	Approved	chris.lopez	chris.lopez	chris.lopez	06/20/2019 02:48 PM
Monthly QoS	Approved	chris.lopez	chris.lopez	chris.lopez	
Monthly QoS	Approved	chris.lopez	chris.lopez	chris.lopez	
Monthly QoS	Planning	chris.lopez	chris.lopez	chris.lopez	
Monthly QoS	Approved	chris.lopez	chris.lopez	chris.lopez	
QoS Prio	Approved	josh.bryant	josh.bryant	josh.bryant	06/18/2019 02:07 PM
Monthly QoS	Approved	chris.lopez	chris.lopez	chris.lopez	06/18/2019 01:07 PM
Monthly QoS	Planning	chris.lopez	chris.lopez	chris.lopez	06/18/2019 01:07 PM
Monthly QoS	Approved	chris.lopez	chris.lopez	chris.lopez	06/18/2019 06:05 PM
Monthly QoS	Approved	chris.lopez	chris.lopez	chris.lopez	06/18/2019 06:05 PM
Monthly QoS	Approved	chris.lopez	chris.lopez	chris.lopez	06/18/2019 06:05 PM
QoS	Approved	chris.lopez	chris.lopez	chris.lopez	06/18/2019 02:48 PM
QoS Prio	Approved	josh.bryant	josh.bryant	josh.bryant	06/18/2019 02:08 PM
Monthly QoS	Approved	chris.lopez	chris.lopez	chris.lopez	06/18/2019 02:01 PM
Monthly QoS	Approved	josh.bryant	josh.bryant	josh.bryant	06/11/2019 07:14 PM
Monthly QoS	Approved	josh.bryant	josh.bryant	josh.bryant	06/11/2019 07:05 PM
QoS Prio add	Approved	chris.lopez	chris.lopez	chris.lopez	06/11/2019 06:08 PM
QoS Prio add	Approved	chris.lopez	chris.lopez	chris.lopez	06/11/2019 06:04 PM
Monthly QoS	Approved	josh.bryant	chris.lopez	josh.bryant	06/11/2019 06:00 PM

6.7 Ansible Task Integration

Ansible is a popular provisioning, orchestration and application deployment tool utilized by many different teams across an organization due to its variety of use cases and business applications.

Ansible Integration is an add-on feature to NetBrain's existing Change Management module. Users can leverage the Ansible Task node to define and execute an ansible playbook, perform dry-runs of the procedure and record the execution results.

Most Ansible users will use SCM (Source Code Management) systems to manage their playbooks. NetBrain can also integrate with the mainstream SCM system, such as GitHub, to enable sync with existing playbooks.

ANSIBLE TASK

Playbook

Inventory

Load Playbook

Please type or copy the content of Playbook here ...

RUN

7. Application Assurance Module

7.1 Overview

Business IT needs have evolved, and applications are at the core of any enterprise IT strategy.

Understanding what applications and services will be impacted when an anomaly is detected within the network is critical.

NetBrain's Application Assurance Module (AAM) is designed to manage paths based on applications and periodically verify the application paths to detect network changes.

Applications and paths can be added manually within NetBrain, or by predefining the path in a CSV file and importing it into AAM



7.2 Baseline Traffic Paths

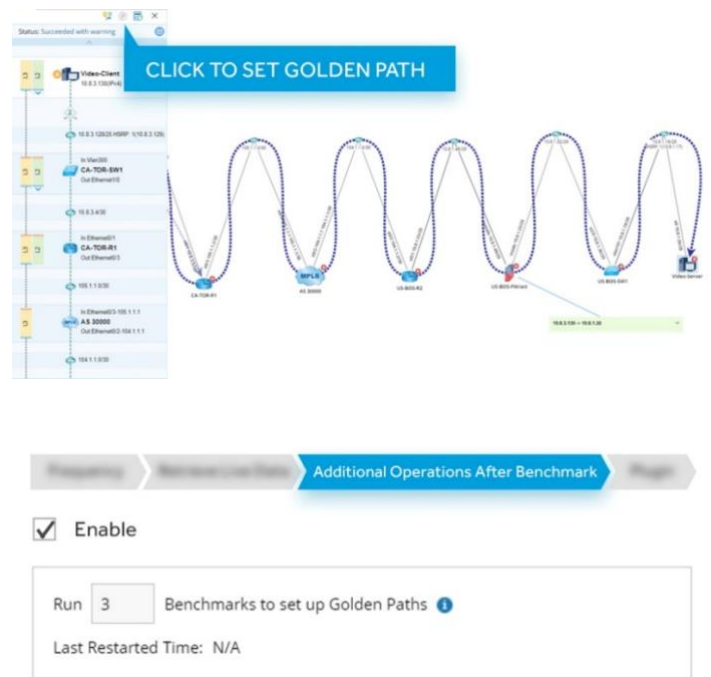
It is essential to understand what a healthy network looks like, what key applications and services are critical to business operations and their critical path dependencies to minimize costly and unplanned down-time.

Understanding the baseline of critical paths or the **Golden Path** of expected traffic provides teams with the needed visibility and tools to dramatically speed up the time to resolution.

Critical application paths or Golden Paths can be set in the following ways:

- Draw expected path result on the map from Application Manager
- Automatically Set Golden Path based on benchmark

The System can be configured to analyze the results of a calculated path after benchmarks are run and auto set the Golden Path when requirements are met.



The screenshot shows a network map with a highlighted path. A blue button labeled 'CLICK TO SET GOLDEN PATH' is visible. Below the map, there is a section titled 'Additional Operations After Benchmark' with a checkbox for 'Enable' and a 'Run' button. The 'Run' button is set to '3' and the text 'Benchmarks to set up Golden Paths' is displayed. The 'Last Restarted Time' is shown as 'N/A'.

7.3 Analyze Impacts to Key Traffic Paths

Application Manager can also show the path verification results. The system compares both incoming and outgoing interfaces of devices at each hop along the current path and documents any differences found with the Golden Path.

Utilize this feature after any configuration or design change, to verify no negative impacts have occurred to your critical applications.

APPLICATION	PATH	RESULT	COMPARE W/ PREVIOUS	GOLDEN PATH
BOS-APP	VoIP	Succeeded	Changed	No Change
	Video Service	Failed	Changed	No Change

7.4 Monitor and Verify Traffic Paths

Being able to proactively monitor and verify critical application paths enables teams to achieve a high level of agility required for today's modern networks.

NetBrain can periodically monitor or verify the application paths and send alerts and emails when paths change.



The screenshot shows a table with two rows of target devices. The first row is 'Email Services / Client to DNS(172.24.101.41 to 172.24.32.2)' and the second row is 'Email Services / Client to SMTP(172.24.101.41 to 158.2.10.161)'. Below the table is a button labeled '+ Add Application and Path'. At the bottom, there is a blue button labeled 'ADD TASK'.

Verification results can be viewed in Application Manager, exported to a CSV file or on a map clearly depicting the differences between current path and Golden Path.

Additional Operations After Benchmark

No. Application/Path

- 1 Email Services / Client to DNS(172.16.1.1)
- 2 Email Services / Client to SMTP(172.16.1.1)

+ Add Application and Path

- ☒ Email_Service
- ☐ DNS-SERVICE(10.88.3.2 to 10.88.16.131)
- ☐ SMTP_SERVICE(10.88.3.2 to 10.88.16.5)
- ☒ BOS-APP1
- ☐ VOIP_SERVICE(10.88.8.4 to 10.88.0.68)
- ☐ VIDEO_CONFERENCE(10.88.8.132 to 10.88.0.70)
- ☐ VIDEO_SERVICE(10.88.8.68 to 10.88.0.69)
- ☒ Untitled Application

THE CURRENT PATH

THE GOLDEN PATH

PE-3600X

Verify Application

Application	Path	Source IP	Destination IP
BOS-APP1			
VoIP		10.88.8.4	10.88.0.68
Video_Service		10.88.8.68	10.88.0.69
Video_Conference		10.88.8.132	10.88.0.70
Email_Service			
TO-DNS-SERVER		10.88.3.2	10.88.16.131
TO-SMTP-SERVER		10.88.3.2	10.88.16.5

8.1 Create Inventory Report

Every NetBrain report can also be exported to an external format.

The screenshot shows the Cisco Prime Network Manager interface. On the left, a sidebar lists various reports under 'Built-in Reports' and 'Customized Reports'. The 'Device Report' is selected. The main area displays a table of devices. A red circle highlights the 'apic' devices in the table.

Host	Mgmt IP	Mgmt Interface	Device Type
ACI-L2Out-249	2	Ethernet0	End System
ACI-L3OUT-246		Ethernet0	End System
apic1	1	Vlan48	Cisco IOS Switch
apic2	1	GigabitEthernet1/0/48	Cisco ACI APIC
apic3	45		Cisco ACI APIC
AS 23500	48.146		MPLS Cloud
AS 30000			MPLS Cloud
Baraccuda-FW	10.8.5.1	eth1	Baraccuda Firewall
CBAC75-DP4E...	20.0.7.3	Ethernet0	End System

8.2 REST API

NetBrain provides **REST APIs** that can enhance workflows such as synchronizing of site structure from third party systems, network discovery, benchmarks, topology building and device management to name a few.

Detailed documentation on NetBrain REST APIs can be found in GitHub.

<https://github.com/NetBrainAPI/North-Bound-API>

NetBrainAPI / North-Bound-API

Gongdai update

3rd Party Software Integrate Docume...

Golden Use Case Templates

REST APIs Documentation

8.3 One-IP Table

IP Address Management, or IPAM provides you with the general information on the state of your network and the IP addresses being used at any given time. IPAM has become an important part of quickly analyzing and troubleshooting the network.

NetBrain's One-IP table records the physical connections for all IP addresses in the workspace. It's retrieved during the Layer 2 topology discovery, and it can be used to troubleshoot any layer 2 connection issues. Once opened, it will group IPs by LAN segments. In addition, the One-IP table can be exported to a word or excel document on demand.

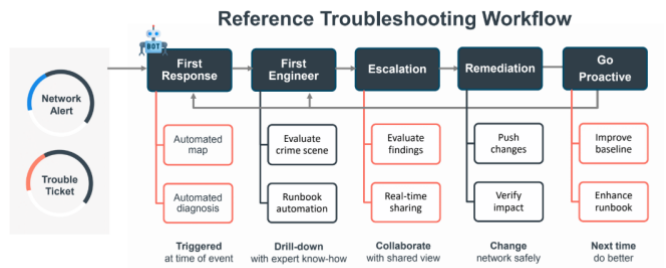
One-IP Table

Total Entries: 189				
DNS Server Settings Export Refresh Resolve All DNS Show Unknown End System Only				
IP Address	LAN Segment	MAC Address	Vendor	Switch Port
192.168.48.1	192.168.48.0/22	0008.E3FF.FFFC	Cisco Systems	Baraccuda-FW.eth0
192.168.48.11	192.168.48.0/22	29BF.8D07	VMware, Inc.	US-BUR-L2Core-SW1.GigabitEthernet1
192.168.48.2	192.168.48.0/22	9F5.043B	VMware, Inc.	US-BUR-L2Core-SW1.GigabitEthernet1
192.168.48.4	192.168.48.0/22	7C.6283	VMware, Inc.	US-BUR-L2Core-SW1.GigabitEthernet1
192.168.48.46	192.168.48.0/22	93.89B4	VMware, Inc.	US-BUR-L2Core-SW1.GigabitEthernet1
192.168.48.1	192.168.48.0/22	9D0.4E67	VMware, Inc.	US-BUR-L2Core-SW1.GigabitEthernet1
192.168.48.82	192.168.48.0/22	C.29B1.226F	VMware, Inc.	US-BUR-L2Core-SW1.GigabitEthernet1
192.168.48.83	192.168.48.0/22	000C.2904.CE6F	VMware, Inc.	US-BUR-L2Core-SW1.GigabitEthernet1
192.168.48.100	192.168.48.0/22	001A.6204.AF3D	Data Robotics, Incorpora...	US-BUR-L2Core-SW1.GigabitEthernet1
192.168.48.120	192.168.48.0/22	0050.5693.00B7	VMware, Inc.	US-BUR-L2Core-SW1.GigabitEthernet1
192.168.48.127	192.168.48.0/22	000C.296A.3202	VMware, Inc.	US-BUR-L2Core-SW1.GigabitEthernet1

9. Workflow Integration with NetBrain

9.1 Integrate NetBrain with Troubleshooting Workflows

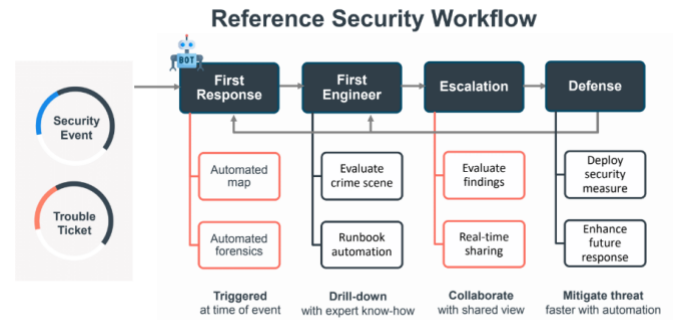
NetBrain can effectively integrate with existing troubleshooting workflows by automating common diagnostics, and empowering lower-level engineers to tackle higher-level issues. NetBrain helps reduce the impact of outages by serving as an aggregated interface to the user's entire network.



9.2 Integrate NetBrain with Security Workflows

It's often difficult to capture the 'crime scene' of a security incident before it turns into a business issue – to visualize where the attack is coming from, what's been impacted, or whether the incident is a false positive.

NetBrain assists security operations during each step of the process, from automating a map of the afflicted area, to helping users deploy security measures across their devices at scale.



9.3 Integrate NetBrain with Documentation Workflows

NetBrain was developed years ago to address the issues associated with manual documentation. Each map is created dynamically, and every one of these maps is rich with information, like underlying design and configuration data. NetBrain also helps users narrow the scope of the map to only the elements they need to be concerned with.

In addition, NetBrain can provide documents of network processes – helping senior engineers encode their advanced knowledge in a way that is easily shared across teams and organizations.

