BROADCOM

WHITE PAPER

Proactive Insights

How to Gain the Intelligence You Need to Address Issues—Before They Have an Impact

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OVERVIEW

Network operations teams face the frustrating reality of constantly being stuck in firefighting mode. They struggle with the daily pressure of troubleshooting and the constant need to fix problems. They have to contend with both real incidents and false positives. This distracts them from strategic tasks and prevents them from planning ahead to meet evolving business requirements.

These challenges largely stem from traditional approaches to network monitoring, which are largely reactive in nature. Teams detect and fix issues after they have had an impact on network performance or availability, as well as business services and the user experience. Rather than focusing on preventing issues, teams receive notifications after problems have occurred—so they have to scramble to respond and minimize the damage.

To avoid these business problems, network operations teams must focus on gaining proactive insights as part of an effective network observability and management approach. Teams need to establish effective baselines, understand what constitutes normal performance, and see how usage and performance are evolving. Further, they must be enabled to predict trends, understand evolving capacity demands, and track volatility. With this visibility, teams can objectively validate vendors' compliance with SLAs.

Network operations teams need a modern network observability and management solution that can help them achieve these three key objectives:

- **Establishing baselines**. When teams lack insights into what constitutes abnormal network behavior, it can be extremely difficult to ensure the reliability and performance of their networks. By leveraging baseline and threshold functions, teams can gain a clear understanding of the normal and abnormal behavior and patterns of the network.
- **Planning**. Without a clear understanding of network trends, capacity, and volatility, it can be difficult to plan ahead for future networking requirements and improvements. By examining the past performance, capacity, and volatility of the network, teams can gain insights into future trends. This sets the stage for effective planning to enhance network delivery and end-user experience.
- **SLA validation**. Ineffective performance monitoring can hinder network SLA validation. If network visibility is incomplete, it can be difficult to identify problems, and where they're occurring. Without tangible evidence of issues with a vendors' services, it can be hard to hold them accountable. By leveraging reliable performance monitoring processes and tools that align with SLAs, teams can intelligently monitor vendors' compliance with SLAs.

ESTABLISHING BASELINES

In large enterprises, one of the main difficulties of network observability and management is the complexity and diversity of the network infrastructure. Today, teams have to monitor and maintain different types of technology stacks, silos, vendors, and devices. Moreover, there are often many false positives that aren't easily actionable, cluttering the visibility of operators and making it hard to identify and resolve the real issues that can adversely affect network delivery and end-user experience.

To combat these challenges, network operations teams need to have a clear and comprehensive baseline understanding of network performance, health, and user experience at any given time. This is vital in enabling teams to ensure that the network is performing as expected—and to find out immediately if it is not. With visibility into past and present network data sets, teams can see what trends are emerging.

A baseline is a method of assessing normal network behavior, based on historical data. This helps to create a standard for comparing and evaluating how well a network is performing. Establishing a baseline involves gathering and analyzing data on different network metrics, such as bandwidth, latency, throughput, errors, availability, and utilization. Baselines help network operations teams monitor changes over time, informing them about deviations that are happening in real time. Baselines also enable teams to forecast future usage and performance so they can

plan intelligently. By establishing baselines, network operations teams can recognize expected network behavior and spot any deviations or anomalies that may signal problems or inefficiencies. Network baselining also helps teams to track changes and trends in network performance over time, which can provide insights for planning for future capacity, optimizing network configuration, and troubleshooting issues.

To establish baselines, many organizations rely on network performance monitoring tools, but some of these tools have limitations that diminish their reliability and accuracy. For example, some tools:

- Use static thresholds to detect anomalies and trends, but they may not capture dynamic and complex changes in network traffic and user demand.
- Fail to collect all the important metrics that influence network performance, such as latency, jitter, packet loss, bandwidth utilization, application response time, and more.
- Lack historical data or advanced analytics, which are instrumental in enabling meaningful analysis to find patterns and trends in past and present network data sets.
- Don't offer complete visibility across both internal and externally managed networks, and they lack granular insights into the network topology, devices, protocols, flows, and applications, making it difficult to accurately pinpoint the root cause of performance issues and end-user experience problems.

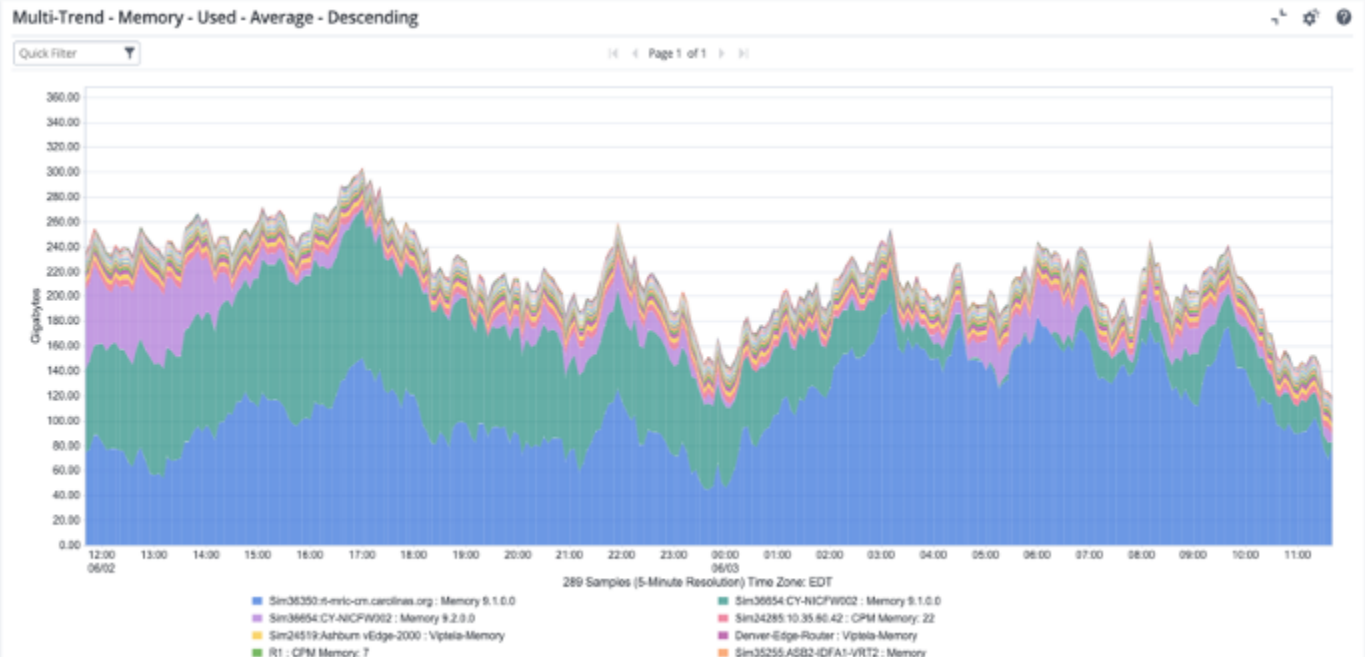
Network baselines help teams to understand normal network patterns over time, identify abnormal activity, and spot emerging trends. To be effective, teams need a solution that can filter out noise and establish a reliable baseline for all key network metrics and indicators. The solution must also use advanced threshold functions to detect and alert on any network anomalies, abnormal patterns, and developing trends or issues that can affect network performance and user experience quality.

Metric Baselining

NetOps by Broadcom leverages historical data and statistical analysis to establish a baseline of normal behavior for the network. This helps teams to identify anomalies that could indicate problems. The solution analyzes historical data to find patterns based on device metrics, network traffic, user experience, error rates, and other relevant metrics. The solution compares the collected network data with the normal behavior baseline. If there is a deviation that goes beyond an expected range, it is marked as an anomaly and can trigger an alert.

The solution is designed to gather data from any source, regardless of whether network operations teams own or manage the network or not. The Broadcom solution can collect, store, analyze, and display detailed information from various sources, such as SNMP MIB requests, streaming telemetry, and flow protocols, and through a third-party vendor API. By creating baselines for key metrics, network operations teams can easily compare past performance, evaluate how the network is performing currently, and forecast future network performance. For instance, they can quickly compare current CPU utilization with a baseline average that reflects the system's normal range of operation. A current CPU utilization that is higher than the baseline may indicate an excessive load from a new application process, an increase in the number of users or sessions, or growth in the amount of data being processed.

The solution uses a dynamic approach to determine baseline averages and associated standard deviations. Standard deviation refers to the statistical measure of how much variation there is in the data that was used to calculate the baseline averages. The solution updates the baseline calculations as new data comes in, considering the hourly patterns of utilization for each day of the week. This way, the solution can continue to improve its ability to estimate what is "normal" and reduce the number of missed violations and false alarms that are generated.



Advanced Threshold Functions

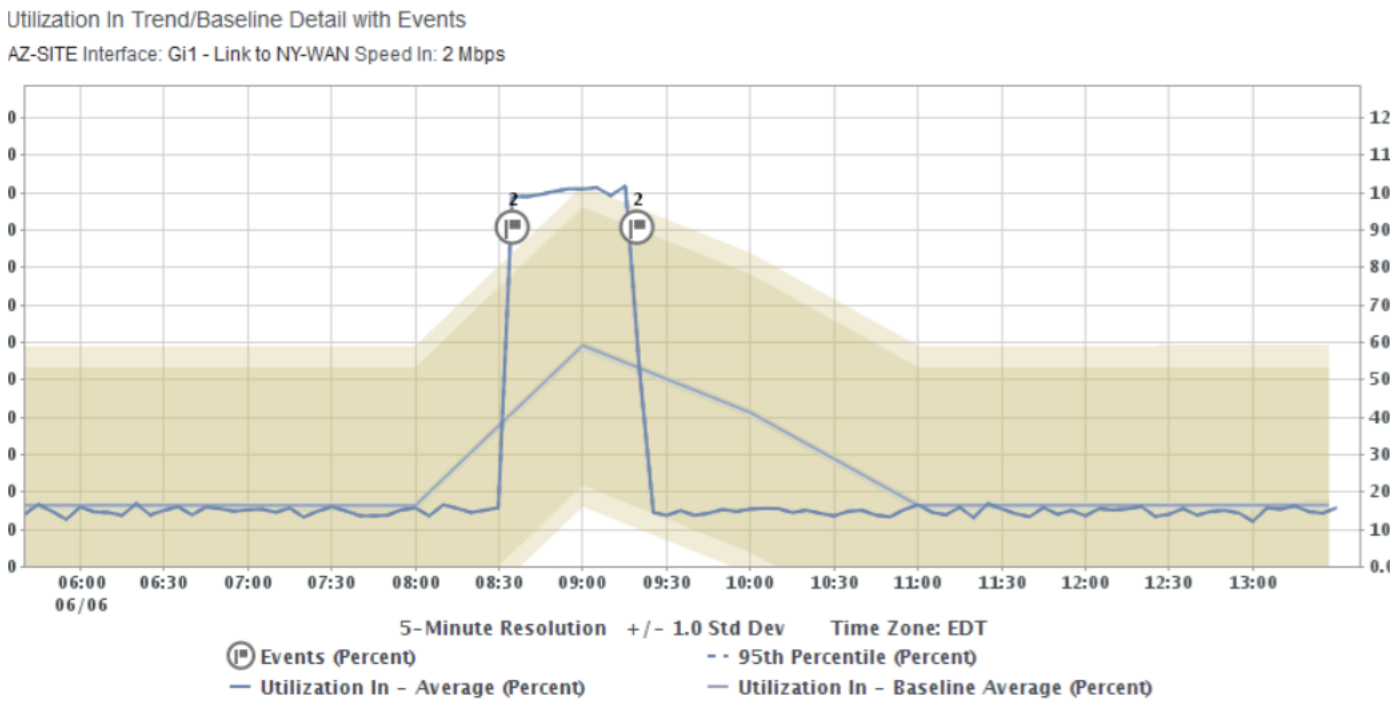
NetOps by Broadcom is a powerful solution for monitoring network performance and detecting anomalies that can have an impact on network delivery and user experience. The solution provides advanced baseline monitoring and threshold functions, including tracking deviation from normal and generating alarms based on time over thresholds. The solution can establish normal baselines for various network metrics and alert network operations teams when those metrics deviate from normal or exceed predefined thresholds. This way, teams can avoid being overwhelmed by irrelevant alerts and focus on resolving real issues quickly and efficiently.

The solution offers a smart, dynamic way to set baseline thresholds, adapting automatically to traffic patterns. The solution calculates traffic usage across different time intervals, such as hour, day, or week. It detects normal trends and activity levels that exceed acceptable thresholds. For instance, the solution can determine that activity on an employee application is higher on Mondays at 9:00 a.m. than Saturday at 2:00 a.m. This helps distinguish between patterns in network activity and real issues, speeding problem resolution and boosting level-one staff efficiency.

The solution can also generate an alarm when the value of a metric differs from the baseline by a specified number of standard deviations.

Dynamic baseline thresholds enable network operations teams to compute baseline averages based on the same hour of a day or day of a week. Users can have alerts based on standard deviations from baseline averages for a sustained period of time. To eliminate false positives, teams can also include a minimum threshold. For example, consider a CPU that has a baseline utilization of 65% with a standard deviation of 10%. If that number jumps to 75%, nearly a 15% increase, it would not trigger an alarm since it doesn't exceed the minimum threshold.

The solution provides thresholds on multiple metrics, such as latency, packet loss, jitter, and more. For example, teams can set up a latency or HTTP DNS resolution threshold in milliseconds, and a percentage threshold for jitter or packet loss. They can also define different alarm values for minor, major, or critical situations. The alarm values depend on the response time, the transaction time, or the metric type. In this example, when the latency, jitter, or packet loss exceeds the normal threshold value, the appropriate alarm is triggered automatically. This way, operators can keep track of any latency, jitter, or packet loss issues and troubleshoot them quickly.



PLANNING

Traditionally, network monitoring approaches have been reactive, focused on resolving problems after an outage has occurred or a performance threshold has been breached. With this approach, by the time teams know about a problem, critical time has passed, and user experience levels have been negatively affected.

How do network operations teams prevent this from happening? How can they maintain the highest levels of service availability? How can they ensure end-user experience levels remain as high as possible? Raising performance thresholds to artificially elevated levels will only generate alert noise and coverage fatigue.

To manage their environments effectively, network operations teams should take a proactive approach, keeping an eye on network performance and detecting any potential issues before they affect end users. By doing so, teams can avoid or reduce the impact of network failures, and they can anticipate, predict, and plan for future network needs. The question then is, "How do teams achieve this?"

Monitoring the network remains essential because it enables teams to observe and identify problems with network performance and user experience based on a set of predefined metrics. Prior sections outlined how baselining and setting thresholds can help teams understand the status of metrics and get notified of issues when anomalies and incidents cause the thresholds to be exceeded. However, relying largely on static baselines or thresholds that are based on historical data can still result in blind spots regarding emerging trends, capacity needs, and volatility.

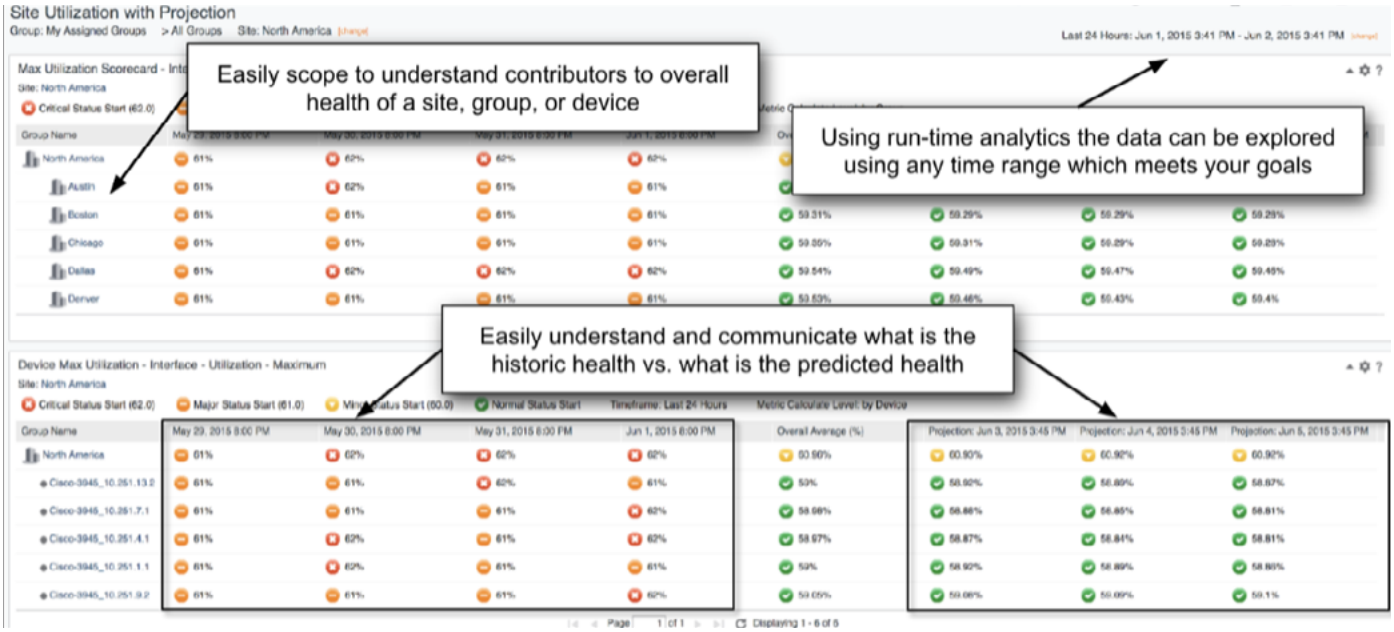
One way to evaluate the performance of a network device is to set a utilization threshold, such as 75%, and assume that the system performance is adequate if it stays below that limit. However, this method can miss important variations and volatility in performance that can occur within the threshold range. For example, what if the utilization never goes above 70%, but the average is only 25%? In this case, setting the threshold at 75% would not reflect the actual capacity needs of the system. What if the mean value does not reflect the true capacity needs, because there are many instances in which the utilization is much higher than the mean? In this case, using the mean as a measure of performance would not capture the true volatility of the system. What if using the maximum value or the 95th percentile would result in overestimating the capacity, because most of the values are lower than those metrics? What if there are hidden patterns of volatility in the performance data that require further analysis?

To achieve better network performance, capacity, and end-user experience, teams need to shift from reactive network monitoring approaches to proactive models. This way, they can gain essential actionable insights across the networks they manage and the networks managed by third parties. These insights will help them to identify and resolve potential problems based on emerging network trends, capacity needs, and volatility—before they affect network delivery. Further, this will enable teams to plan ahead and address projected needs in order to achieve enhanced network performance, capacity, and end-user experience.

Projection Using Linear Regression

NetOps by Broadcom is a powerful solution that can help teams plan effectively and optimize their resources. By using the solution's historical metric data, teams can estimate how certain metrics will change over time and what their values will be in the future. This feature, called metric projection, is very useful for capacity planning. For example, if a network team wants to know whether a system's interface bandwidth will be sufficient to handle the expected traffic in a few months, they can use the solution to calculate the projected interface utilization and compare it with the available bandwidth. This way, they can identify potential bottlenecks and take preventive actions before those bottlenecks affect network performance.

Metric projection enables teams to forecast future trends for key network operations metrics. This feature works by computing a linear regression line from the daily percentile values of the metric. Linear regression is a statistical method that tries to find the best-fitting straight line for a set of data points by minimizing the sum of squared errors between the actual and predicted values. The projection feature uses all the daily percentile values from the last 90 days as input data. Teams can select up to three different time frames to project the metric values, such as 20, 60, or 180 days ahead, to display a projected trend.



Volatility Analytics

Network performance volatility is a critical factor that needs to be considered. Variability in metrics like utilization, loss, and errors can affect the quality and consistency of the user experience. By measuring and analyzing these metrics, we can detect and prevent volatility that may harm network performance. This can help us deliver better and more reliable performance across various network technologies.

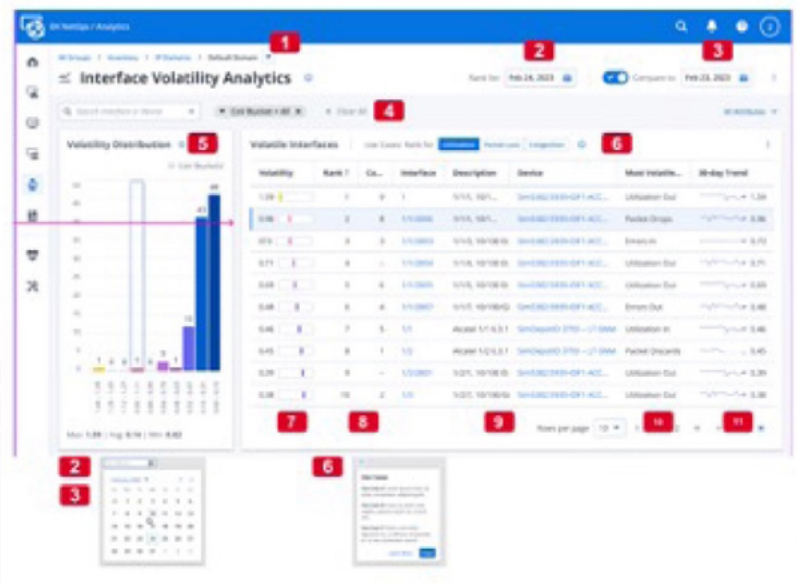
NetOps by Broadcom offers powerful capabilities for analyzing network volatility and optimizing resource allocation. Network volatility refers to the degree of variation in network utilization over time. A high-volatility network interface may require more capacity to cope with fluctuating demand, while a low-volatility one may have unused or underused resources. By understanding and measuring network volatility, network operations teams can plan, design, and manage networks that deliver both high performance and high consistency. This will improve the quality of service and user experience across the network.

The solution uses a normalized ratio from our volatility analysis capability to perform multi-variant calculations. These calculations reveal insights about the technologies we analyze. By using these statistical methods, network engineers and architects can detect small but important changes in network performance metrics. This gives them a deeper and more nuanced understanding of how the network performs. The solution's Volatility Dashboard lets teams quickly access key insights to improve, plan, and shape network performance and traffic.

The solution goes beyond analyzing volatility metrics for network interfaces. It can also track other network technologies that are subject to volatility, including the following:

- **Wireless networks**. Wireless technologies like Wi-Fi and cellular networks can have high volatility in signal quality and strength, which can affect network performance and user experience.
- **Cloud services**. Cloud-based applications and services can also have high volatility in network delivery performance metrics, such as latency, jitter, and packet loss. This can lead to inconsistent application performance and user dissatisfaction.
- **Security technologies**. Security technologies can also experience volatility due to changing threat landscapes and attack vectors.

By using volatility metrics, network architects can monitor and manage these network technologies more effectively, so they can detect performance issues early and take preventive actions. They can also optimize their IT resources and ensure consistent network and application performance. Volatility metrics can be applied to NetFlow and other sources of traffic capture, providing a quick way to identify volatility across the network.



1	Context selector allows focus on specific subset of technology (WAN, data center fabric).
2	Rank for date selects the primary day (24-hour) volatility will be enabled for.
3	Select a compare date to compare volatility and ranking between two 24-hour periods.
4	Filters enable focusing based on specific susbets, such as name, vendor, etc.
5	Volatility distribution provides visibility into the volatility distribution for the selected group—select a bar to focus on only those items.
6	Select use cases to change the volatility calculations for specific use cases. Each use case contains specific metrics and weightings applicable to the use case.
7	Relative volatility to allow easy comparison against peers.
8	Volatility ranking for both "rank for" and "compare" dates.
9	Interface and device information with drill-down to specific context pages.
10	Metric with highest volatility ranking for item and use case.
11	30-day sparkline showing trend of daily volatility for item and use case.

Intelligent Capacity Planning

NetOps by Broadcom enables teams to collect and analyze historical and real-time network traffic data and intelligently plan network capacity based on this intelligence. By analyzing traffic patterns and trends, the solution can help teams gain insight into their network and make better capacity planning decisions to support future network requirements.

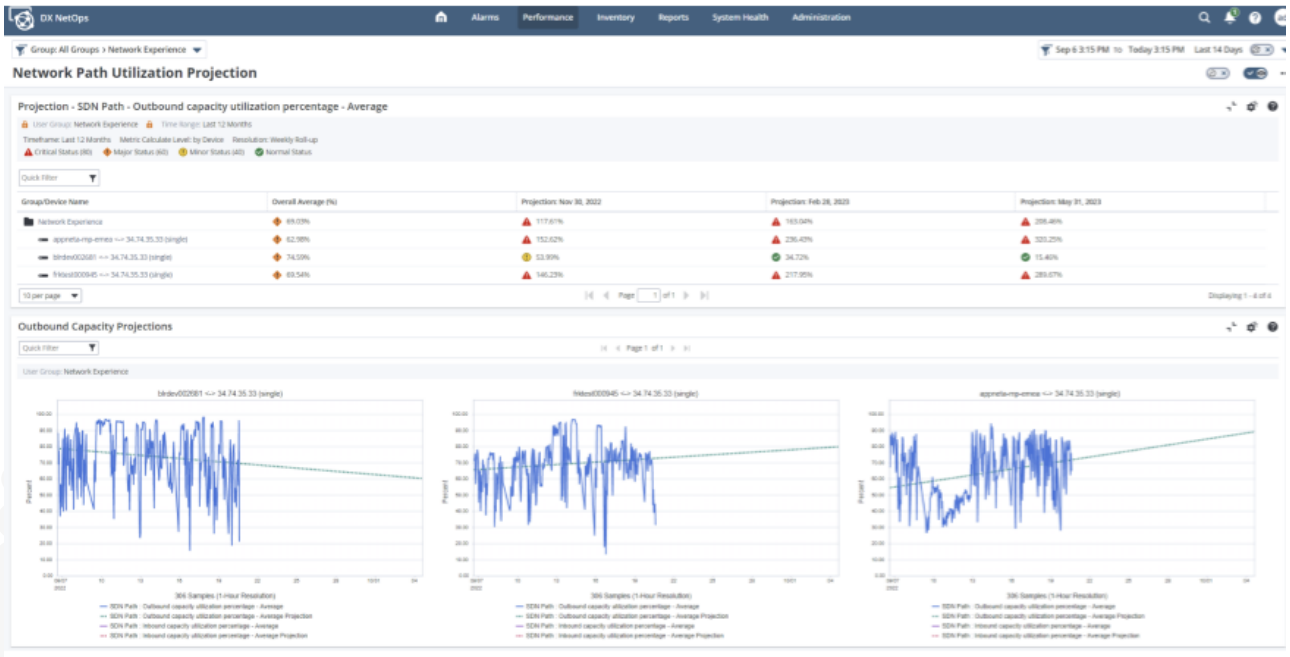
With the solution, teams can accurately assess their applications' and users' network capacity needs. They can also monitor how new applications affect WAN links and track the growth of application traffic over time using detailed analysis of protocols, baselines, and percentages. Through this analysis, teams can make smarter infrastructure investments.

With the Broadcom solution, teams can establish baselines for protocol and flow data, so they can compare current data with past performance. The solution can analyze trends in applications, hosts, and conversations, for each class of service. This information helps teams optimize their network infrastructure for application performance. Teams can review trend settings for historical data and for future projections to perform more effective capacity planning.

The solution offers predictive analytics that enable teams to gain a comprehensive and clear understanding of the network and its impact on business outcomes. The solution can also employ metric projection to generate customizable and dynamic projections that help with capacity planning and identifying potential issues. This solution can estimate and save future values based on historical data. This provides useful insights for network and capacity planners who need to plan ahead and optimize their resources.

Using historical metric data, the solution applies metric projection to forecast future values. This can assist with capacity planning by showing how the metrics will evolve over time. For example, network operations teams can use metric projection to compute the projected utilization of a specific interface and verify if the bandwidth available will be sufficient to support future demand. With this feature, teams can also set up three different intervals for metric projection. For example, they can view what the projected metric will be in 20, 60, and 180 days.

The image below illustrates how the solution can create projections based on historical data. The image features the projection for network path utilization, which is useful for understanding how much of the link capacity is used and how it will change in the future based on the historical baseline. The solution can provide projections and percentiles for various network metrics, such as packet loss, latency, traffic, and more. This enables teams to gain future insights and proactively detect capacity issues.



SLA VALIDATION

Network operations teams must ensure the availability and performance of network services. They need to monitor and troubleshoot network issues, as well as implement and maintain network configurations and policies. One of the key tasks of network operations teams is to validate SLAs.

SLA validation is the process of verifying that the SLAs between a service provider and a customer are met. SLAs define the expected quality and performance of a service. SLAs can specify commitments for various network metrics, such as latency, throughput, packet loss, jitter, availability, uptime, and more. SLA validation can help both parties to ensure that service commitments are being met, and to identify and resolve any issues that may affect service quality.

However, network operations teams face several challenges in validating SLAs effectively. Network environments are complex and diverse. These teams have to contend with various devices, protocols, topologies, and vendors across different networks. Moreover, the volume of network traffic tends to keep growing, and gets increasingly dynamic and unpredictable, which generates a lot of noise and false positives. This increases the risk of disruptions, outages, and SLA violations. These challenges are compounded by the fact that so many services are now reliant upon networks that internal network operations teams don't own or manage, such as cloud environments and ISP networks. These third-party networks present a significant blind spot for many teams today.

To address these challenges, teams need to ensure the quality and reliability of their network services across the entire network delivery path. To do this, they need to have a comprehensive and continuous view of indicators of network performance, health, and user experience. Many teams use multiple network monitoring tools from different vendors to collect and monitor such data as latency, jitter, packet loss, throughput, and availability.

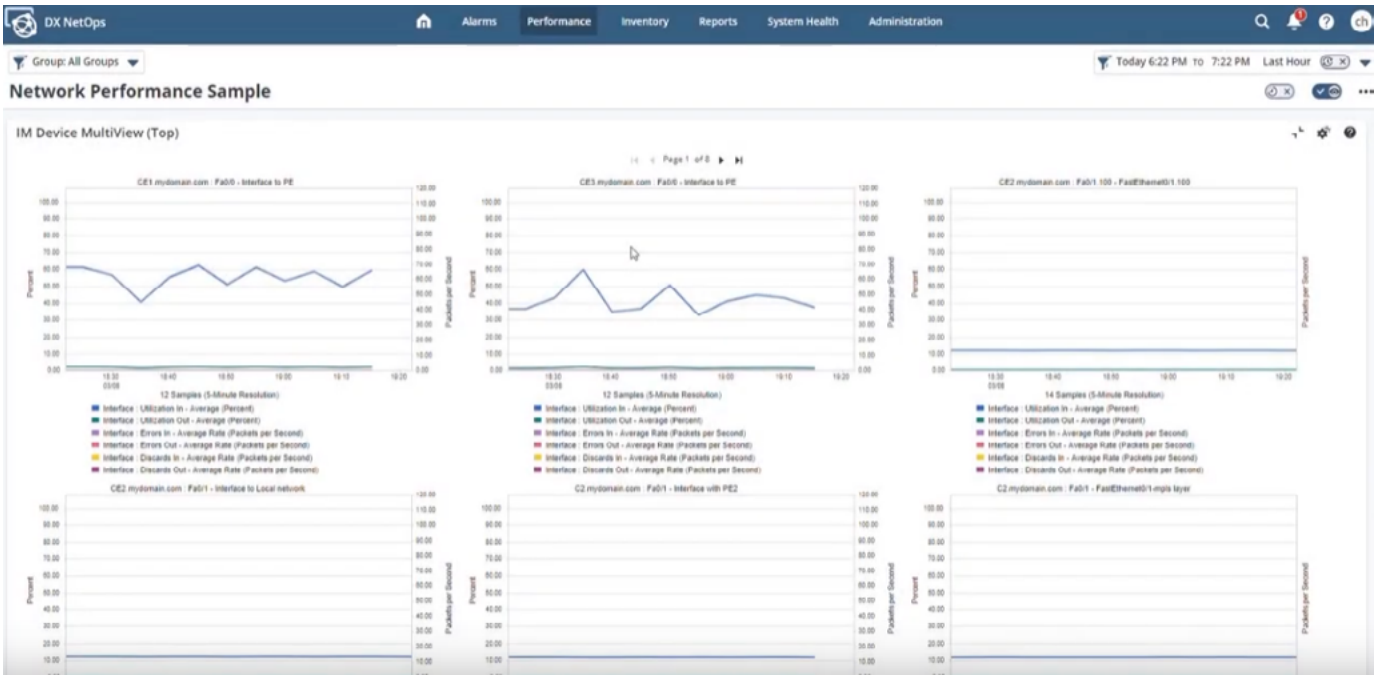
Some use additional technologies to perform analytics on both real-time and historical data. Most teams employ tools that provide dashboards, charts, graphs, and alerts that help track SLA compliance and deviations. The challenge is that using multiple network monitoring tools from different providers creates unnecessary operational complexity and costs.

To ensure compliance with SLAs, network operations teams need to have actionable insights into network performance, health, and user experience. They also need to adopt more proactive methods for monitoring, analyzing, and optimizing the network before any problems occur. Proactive insights can enable network operations teams to identify and resolve potential issues before they have any impact on service quality. In the process, they can eliminate or reduce service interruptions and poor end-user experiences that can lead to SLA breaches.

SLA Validation

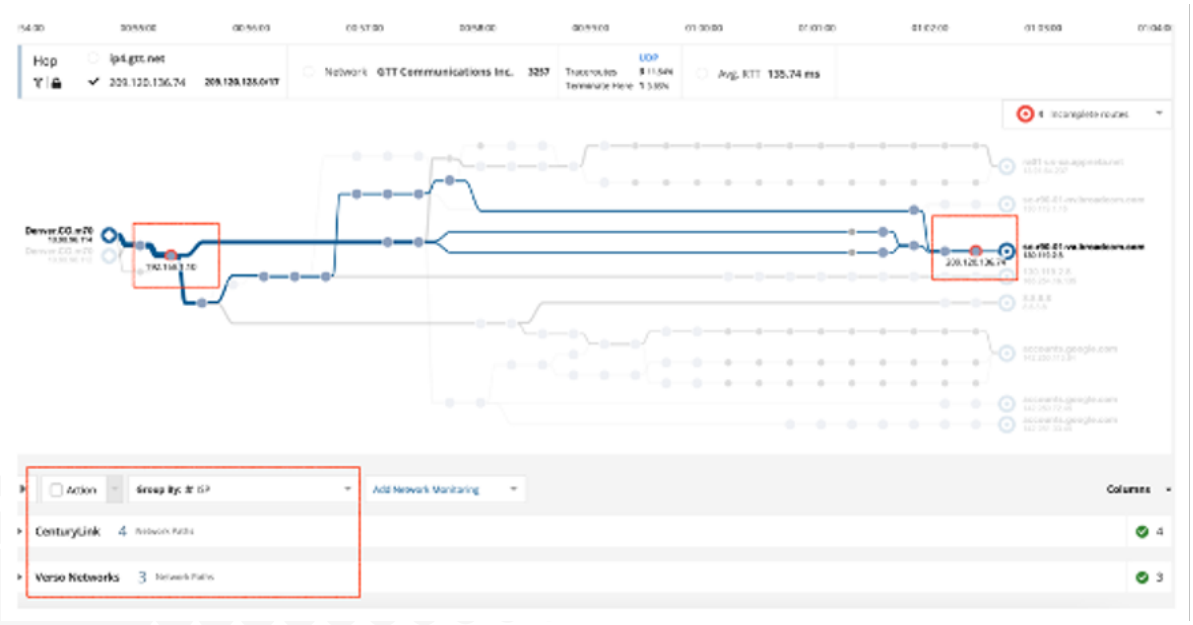
One of the essential tasks in network operations is to conduct network performance monitoring and testing to set service-level expectations and monitor service quality. NetOps by Broadcom offers response time tests that measure service delivery quality. The solution is far more accurate than simple status reports, which only show service availability. Service delivery speed plays a key role in the quality of the end-user experience.

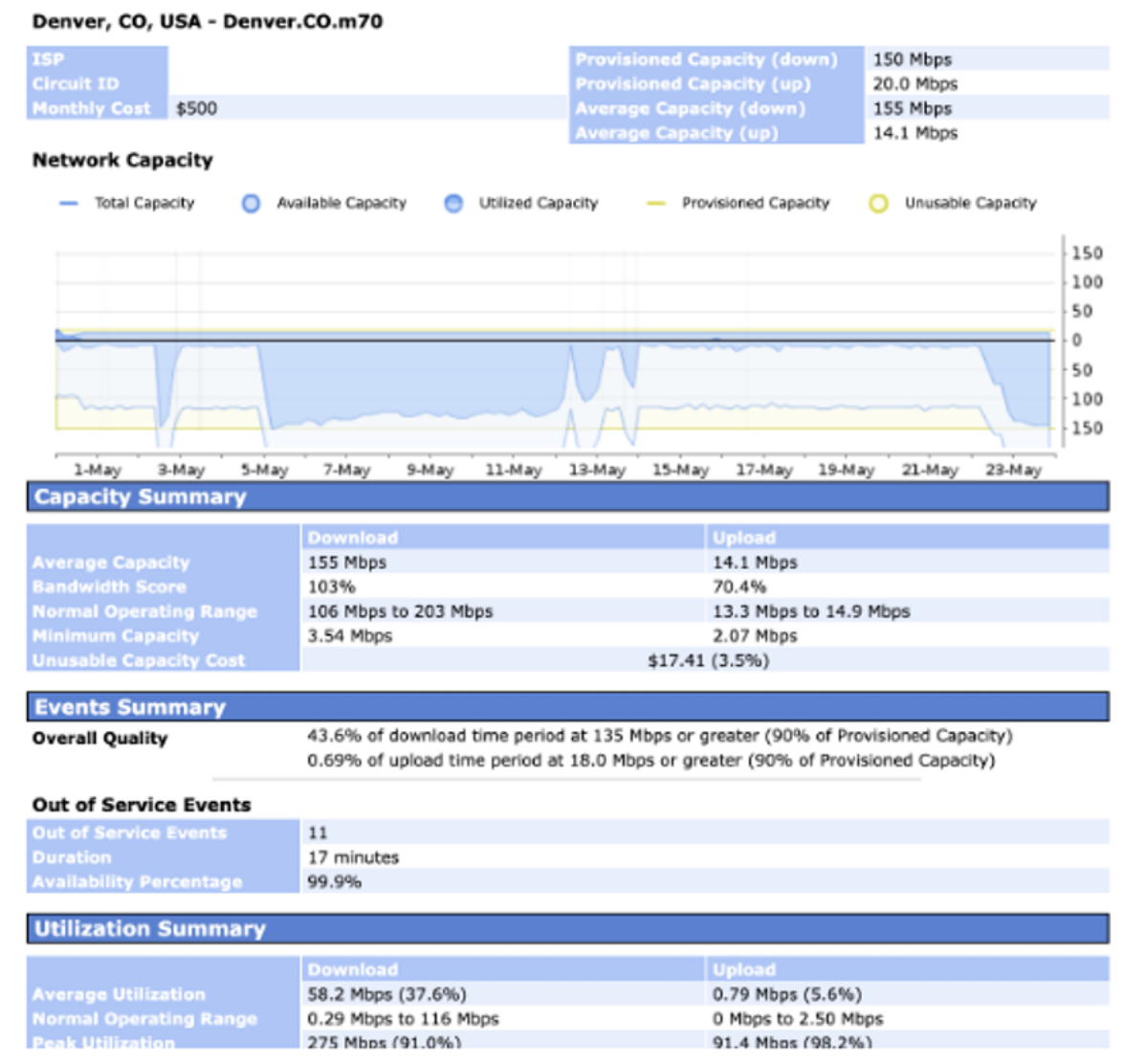
One way to understand the difference between perceived and actual availability of a web service is to imagine a scenario in which a web page takes much longer than expected to load. For instance, if a service consumer is accustomed to having a web page load in five seconds, but it takes 20 seconds to load, they might think that the web service is down, even if it is still accessible. This shows the critical role of the service consumer's expectations and perceptions of such factors as loading time, and how those can differ from basic measures of whether a system is up or down.



With the solution, teams can define response time thresholds to evaluate how fast their service responds to requests. These thresholds enable teams to create SLAs that guarantee a certain response time and ensure the needs of the customer are satisfied. The solution makes it easy to monitor and manage services and SLAs.

The solution helps teams create, manage, and monitor the quality of business services, SLAs, and service models. Operators can get real-time and historical data on the health and performance of service management components. Teams can also generate various reports for different service management aspects. The solution enables teams to go beyond the individual device and application level and manage their infrastructure as a whole. The solution's tools enable teams to design mechanisms that allow service providers and customers to verify service availability and performance.





Denver, CO, USA - Denver.CO.m70

ISP		Provisioned Capacity (down)	150 Mbps
Circuit ID		Provisioned Capacity (up)	20.0 Mbps
Monthly Cost	$500	Average Capacity (down)	155 Mbps
		Average Capacity (up)	14.1 Mbps

Network Capacity

Capacity Summary

	Download	Upload
Average Capacity	155 Mbps	14.1 Mbps
Bandwidth Score	103%	70.4%
Normal Operating Range	106 Mbps to 203 Mbps	13.3 Mbps to 14.9 Mbps
Minimum Capacity	3.54 Mbps	2.07 Mbps
Unusable Capacity Cost	$17.41 (3.5%)	

Events Summary

Overall Quality	43.6% of download time period at 135 Mbps or greater (90% of Provisioned Capacity) 0.69% of upload time period at 18.0 Mbps or greater (90% of Provisioned Capacity)

Out of Service Events

Out of Service Events	11
Duration	17 minutes
Availability Percentage	99.9%

Utilization Summary

	Download	Upload
Average Utilization	58.2 Mbps (37.6%)	0.79 Mbps (5.6%)
Normal Operating Range	0.29 Mbps to 116 Mbps	0 Mbps to 2.50 Mbps
Peak Utilization	275 Mbps (91.0%)	91.4 Mbps (98.2%)

With the solution, teams can set “guarantees” in two domains: availability and response time. Both kinds of guarantees measure service downtime and contrast it with a threshold chosen by the user for a period. Availability guarantees also include additional thresholds, such as mean time to repair, mean time between failure, and maximum outage time.

Furthermore, to help network operations teams effectively identify the root cause of performance issues that can affect SLAs, the solution actively monitors the entire delivery path from local networks to last-mile ISP performance. If the problem is with an ISP, the solution can prove it. The solution provides real-time data on SLA and performance issues based on location, region, ISP, and application. To quickly pinpoint the culprit of route problems between the source and destination, teams can leverage route visualization views. These views can show the route by hop or by network and allow the team to drill down on problematic segments affecting SLAs or performance. The solution also enables teams to monitor end-to-end performance from one minute to one year and discover trends in SLA violations and performance degradations over time.

With the solution, network operations teams can access SLA validation reports that show SLA, performance, and capacity metrics. These reports can help pinpoint ISPs and circuits that cause issues. Teams can also check the provisioned capacity, which shows either the maximum total capacity seen during the specified time range, or the expected capacity based on the SLA with the ISP. Using the solution's patented packet analysis technology, teams can automatically measure the total capacity or the end-to-end capacity. It is important to compare the total capacity measured with the provisioned capacity specified, because a large discrepancy over an extended time period could signal waste or underuse of capacity. The solution can help identify if this is the case by measuring how much capacity is unused, and by showing the cost or value of the gap between the total and the provisioned capacity. Moreover, the solution provides bandwidth quality reports that display metrics on the frequency, duration, and percentage of service outages and availability, which help verify SLAs and performance.

CONCLUSION

Reactive network monitoring tools and practices are not sufficient, as they only enable teams to deal with issues after they occur. Instead of waiting for issues to happen and then fixing them, network operations teams should prevent them from occurring in the first place. This way, they can avoid downtime, performance issues, and poor user experiences.

To prevent problems, teams need to take a proactive approach to network observability and management. By leveraging proactive insights, network operations teams can analyze current and historical network data sets to spot trends and anticipate potential issues before they happen. By doing so, teams can make informed and forward-looking decisions that can improve network efficiency, reliability, and user experience. Proactive insights can also help network operations teams find opportunities for network optimization and innovation.

NetOps by Broadcom helps customers optimize network performance and resilience, while keeping a clear focus on what really matters: the user experience. The solution can help your teams gain the intelligence needed to take a proactive approach to network operations, so they can prevent costly network disruptions.

With the solution, you can better understand volatility, anticipate capacity needs, predict potential threshold violations, and mitigate risks before they affect the business. With the solution, you can improve network observability and management, capacity planning, forecasting, and SLA validation.

Large US Commercial Bank Gets Ahead of Emerging Capacity Needs

A financial services company's network operations team struggled to cope with their network capacity growth. They faced high demand from customers and employees, who were highly reliant upon the organization's digital services and applications.

The network operations team had to oversee a network infrastructure that extended beyond their enterprise boundaries, with circuits across data centers, links to the cloud, and modern technologies like SD-WAN with broadband connections. They also had to undergo internal and external audits to demonstrate that they have control over the network. This involved knowing how various network devices were used at any given time to ensure that the network could reliably handle large volumes of data, transactions, and connectivity. However, the network operations team lacked a complete view of their network capacity consumption. They struggled in accessing historical data on capacity usage, and they could not easily predict their future network needs based on their usage patterns.

By using NetOps by Broadcom, the company's network capacity planners could easily spot and examine the network segments that had increasing usage and were approaching capacity limits. They achieved this workflow by using dashboards that showed the KPIs relevant to capacity planning for a specific time period. Examples of the KPIs used include:

- Interface Utilization In: Average, 90th Percentile, 95th Percentile, Max
- Interface Utilization Out: Average, 90th Percentile, 95th Percentile, Max

The dashboard showed the most used items at the top, which helped capacity planners find network components that were overused or underused in different locations. They also analyzed these items by tracking their KPIs for 13 months and looking for increasing trends. This enabled them to meet their audit and compliance standards.

The Broadcom solution enables the network operations team to set up capacity baselines and thresholds and identify errors or discards in network devices, such as interfaces and routers. In a portal view, the solution displays the devices with the most abnormal utilization rates. This helps the team contend with their ongoing challenge of monitoring network devices for over/under utilization across various components, such as interfaces, routers, switches, Wi-Fi retail locations, MPLS cellular, and branches in different geographies.

The solution also provides alerts for critical circuits or interfaces, and firewalls and other network security devices that have high utilization rates. The team has since established a protocol that enables them to confidently generate a network capacity status report on a monthly basis. The solution also provides insights that help the team determine network devices that reach critical utilization thresholds, especially the ones that reached the 95th and 90th used and max thresholds, as mentioned in the previous example. With the solution, they can plan for future capacity needs based on historical, real-time, and trending data.

Why Broadcom

Network monitoring can be challenging and costly, especially when teams are contending with multiple tools, blind spots, and a lack of control. Broadcom offers a highly scalable, comprehensive solution that can help you overcome these challenges.

Broadcom can help you manage your network with a flexible and comprehensive solution that works with any vendor, technology, and protocol. NetOps by Broadcom can collect and analyze different network metrics, such as utilization, throughput, latency, jitter, packet loss, errors, congestion, quality of service, and end user experience.

The solution offers comprehensive visibility and deployment flexibility, enabling data gathering from across your environment, from the site to the cloud. This end-to-end visibility can help you improve network performance and efficiency and enable you to detect and fix any problems quickly and accurately.

With the Broadcom solution, you can gain unified visibility across all the environments your business services rely upon, including your internally managed networks and those operated by third parties. With these solutions, you can reduce operational and software costs, minimize downtime, improve service quality, and enhance the user experience.

For more information, visit our website at: www.broadcom.com

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