

NetBrain for Multi-Cloud Network Automation

Application and Service-Delivery Enforcement Across Hybrid-Cloud Infrastructures

It's time to automate network configuration enforcement, visibility, compliance and security for your entire network, from data center to public cloud. Get the real-time data you need to understand and troubleshoot your hybrid-cloud network so you can support the services your business depends on.

NetBrain extends its network visibility all the way from the endpoint to the public-cloud and everything in between. NetBrain has native support for your multi-cloud infrastructure (Amazon Web Services/AWS, Microsoft Azure and Google Cloud Platform/GCP), traditional networking infrastructures, along with your software-defined WAN and SDN deployments.

Hybrid-Cloud Network Challenges

The rapid growth of emerging application areas such as work-from-home, distance learning, telehealth, and IoT, just to name a few, is increasing the role of public cloud in enterprise networks. This has added another dimension to already complex network infrastructures.

Even seasoned network operations professionals may find themselves under a learning curve when it comes to multi-cloud environments.

- Lack of visibility and observability into cloud infrastructure
- Too many tools
- No single source of truth
- Inconsistent skill sets
- Siloed operations teams

Fortunately, NetBrain Next-Gen provides a platform to automate hybrid-cloud networks at scale. NetBrain users can visualize and automate their hybrid-cloud networks, leveraging the same unique capabilities of the NetBrain solution that have enabled success for physical and software-defined network infrastructures.

Strategically Manage Hybrid-Cloud Networks

Auto-Discovery of Hybrid-and Multi-Cloud Networks

While many organizations have little, if any, network visibility, NetBrain offers visibility from data center to cloud and across multiple clouds. This enables real-time application pathing in hybrid-cloud environment- even if both ends are in the public cloud.

NetBrain auto-discovers and provides native support for Amazon Web Services (AWS), Microsoft Azure, and Google Cloud public cloud environments. It then visualizes these using Dynamic Maps to show application dependencies across clouds, SDN and on-premises infrastructure reduces time to pinpoint problems and accelerate cloud troubleshooting. It then provides a consolidated view of key operational data that integrates with the cloud providers' native cloud monitoring, logging, and billing tools.

Full-stack Digital Twin Enables Scalable No-Code Automation

The cloud digital twin of your network enables visibility via Cloud API data for a comprehensive view of cloud infrastructure and utilization. NetBrain's digital twin is unique because it captures, in real-time, your entire hybrid-cloud network. NetBrain goes beyond basic device and topology-level understanding with real-time forwarding and diagnostic logic. The entire network in real-time—every device, every platform, every firmware version – contains all the topology data and baseline configuration, and performance analysis.

This foundational data model offers real-time telemetry dynamically constructing real-time models for any hybrid multi-cloud network, upon which automation is built.

No-Code Automation for Hybrid-Cloud Networks

NetBrain's powerful network AI and automation platform can be extended to various automated diagnostics for different customers' hybrid-cloud network use cases.

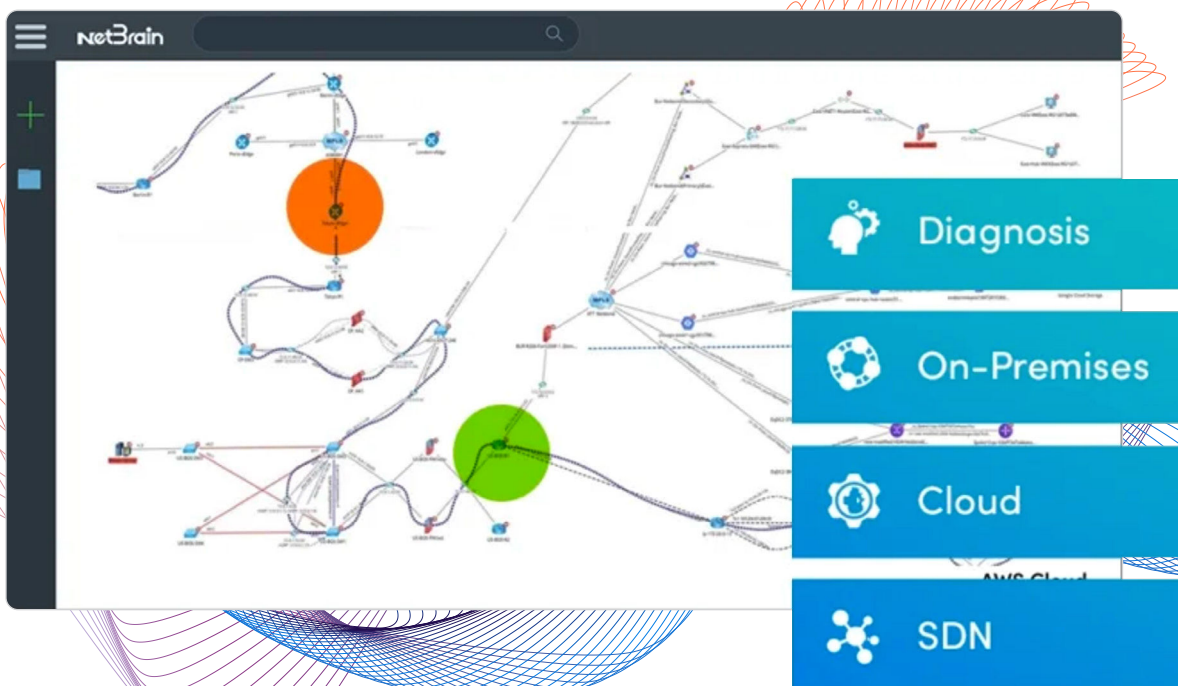
NetBrain revolutionizes network operations management by offering a no-code approach to auto-discovering multi-vendor, hybrid-cloud network devices and their architectures, establishing design rules and baselines, and ensuring network design enforcement. With NetBrain, engineers can document design baselines, operational states, and conditions without coding. Most importantly, it enables the automated validation and verification of network designs. NetBrain auto-discovers network features, creates automated checks, and auto-replicates them across all 'similar' designs in your hybrid multi-vendor network.

CLOUD SUPPORT



API Support

API integration enables the diagnosis of cloud networks with a single pane of glass using Intent Data Views to add color-coded diagnostic information directly onto any map or path for easy troubleshooting with the relevant connectivity details and context to help you solve problems fast.



Visualize Hybrid-Cloud Networks with Dynamic Maps

NetBrain's end-to-end visibility and automation capabilities fully extends to the public clouds to support thousands of accounts and millions of virtual servers providing important information about interface statistics and conditions of resources (e.g. CPU, memory, and storage). This enables NetBrain users to:

- Facilitate faster troubleshooting with collaboration across traditional and cloud operations teams
- Troubleshoot complex service connectivity issues which include one or more public cloud endpoints
- Ensure maximum availability and lowest MTTR for cloud-based applications
- Unify all parts of any organizations' digital infrastructure including their public cloud-based services.

Map the hybrid infrastructure in seconds cloud path map

Map the entire network, including AWS VPC/EC2, Azure VNet/VM and Google VPC/VM Instance. Extend this visibility to new devices and new people without tedious cloud querying.

True, contextual end-to-end visibility

See the boundaries between cloud and other technologies in one easy-to-read map. Normalize the data between network elements to help NetOps understand how cloud architecture relates to the rest of the network in a meaningful and contextualized way.

Solve hybrid network documentation problems

Export dynamic maps and reports for audits and to ensure compliance.

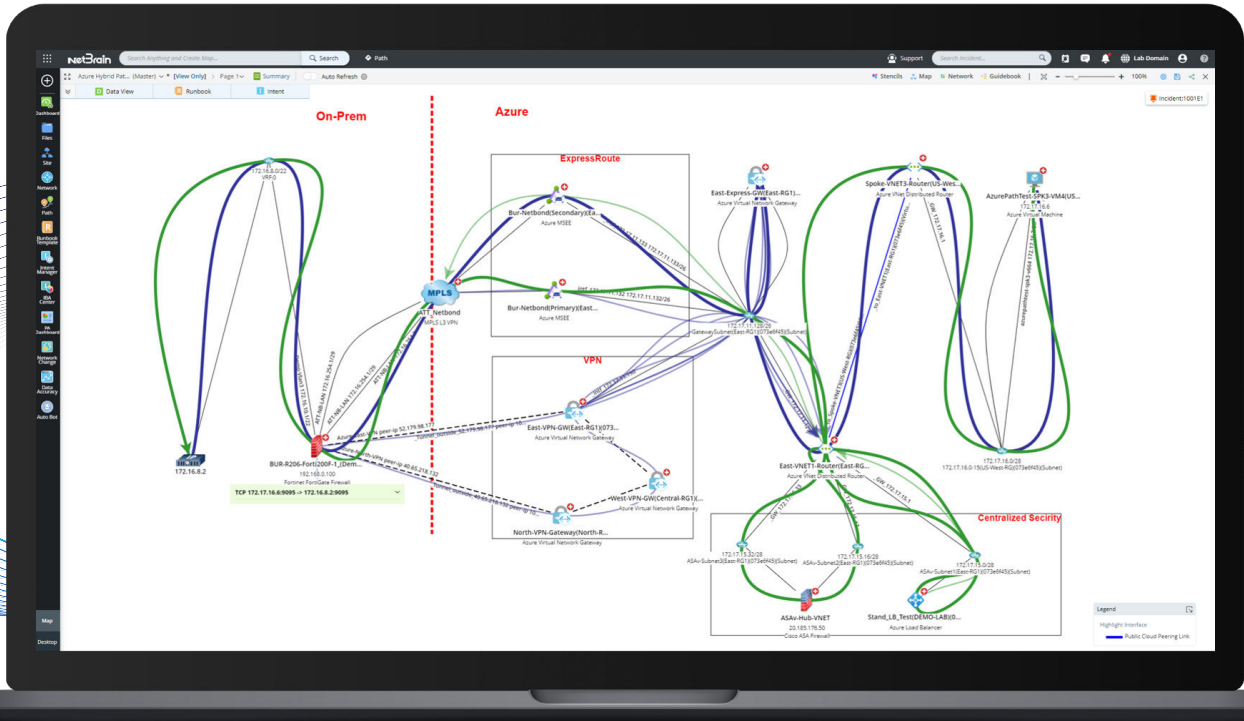
NetBrain provides a comprehensive view of the digital twin for cloud infrastructure and application, verify network design, discover traffic flow, identify network issues, understand resource utilization, etc.

CLOUD VISIBILITY FEATURES

1. Cloud Node Visibility
 - VPC/Vnet, VPN Gateway, Load Balancer, Firewall, NVA, ...
2. Cloud Topology Visibility
 - Peering, VPN Tunnel, BGP Session, Interconnect, ...
3. Cloud Resource Hierarchy
 - Network Tree (Hierarchy View)
 - Network Context Map
4. Data Table
 - Cloud Firewall Rule Table, BGP Learned Route Table,....
5. End-to-end Path
 - Inter/Intra Cloud Traffic Path
 - Multi-Cloud Traffic Path
 - Cloud and On-Prem Traffic Path

Map Traffic Flows End-to-End with A-B Path Calculator

When it comes to operational tasks like troubleshooting application slowness, teams must be able to discover the hop-by-hop path of the application. NetBrain's A-B Path Calculator can perform this analysis automatically, all the way from the public cloud to the network edge. Path logic assesses many traffic-forwarding characteristics like Security Groups and ACL across subnets, VPCs, network virtualization appliances like firewalls, direct connections, ExpressRoute, VNets, and more.



In addition, NetBrain uses self-designed algorithm to calculate the Virtual Route Table for Cloud Network Objects like VNet, VPN Gateway, etc., which is not in the route table on the cloud console, but provides a clearer connectivity understanding.

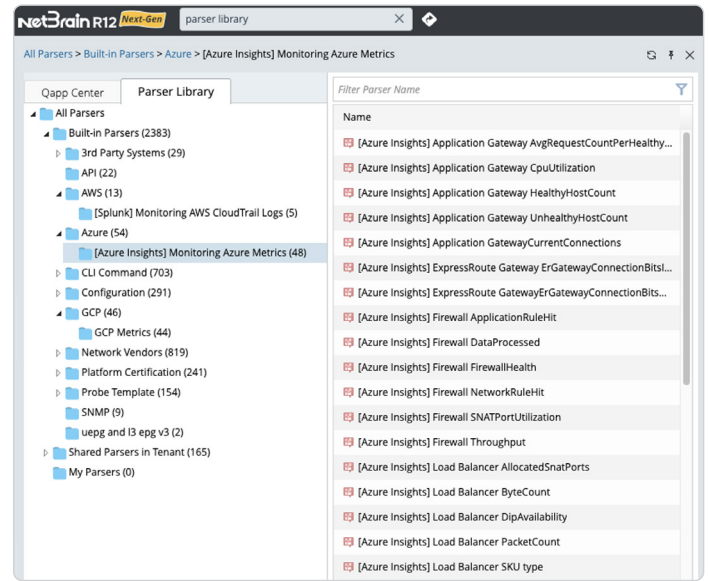
This lets you gain complete visibility into Service Groups and source to destination pathing to uncover the causes of application performance degradations.

- **Live A-B Path Discovery** – Retrieves the routing table from the live network and presents both forward and reverse paths. NetBrain automatically calculates a hybrid map of the traffic flow mapping it, in real-time. Path logic assesses the traffic-forwarding characteristics of all the devices involved including the routers, switches, firewalls, load balancers, and more. It automatically calculates the path types such as IPsec VPN, based on the topology dependency of the outbound interface at each hop. You can use this data to isolate the critical network components when investigating network or application problems, as part of design review projects, or to proactively assure application availability.
- **Mapping A-B Application Paths** – Visualize every hop for every application on their paths from public cloud to edge. Show path details like which security rule or route entry matched for specific traffic.
- **Historical A-B Golden Path Calculation** – Determine what a “normal” network path looks like (e.g., for a given application) and how it may have changed over time

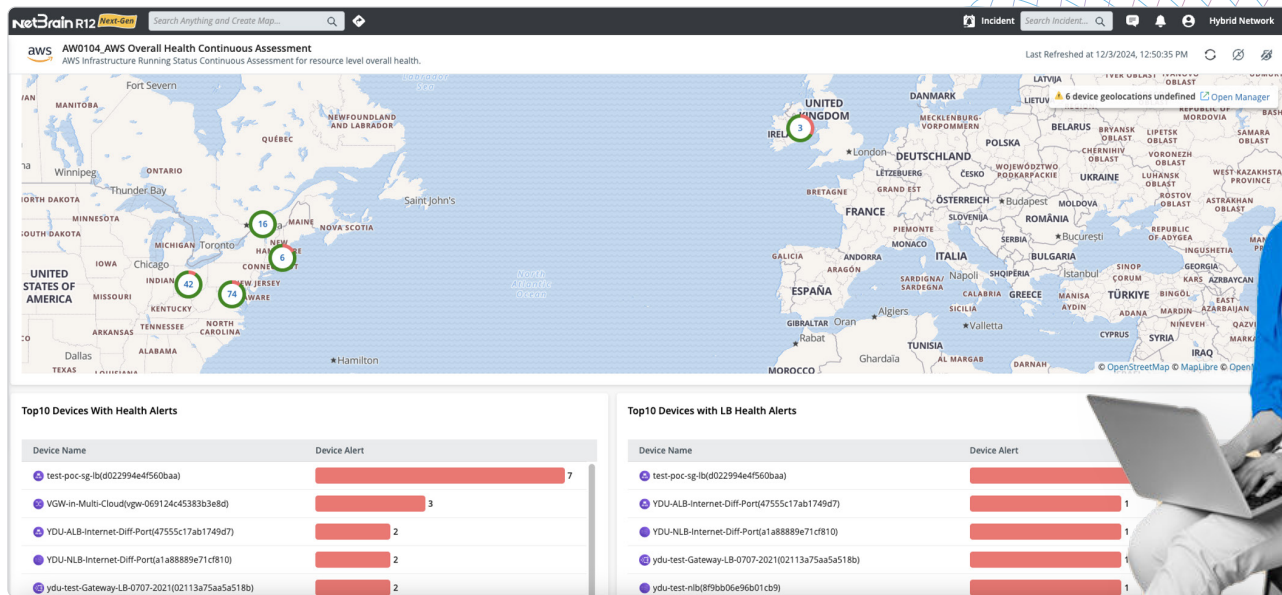
Cloud Network Observability

As more and more IT workloads are being moved to the public cloud, operating the Network Infrastructure end-to-end has become more challenging for IT specialists. The main challenges of managing the public cloud include lack of visibility, managing a huge number of accounts and subscriptions and operating a multi-cloud environment.

Cloud Observability uses intent-based automation to assess cloud configurations and monitor the cloud operation status. Intent-Based Automation enables cloud observability via the no-code API platform. The built-in API Data Retriever Library enables pre-defined API retrieval eliminates the need for defining functions while helping to maintain the standard API data that is crucial for automation.



NetBrain Cloud Observability Features



NetBrain provides comprehensive cloud observability by enabling the following capabilities:

Observe cloud configuration changes via a dashboard to view intent details and specific alterations

Real World Problems

Cloud Network provisioning configuration data is frequently updated by a different team.

How can you guarantee the approved config change is implemented correctly and find out unexpected changes?



NetBrain Best Practice

- Enable full config change continuous assessment automation
- Observe whole network config change status

Security team only pays attention to specific cloud provisioning configuration data like NSG and firewall rules.

How can you guarantee the specific part/feature of config change is implemented correctly?



- Enable feature config change continuous assessment
- Observe specific config change status

Company-wide rule compliance should be implemented in cloud provisioning config data.

How to guarantee the config change follow Company compliance and golden config template.



- Enable Golden Config change continuous assessment automation
- Observe specific network config change status

Continuously verify cloud infrastructure health status to ensure network compliance.

Real World Problems

How can I observe the multi-cloud resource running failure status in one panel, and is it customizable?



NetBrain Best Practice

- Enable resource health checks from the built-in automation library.
- Observe resource health status like VPN down, LB backend unhealth, etc.

How can I observe if the multi-cloud dynamic data like CPU/Memory usage is in a normal range, and if it's customizable?



- Enable resource health checks from the built-in automation library.
- Compare the current value with the threshold range.

How can I observe if the multi-cloud data like traffic throughput is in a normal change trend, and if it's customizable?



- Enable resource health checks from the built-in automation library.
- Compare the current value with historical data.

Facilitate troubleshooting, assessment, and change workflows for cloud issues, such as VPN outages.

Utilize Cloud Application Assurance for continuous assessment of application path-based security, health, interconnect metrics, and overall application performance.

Real World Problems

Organizations deploy applications on-premises and in the cloud, utilizing a mixture of public and private networks.

How can you resolve today's major application assurance challenges:

- Lack of visibility into which applications are running on the network and who is using them
- Pinpointing the source of performance slowdowns for critical applications
- Understanding underlying dependencies and performance baselines before implementing changes in the environment



NetBrain Best Practice

- Use NetBrain's application assurance with path-based automation to identify missing routes, security risks, connect issues, etc.
- Enable application assurance from the built-in automation library.

Evaluate cloud security posture across Network, Server, Data, and Application layers.

Real World Problems

How to fix today's major cloud security challenges:

- Managing a rapidly evolving attack surface
- Lack of visibility
- Lack of cloud security strategy and skills
- Cloud compliance



NetBrain Best Practice

- Continuously observe various cloud security measures, referred to as a defense-in-depth.
- Enable resource security checks from the built-in automation library

Regularly check cloud connections and links for up/down status and metrics like bandwidth and throughput to ensure connectivity quality and health.

Real World Problems

How to resolve today's major cloud connectivity assurance challenges:

- Lack of knowledge and expertise
- Lack of visibility
- Data protection and privacy
- Secured connectivity into the public cloud
- Variable performance

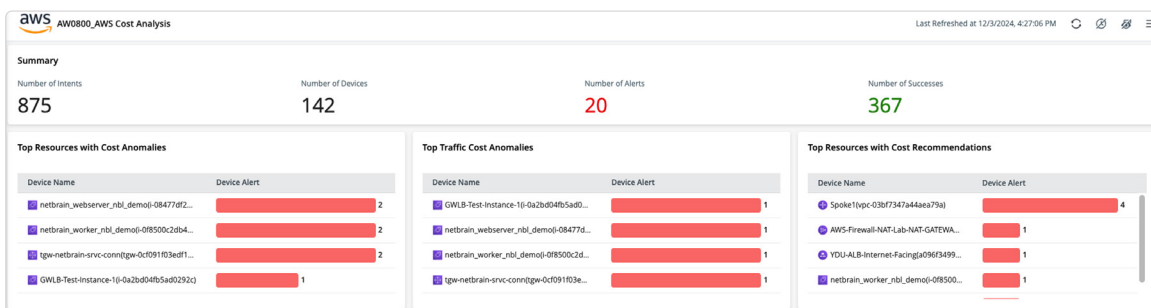


NetBrain Best Practice

- Use NetBrain path-based automation to enable connectivity assurance from various challenges like up/down status, security posture, performance, etc.
- Enable application assurance from the built-in automation library.

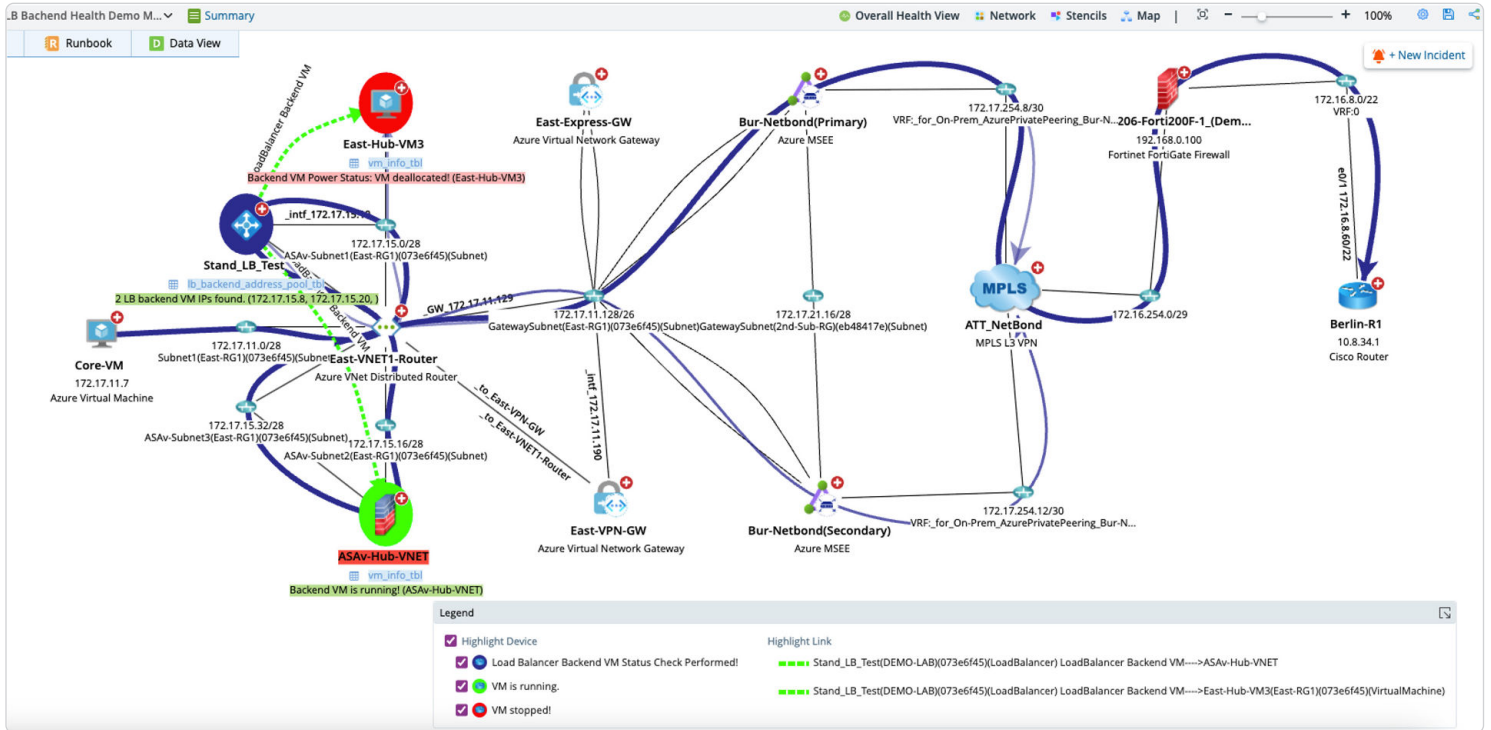
Analyze cloud costs and billing from the network layer to identify cost-saving solutions, including assessments of low usage or unused cloud resources, using the Cost Explorer and Cost Advisor.

- Cost Explorer - Analyzes cloud cost and usage reports, breaks down detailed expenses, and detects anomalies, such as sudden spikes of data transfer cost in some AWS Transit Gateway Attachments.
- Cost Advisor - Examines cloud resource configurations and metrics, providing recommendations for optimizing resources, like removing unused assets, migrating outdated ones, or downsizing over-provisioned instances.



Hybrid-Cloud Network Automation Use Cases

- Troubleshoot VPN route issues, and load balancer backend server health with the NetBrain AI Co-Pilot
- Troubleshoot cloud private connectivity issues like Azure ExpressRoute and AWS Direct Connect
- Assess and troubleshoot routing configuration and status, VPN tunnel and cloud private connectivity like Azure ExpressRoute and AWS Direct Connect
- Cloud Security and Compliance - Assess and observe Golden Template Security Rule violations



Leverage AI Co-Pilot to interact with Automation

Use the AI Co-Pilot to gather cloud device data, check for VPN Tunnel problems on a map of devices and show result on an observability dashboard. Auto-remediate any cloud VPN down issues in one-click and auto-test after the change to ensure success.

The screenshot shows the AI Bot interface with the following components:

- AI-Bot**: The main interface for interacting with automation.
- Intent**: The user's query: "Get all Azure VPN gateway model device details from the map."
- Runbook**: The resulting data table.
- Dashboard**: The resulting insights.

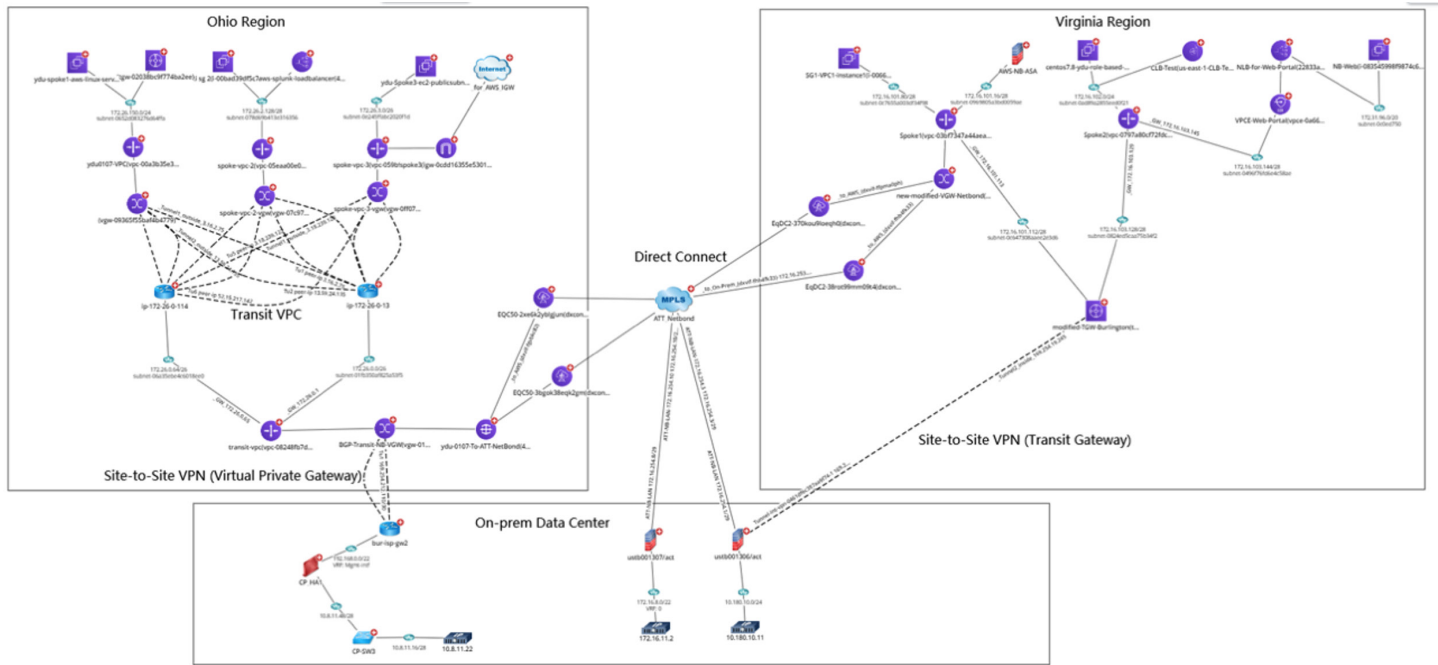
Device Name	Device Type	Location	Vendor	Model	Belong Site
East-VPN-GW(East-RG1)(073e6f45)(VirtualNetworkGateway)	Azure Virtual Network Gateway	eastus	Microsoft	Azure Virtual Network Gateway	eastus

Key Insights:

- The device is an Azure Virtual Network Gateway located in the **eastus** region.
- It is provided by **Microsoft** and is specifically designed for Azure networking.

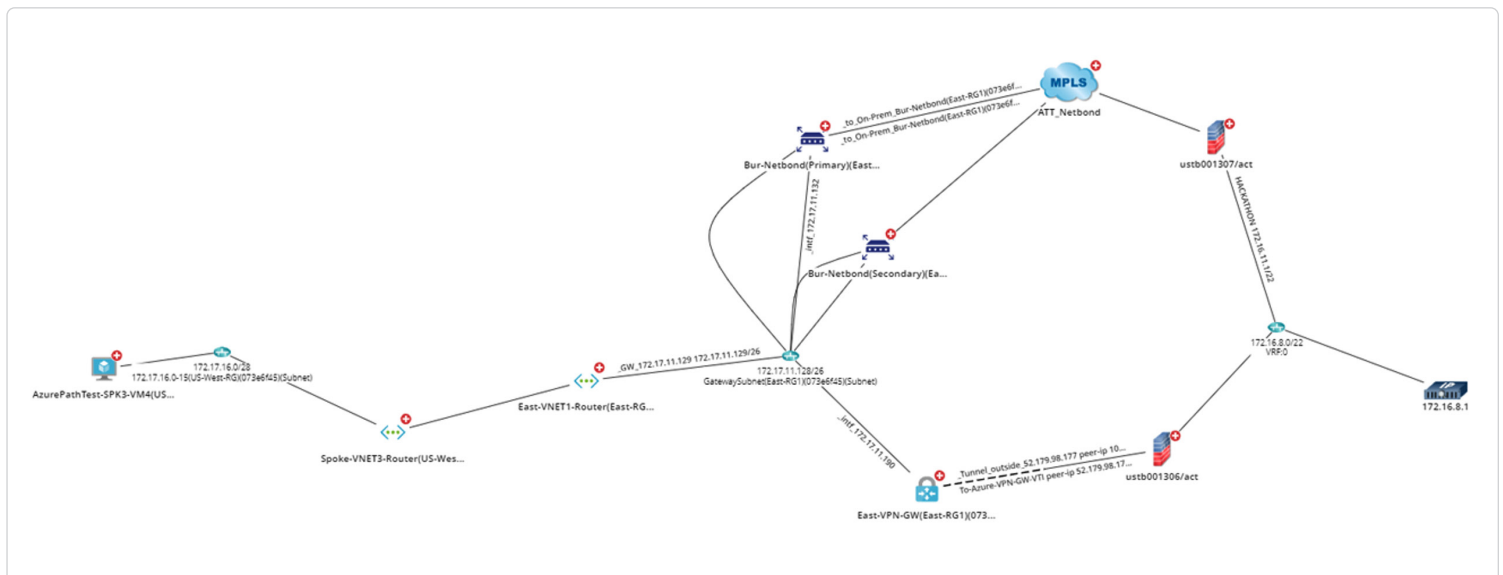
Amazon Web Services (AWS)

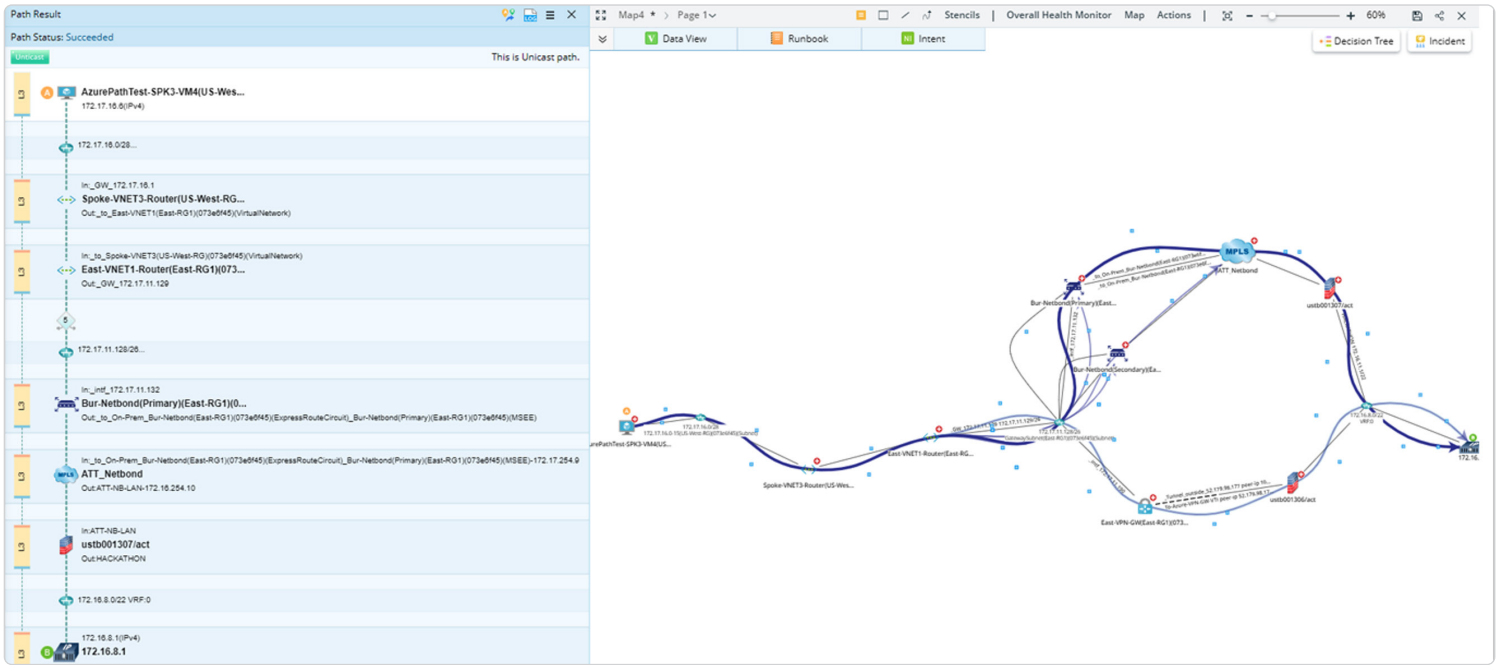
NetBrain can discover AWS public cloud resources, visualizing not only all AWS resources like VPC, Firewall, Load Balancer, TGW, VGW, EC2 but also topology and techniques like VPC Peering, Direct Connect and Site-to-Site VPN used from on-premises to AWS cloud.



Microsoft Azure

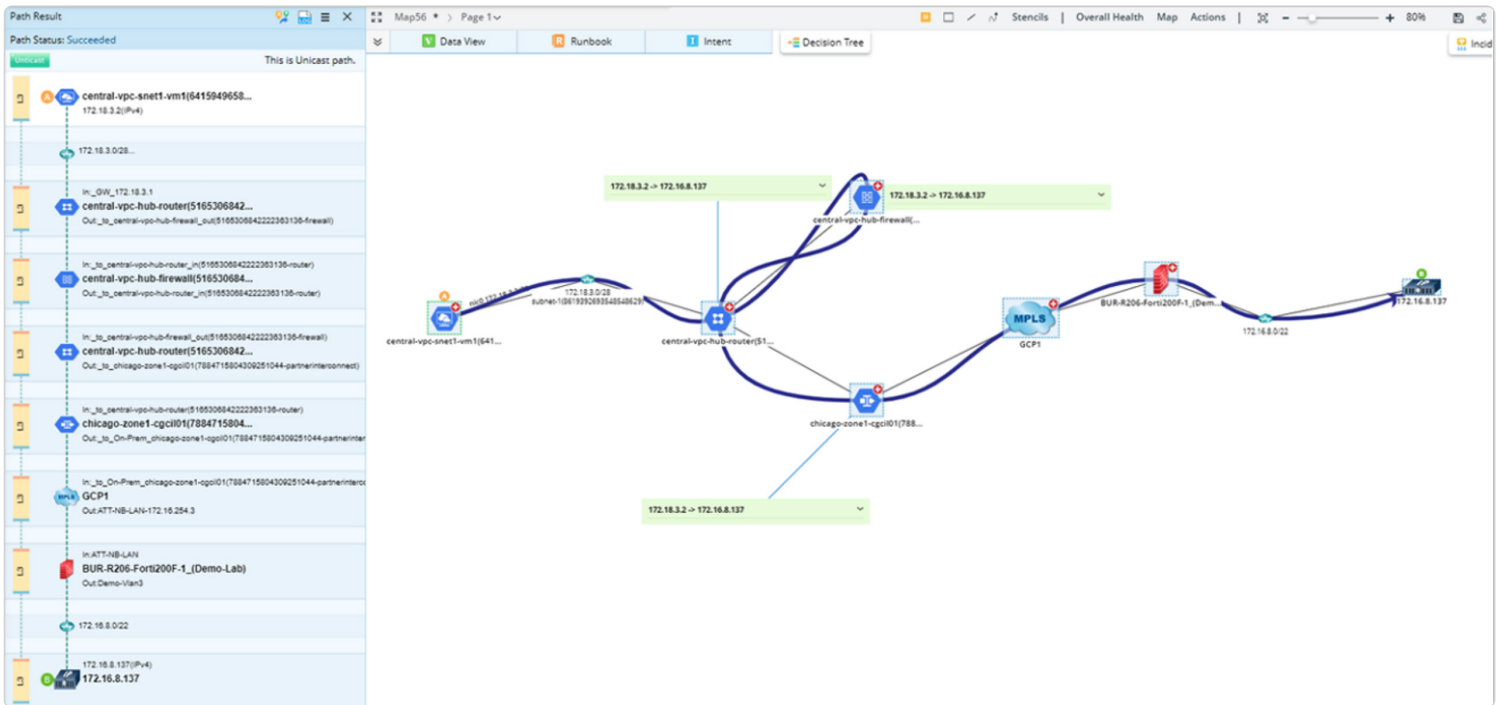
NetBrain can discover Microsoft Azure public cloud resources, visualizing not only all Azure resources like Virtual Network (VNet), Firewall, Load Balancer, MSEE, Virtual Hub/VHub, VPN Gateway, ExpressRoute Gateway, VM but also topology and techniques like ExpressRoute Connection and Site-to-Site VPN used from on premises to Azure cloud.





Google Cloud Platform (GCP)

NetBrain can discover Google Cloud public cloud resources, visualizing not only all Google Cloud resources like VPC, Firewall, Cloud VPN, Cloud Router, VM but also topology and techniques like VPC Peering, Partner Interconnect, Dedicated Interconnect and Site-to-Site VPN used from on premises to Google Cloud.



Benefits

- Gain Visibility Across Hybrid-Cloud Network – Obtain accurate and up-to-date visibility into the public cloud, alongside software-defined and physical networks in a consistent and familiar way.
- Reduce “Mean Time to Repair” – Public clouds increases the complexity of identifying where problems originate. Get a quick answer as to whether a problem is a network problem or not.
- Align IT team and cloud providers – Unified visibility of collocated and public cloud infrastructure helps each responsible team better collaborate and get to resolution faster.
- Troubleshoot application dependencies – Quickly locate the network components associated with an application during troubleshooting to find the root cause.
- Improve security posture – Intents make identifying security design and hardening issues much easier, but also aids in maintaining compliance.
- Support bursting – NetBrain learns to identify when bursting is occurring, automatically adjusting, and providing licensing flexibility where required.

About NetBrain

A pioneer since 2004, NetBrain is democratizing network automation through GenAI. With its intuitive no-code automation platform, NetBrain empowers network architects, operators and engineers to harness the power of AI and automation, transforming complex operational processes into efficient workflows. By automating network troubleshooting, change, and assessment workflows, NetBrain helps organizations boost operational efficiency, reduce MTTR and mitigate risk. Unifying GenAI and human intelligence, NetBrain provides comprehensive hybrid network observability through continuous network assessment automation and visualization technology, enabling IT organizations to be proactive, make informed decisions and drive innovation.