Network Health Framework: A Proactive Approach

Cisco Services Solution Improves Network Health with Preemptive Practices: Analyses, Action Plans, and Remediation.

Abstract

Service Providers (SPs) today are delivering a rich set of business and consumer services over converged Next-Generation Networks (NGN). Their network must be reliable, and performing optimally as any degradation in the health of the network directly affects all their services, potentially creating subscriber churn and loss of revenue due to poor end user experience. It is essential therefore that the SP adopt a proactive approach to managing the health of their NGN to prevent any performance degradation or outages as opposed to reacting to any breakdown.

This paper describes the operational challenges faced by the Service Provider as they transition to converged multiservice Next-Generation Network (NGN). Next, the paper describes how service providers can overcome these challenges with a proactive approach for network health management to preempt problems before they impact their Network and Services. Cisco® Services professionals introduce this type of holistic approach as the basis for a solution built around the Network Health Framework. The final sections of the paper provide more detail about the features and benefits of the Cisco Network Health Framework solution for maximizing performance and availability of service provider networks. Cisco network health experts are uniquely positioned to help service providers make the transition to the forward-looking, preemptive methodologies; at the heart of Cisco Assurance Services, the Network Health Framework lets providers cost-effectively evolve existing networks for more resilient IP Next Generation Network (NGN) services.

Introduction

Assurance-based IP services are the talk of the industry lately, offering the potential to more predictably scale networks for new services and head off network health issues before they affect the business. Consumer behaviors have placed urgency on assurance—if they do not get transparent, non-interrupted services, they are quick to jump to a competitor. And enterprise customers are fueling the demand for assurance services as well. Businesses are asking for more stringent service-level agreements (SLAs) and want flexible solutions that address their unique requirements.

At the core of assurance services is the ability to accurately assess and manage the health of the network. Think of the network as an athlete's body. To achieve the best possible results, the athlete needs to maintain a healthy lifestyle and proactively manage every aspect of his or her health. Professional advice and care are vital, in the form of doctors who can treat injuries and trainers who can provide ongoing advice and guidance. In the case of service delivery networks, the best results require a similar holistic approach; including methodologies, tools, and professional advice from experts that can help you maximize the overall health of your network.

The Challenges Surrounding IP Service Portfolio Expansion

Many industry articles and forums reflect that customer retention now ranks higher than new customer acquisition. Two primary factors for consumer churn include price point and customer service experience. The health of the network directly affects operating costs (and therefore price points) as well as the user experience since the business applications all depend on the network. Therefore, the health of the network ranks as a vital priority for today's network operators.

However, numerous operational challenges stem from the increasing scale and complexity of network systems. Some of these issues facing service providers include:

- **Performance and quality of service:** In the past, network operators managed a single network for voice and another for data. Networks could be efficiently tuned to the specific types of applications they supported. Today, IP convergence has introduced a new operational paradigm, with multiple services on a single network. Data, voice, and video applications are all on one network. Complexity of the single network has dramatically increased, making it more difficult than ever to efficiently manage and optimize customer experiences.
- **Capacity:** Increasing global penetration of PCs and mobile communications is bringing new challenges to service providers. Since rapid growth in the subscriber base or sudden increases in bandwidth demand can seriously degrade quality of service or cause outages, operators continually strive to more accurately assess network readiness for growth. For example, a 5x increase in video traffic is expected by 2013.[1]
- **Higher numbers of network faults:** Dedicated, non-converged networks made it easier to identify and correct problems. Now, as networks have become more complex—with multivendor technologies, products, and equipment—fault management is also more complex. Network operations teams not only are stretched to handle the increase in the number of faults, but also are faced with more challenging troubleshooting that call for a new workflow. Increasing security threats also pose risks to providers and their customers, as the numbers and types of threats have escalated compared to the past.
- **Shorter technology and service lifecycles:** Not only are subscriber loyalty declining and customer churn increasing, but also services are becoming more commoditized. Shorter times to market have resulted as

[1] Source: Cisco Visual Networking Index: Forecast and Methodology, 2008–2013

providers compete more aggressively for subscribers, and an agile operation has become vital for rapidly responding to market dynamics.

- **Operational gaps:** Large networks call for a broad range of people skills, processes, platforms, and tools. Expanding and managing this operational knowledgebase have become significant drains on already scarce IT resources.

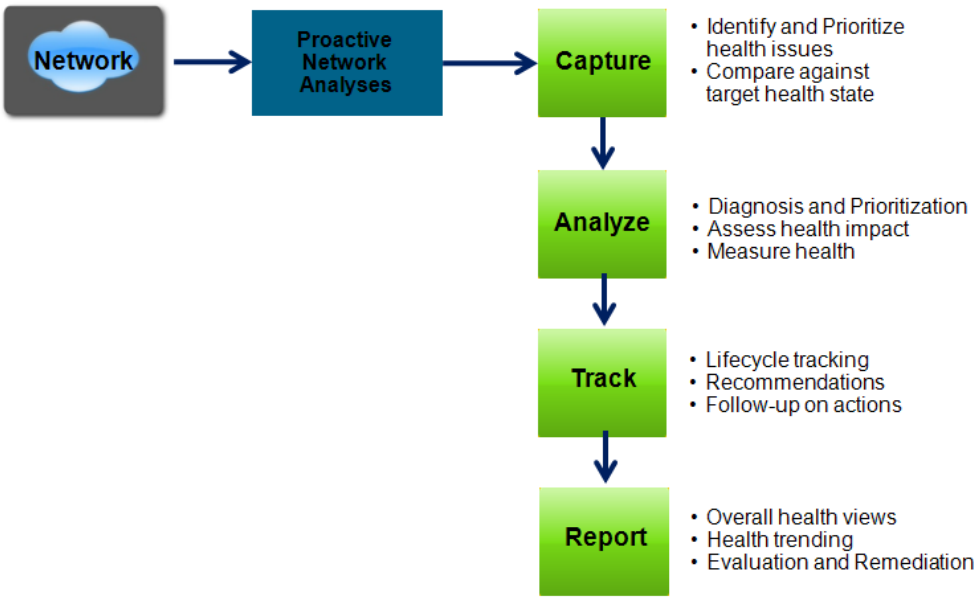
From the growing list of challenges, the issues of most concern to operations teams are those that relate to availability, performance, and capacity. Growth and change can quickly or gradually affect all of these and have a profound effect on the business, but unpredictability poses the biggest challenge, particularly when large and even small changes in equipment, configurations, or applications can affect the overall health of the network.

The Need for Holistic Health Analysis and Management of the Network

By being proactive, service providers not only maintain the health of the network, they can potentially improve operational efficiency and reduce operating expenses with preemptive approaches. A proactive stance calls for accurate and timely visiblity into the health of the network and services and continual comparison with the target health state. Just as an athlete can maximize cardiovascular capacity by monitoring and managing cholesterol counts, blood pressure, and other relevant health indicators, a network operations team can optimize network uptimes and avoid significant drops in quality of service by monitoring and managing prioritized indicators of network health to keep them within optimum range of target states.

Service providers recognize the importance of shifting to a more proactive stance. However, to avoid pitfalls and shorten the transition, in-place network operations teams want proven methodologies. They need network experts who can identify primary network health indicators, accurately measure them, and then analyze and translate the data into prescriptive action plans that can promote improvements. Technology vendors are being asked to help them assess the state of the network, and to transition them to a preemptive management methodology (see Figure 1). Service providers want vendor expertise, new tools, and methodologies that allow them to improve the overall customer experience.

Figure 1. Preemptive Management Workflow



Based on decades of partnering with different service providers around the world, Cisco has seen the industry undergo this shift in focus. Service providers need more than just the right tools and processes to successfully deliver optimal customer experiences. They need assurance-based services that are relevant to their unique businesses and network health experts who can help analyze and customize networks for the delivery of services. For example, if every doctor provided the exact same care, a person could walk into any doctor's office and get the same standard reports and a predefined set of recommendations for living a long life. But most people recognize the value of a doctor who can assess their history, choose the right tests based on their unique history and present condition, and accurately diagnose health. They need a doctor who will work with them on a long-term health plan that is customized to their life conditions and health issues. Similarly, service providers must choose a partner that can offer relevant advice and services based on their unique business requirements, help them customize network health management to their business, and follow up to make sure that the desired results are achieved.

Cisco Network Health Framework: Shifting to Preemptive Management Practices

Cisco has continually evolved its portfolio of services in direct response to the need for more holistic, predictive services. Cisco Services professionals help a provider monitor network health in real time, and give the provider a prescription for changes that can yield the desired improvements in network health.

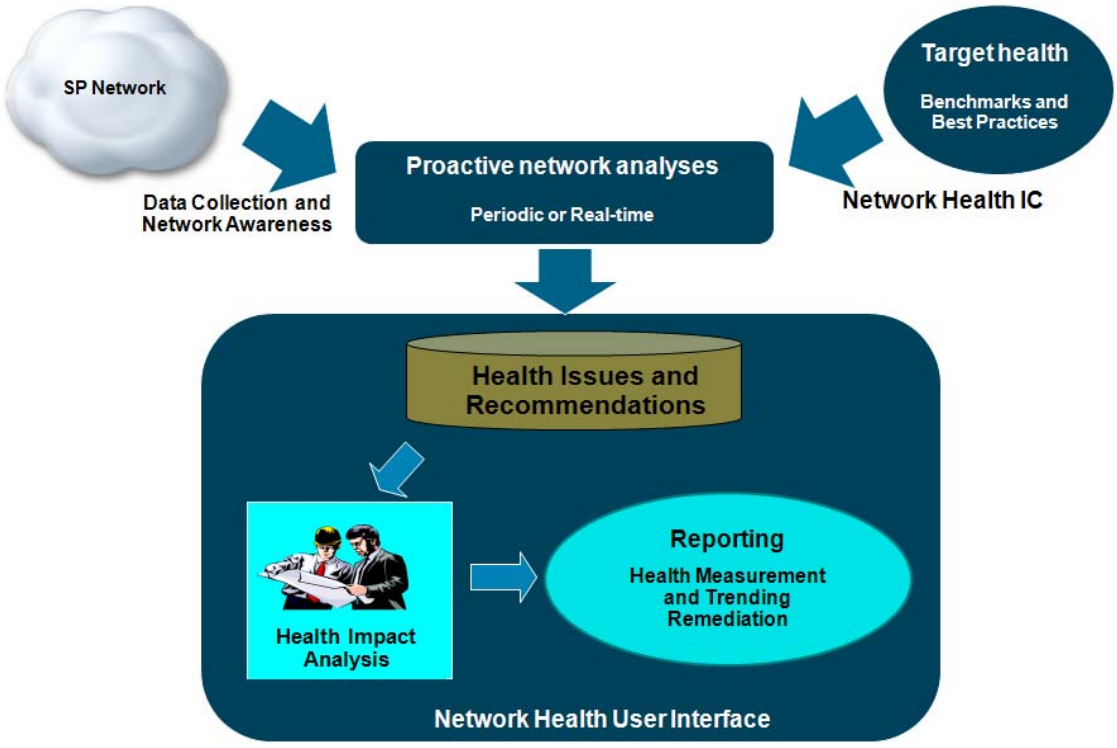
Cisco Services engagements can be customized to focus on specific issues such as network faults, performance, availability, and capacity or provide broader operational support to address service provider network and services assurance requirements. These services represent an evolution of the existing service provider portfolio.

The Role of the Network Health Framework

At the heart of assurance-based services, Cisco experts introduce the Network Health Framework to help address current operational concerns and gain a proactive dimension for network health management (see Figure 2). The service delivery platform includes tools, methodology, and the intellectual capital offered by Cisco Services. To optimize the customer experience, Cisco professionals use the Network Health Framework to:

- **Identify and prioritize** problems around faults, availability, performance, and capacity using benchmarks defined by Cisco experts and selected based on the specific business and network characteristics
- **Provide** objective risk and health indexes based on comparisons of benchmark results with a predefined set of industry metrics across the network and operational layers
- **Diagnose** overall network health, prescribe a prioritized approach for managing issues and service deliverables, and track and report results going forward.

Figure 2. Preemptive Management Workflow



The introduction of the Network Health Framework creates an end-to-end system for managing the health of the network. Three main steps—capture, analyze, and report—put into effect a continuous-loop prescription for managing network health. Collected data is continually compared against a predefined baseline and thresholds to benchmark the health of the network. The benchmark approach leverages the network history as well as industry health standards as summarized by Cisco experts. Cisco uses this patent-pending analytical framework and methodology for providing real-time visibility into the overall health of the network—meeting SLAs—and ultimately protecting the end-user experience.

Network Health Framework Functional Components

To meet the needs of service providers, the Network Health Framework allows Cisco Services professionals to analyze real-time network health data. After sharing results with operations teams, Cisco Services helps service providers track and implement the remediation plan. The Network Health Framework introduces several new capabilities to the collaborative process:

- **Enhanced tools** capture health-affecting issues and carry out real-time tracking of relevant parameters.
- **A global action register**, in the form of a central database, is used for tracking proactive and reactive network issues (uses information related to network issues across the Cisco service provider customer base).
- **Comprehensive metrics and methodology** help diagnose network health using an empirical model.
- **Comparison with Network Health Benchmarks** defines the healthy state of a service-provider network based on different network profiles and health ratings that are computed based on weighted factors that affect overall network health.
- **Dashboards and reporting capabilities** reflect overall health trends.

Network Health Methodology

The methodology introduced with the Network Health Framework helps Cisco professionals and network operators work together to identify, capture, and track health-affecting issues. Cisco Services professionals refer to these issues to assess the overall network health using an empirical model and provide capabilities to measure, trend, and report network health quantitatively.

The methodology results in a rating, or score, that reflects the overall health of a network. To arrive at this score, Cisco Services follows the process outlined in the following steps.

Step 1. Capture and Filter Issues

The process begins with capturing top current and potential network issues from proactive network assessments and other sources, including:

- Periodic health checks such as network audits, network design analysis, configuration best practices, and syslog analysis.
- Real time network monitoring of faults, availability, performance, and capacity.

Once captured, issues are then filtered based on relevance to overall health and classified as:

- Chronic, critical, service-affecting issues
- Network wide systemic issues bearing long-term potential effect
- Issues accompanied with proactive recommendations

Step 2. Define Metrics and Assign Weights

Relevant issues are identified and prioritized, with each given a numerical value that is stored in a network issue database. The assigned values are based on predefined metrics and empirical weights and reflect severity and priority levels. Some metrics are network-independent, and do not change over time. Other metrics are network dependent; their weights might vary from one network to another and might also vary over time.

Based on a diagnosis of a network, predefined weights are assigned to each of these metrics. It is important to note that there might be situations in which not all metrics will be applicable to an issue depending upon the network environment. In situations in which a metric is not applicable, a null weight is assigned to that metric.

Step 3. Compute Health Ratings

Each issue is factored into an empirical formula, resulting in a risk index. A complementary health index is then derived from the risk index. The average of the health indices for all issues then provides a final overall health rating for the network.

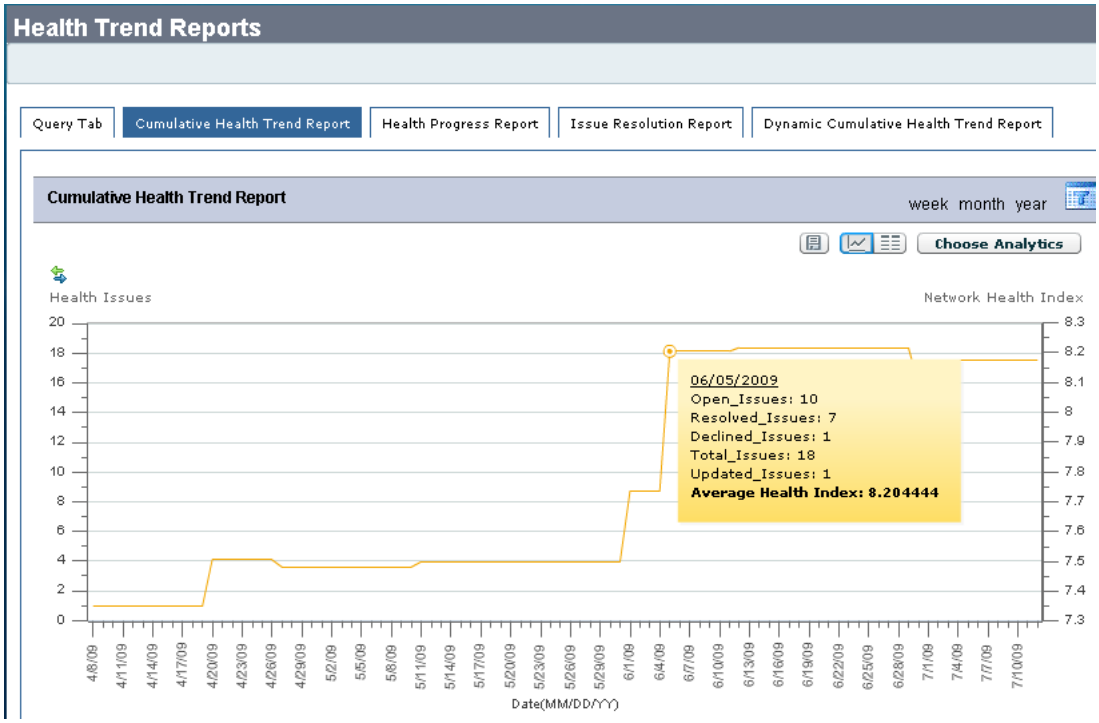
Step 4. Generate Reports and Review Progress

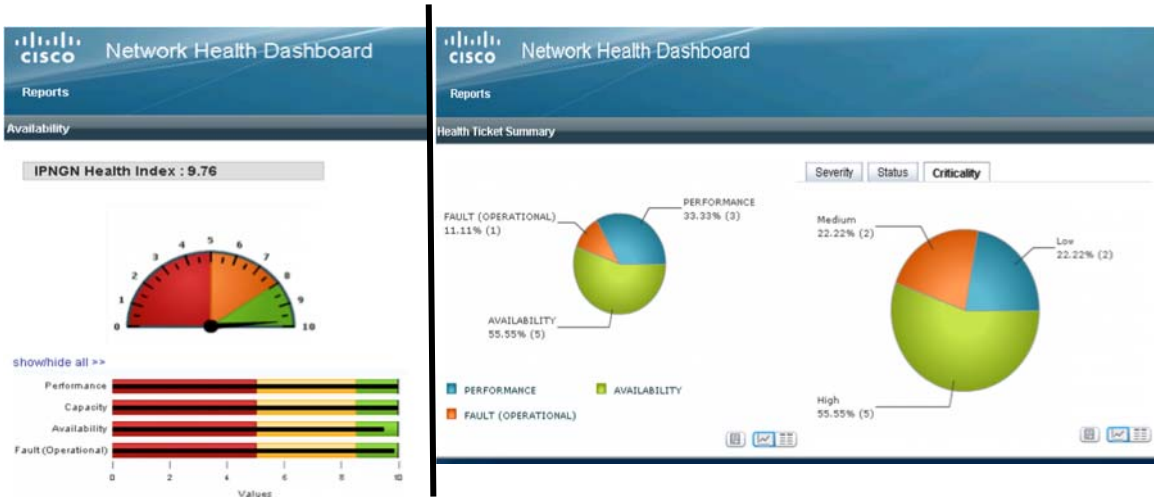
The overall network health rating achieved in the first three steps provides a snapshot of issues and their weights based on effect on network health. This serves as an initial base snapshot. However, any network is a dynamic environment where new issues arise and old issues either change or are eliminated by corrective actions. When changes are significant, their state changes are monitored and captured in the issue database along with new issues. To reflect the true network health, the Network Health Framework allows Cisco Services to capture variations over time along with time stamps and changes in corresponding weights. Subsequent snapshots are then used for tracking and trending analysis.

As issues are resolved, the health index and improvements can be reviewed using the Network Health Dashboard (see Figure 3). The ability to measure network health improvements based on implemented recommendations

and actions provides valuable feedback and helps providers quickly address and resolve issues. “What-if” analyses can also be carried out using the Network Health Framework tools, helping to optimize planning efforts and appropriately react to market changes, new services, or subscriber growth.

Figure 3. Network Health Framework Dashboard View





The Results: Improved Network Health and Operational Efficiencies

The Network Health Framework helps service providers get ahead of customer-affecting issues and promote overall improvements in network health. The results include direct benefits for users (improved quality of service avoided outages) and cost reductions for the provider (minimized time spent in reactive problem-solving mode). The Cisco Services solution also gives providers the tools needed to make better decisions regarding capacity planning and network changes.

The Network Health Framework helps service providers gain more value from Cisco experts by better tracking progress and strengthening relationships with Cisco. Less time spent on problem resolution also means improved productivity for the service provider.

All of the improvements stem from the accurate identification of potential problems, analyses carried out by experienced Cisco Services professionals, recommendations for action, and the ability to measure the results of the actions. Just as a doctor's prescription alone cannot achieve the desired results without diligent follow-through and follow-up visits, meeting network health goals calls for the ability to retest and confirm improvements.

Conclusion

Service providers understand the urgency of shifting away from maintenance-mode network operations and are demanding forward-looking models that make it possible to advance the health of existing service-delivery networks. These tools, as part of a prescriptive methodology that includes intellectual capital, can optimize the overall results in terms of customer experience and reduced churn in the subscriber base. Service providers today can take advantage of Cisco Services that introduce the Network Health Framework to gain visibility over a complete end-to-end network health management—including assessment, analysis, and tracking of results.

For More Information

For more information about Network Health Framework solutions, please email ask-nhf@cisco.com or contact your sales or delivery representative.

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