Greeting the Future Proactively

The Need for Active Testing to Assure The Promise of Cost-Effective Dynamic Networks

With the advent of such innovations as Network Functions Virtualization (NFV), Internet of Things (IoT), and soon, 5G, telecom is undergoing a technological evolution that's also a truly unprecedented business transformation.

We'll enjoy increased speed to deployment of new services and reduced operating costs; new use cases and fresh revenue streams. At the same time, demand on our networks will surge as we move to an IoT world dominated by machine communications. Layered on top of NFV, the Internet of Things—with its potent mix of increased technological complexity and changing signaling and traffic patterns—could potentially launch a perfect storm of failures and service quality issues. Add 5G into the mix, with an explosion of traffic and

use cases, and you have truly daunting complexity. Differentiating quality in this new environment will be the critical challenge.

Active testing provides service providers with unique capabilities needed to tame such complexity through proactive performance and quality assessment. Integrated as part of a comprehensive automation approach, active testing is the only way to test and assure dynamically configured services before they go live. It enables service providers to identify and resolve network problems before customers experience them. And, with the virtualization of the network, active test is now cost-effective to deploy across the entire network, making it a key enabler to network automation.

Thinking Differently About Assurance

In the recent past, service assurance strategies have relied on disparate systems and manual, swivel-chair practices. The operator employing passive monitoring of network traffic was generally able to detect issues— but not before the customer experienced degraded service levels. Because certain types of IoT traffic such as remote alarm systems are sporadic and because networks will become dynamic as NFV deployments become more numerous, passive-only approaches to assurance cannot validate the end-to-end performance of services. Traditional manual, siloed, reactive service assurance practices are simply insufficient for meeting the significant challenges presented by new technologies such as NFV, 5G, and IoT.

To assure quality and stability of these future technologies in a dynamic network, service assurance will need to provide a unified approach across technologies and domain silos. In addition, in this new era of high demand and high expectations, shutting the proverbial barn door after the horse has bolted simply won't do. Operators need to get out ahead of the customer experience. They must continuously test and assure 5G and NFV services across the lifecycle— from network infrastructure validation through service testing to operational assurance. The traditional procedures, in labs and production networks, need to evolve into a seamless, continuous DevOps process.

What is Active Testing?
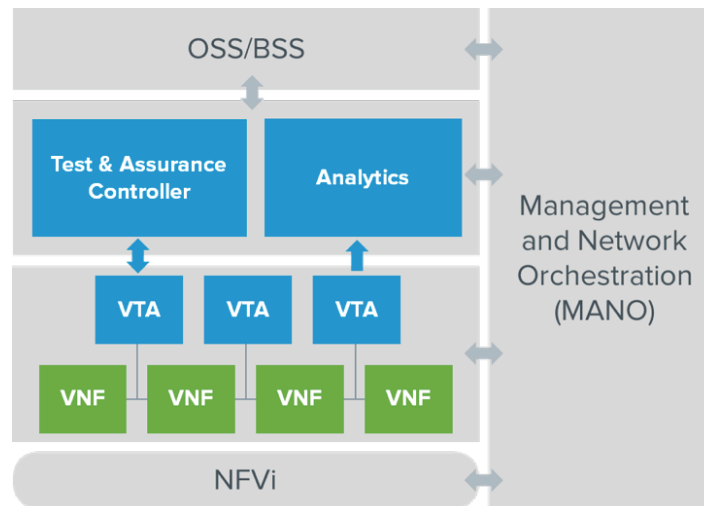
Put simply, active testing is proactive service assurance. Active testing uses test agents and small amounts of synthetic traffic to monitor the health and performance of the network, the quality of services, and compliance with service level agreements (SLAs). Whereas passive monitoring uses probes to ingest and process massive amounts of data, active testing uses synthetic data by emulating real network traffic on-demand.

The delivery of services over virtual networks requires the instantiation of numerous Virtual Network Functions (VNFs) as well as service chains that integrate these VNFs. In order to verify that the VNFs and service chains

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function as expected, and the new service turn-up process has delivered an end-to-end service that meets the customer's SLA, active tests must be performed by virtual test agents (VTAs) immediately after turn-up of new or upgraded customer services. Because VTAs are software-based, they can be dynamically deployed on-demand anywhere in the network—unleashing a powerful new capability for assuring operational networks.

Once the new service is activated and operational, it can be proactively monitored by continuously testing service availability and performance using the same methods to test and validate VNFs and services in lab and sandbox environments. Active SLA monitoring provides preemptive detection of fault conditions, potentially before the customer has even noticed a problem.

Active testing and monitoring provides unique capabilities for assessing performance and quality. It:

- Looks at the service from the subscriber's perspective, measuring the real subscriber experience

- Enhances troubleshooting of network issues and validation of changes by running tests under identical conditions in an automated, configurable, and repeatable process

- Complements passive monitoring for a "best of both worlds" solution

- Tests higher-layer services such as video, OTT, voice, and VoLTE

The ability to deploy VTAs to any part of the network makes active testing particularly well-suited for validating the performance of low-latency 5G network slices, where core network functions may be dynamically distributed to the edge of the network.

Let's Clear Up Some Misconceptions

Some people, not familiar with advances in active test, may be under the impression that active test is hampered by two main limitations: it is slow and costly. That was true a decade ago, when active test control systems were monolithic software releases that required costly integrations with proprietary network / element management systems. As a result, integration of new network infrastructure would typically come out only once or twice a year, meaning support for new services or new features often lagged the initial deployment. Furthermore, active test probes required custom development of dedicated hardware. Adding new capabilities often required complex development and testing.

With the move to virtual networks, operators are increasingly turning to open APIs that dramatically reduce integration complexity for active test. In addition, Spirent has re-architected its active test platform based on cloud-native principles, enabling new features to be released in a rapid, agile fashion. Furthermore, probes can now be deployed as VTAs, leveraging standard compute platforms (NFVI, white boxes or virtual test platforms). That eliminates the need for dedicated, tightly integrated probe hardware. Resources are allocated on-demand and scaled accordingly—dramatically reducing the time and costs of deploying new tests and the solution's total cost of ownership.

Today's active test, like our networks, has evolved tremendously. NFV presents new challenges and opportunities to service assurance which make active test relevant in new ways.

Spirent's highly advanced, automated active test gives you full control over when and where you are going to test. It is now cost-effective to deploy VTAs widely throughout the network, providing better visibility of end-to-end and inter-segment performance and allowing more comprehensive automation of tasks.

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The State of the Testing Art

Spirent is working with ETSI to define a common framework for implementing active testing and monitoring with NFV. The simple open architecture not only aligns with the standard NFV architecture, but also can integrate seamlessly into carrier-specific initiatives.

The industry standards group ETSI with Spirent as rapporteur has defined active testing as a key architecture for next generation virtual networks to be used for pre-deployment validation (testing) and post-deployment active monitoring (operational assurance).

- ETSI GS NFV-TST001 (Network Functions Virtualization (NFV); Pre-deployment Testing)

- ETSI GS NFV-REL004 (NFV Assurance: Active Monitoring and Failure Detection)

The framework complements passive monitoring. Used together, active and passive monitoring approaches provide the best of both worlds, with proactive and reactive capabilities. As the industry moves towards the next generation of hybrid and virtual networks, service providers need to be thinking about how they use both active and passive techniques for a complete service assurance solution.
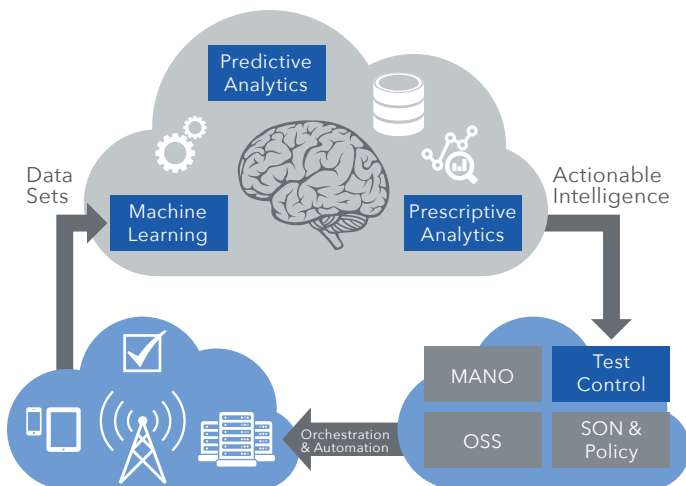
Closed-loop, fully automated assurance leverages predictive and prescriptive analytics and machine learning.

Spirent's Lifecycle Service Assurance Solutions

As operators transform their networks for NFV, 5G, and IoT, service assurance must adapt to address a new generation of challenges. Spirent's VisionWorks suite— based on Lifecycle Service Assurance principles—unifies and automates testing and assurance across the service lifecycle and employs a combination of active testing and passive monitoring to proactively address network validation, service testing and operational assurance.

What Differentiates Our Solution?

Spirent offers a complete solution that includes test agents, a test and assurance controller, and domain-specific, action-oriented analytics:

- Tests cover standard L2-3 connectivity but also high-value L4-7 tests that measure actual subscriber experience (video, VoLTE)

- The controller includes an open library of tests, from Spirent as well as third-parties

- A unified suite of controller functions manages test resources and execution across lab, sandbox, and production network domains, enabling rapid, efficient reuse of test cases (for example, a turn-up test that becomes 24/7 SLA active monitoring)

- Integrating test controllers to service orchestrators drives intelligent automation and zero-touch operations in today's hybrid networks as well as next-generation virtual networks

- Network, device, and traffic emulation provides simple, cost effective, and repeatable testing of real-world network conditions in lab and pre-production environments

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About Spirent Communications

Spirent Communications (LSE: SPT) is a global leader with deep expertise and decades of experience in testing, assurance, analytics and security, serving developers, service providers, and enterprise networks.

We help bring clarity to increasingly complex technological and business challenges.

Spirent's customers have made a promise to their customers to deliver superior performance. Spirent assures that those promises are fulfilled.

For more information visit: www.spirent.com

Our proven active test solutions are already being deployed in the field by leading service providers including:

- Mobile network operators in the US where scalable, automated test solutions have provided 100X increase in testing efficiency and saved millions of dollars in operating costs

- Service providers who are spearheading virtual network transformations in EMEA

- Top mobile operators deploying 5G in the US, achieving 10X faster service activations

For years, Spirent has provided cutting-edge lab equipment that helps service providers, enterprises, and NEMs ensure that their networks perform as they should and keep their promise to their customers. Spirent's deep knowledge of active test methodologies contributes a unique approach to service assurance, in the lab and in production networks, that will help usher in the next wave of technologies.

To learn more about Lifecycle Service Assurance and Active Test solutions from Spirent, please visit: www.spirent.com/Solutions/Service-Assurance.