



# Automated Verification of Dynamically Deployed Services on Cisco Cloud Services Platform 2100

Automate assurance of your application delivery in private, hybrid, and public clouds using Netrounds on the Cisco® Cloud Services Platform (CSP) 2100.

## Introduction

In traditional networks, services were statically deployed, accessed from fixed locations, and did not change much during their lifetime. Today, service workloads are being deployed on demand at an ever-increasing rate, often involving a mix of private and public cloud infrastructures. End users are also accessing these services from a variety of locations, including home offices, corporate premises, and even public locations, creating a complex network environment. In addition, when technologies such as Software-Defined Networking (SDN), Network Functions Virtualization (NFV), and software-defined data centers are introduced, the network gets even more complex.

Regardless of the technologies used, end users expect services to work flawlessly immediately after delivery and forever into the future. These high expectations mean that services need to be delivered right the first time, without issues, and must maintain their quality throughout a lifetime of frequent configuration changes. To achieve this goal of agile, assured service creation and delivery, active testing must be an integral part of the service provisioning and fulfillment processes.

## Benefits

- Increased end-user productivity through delivery of pretested and assured services
- Fewer trouble tickets caused by undiscovered issues in service delivery
- Improved operational efficiency through internal escalation avoidance

## Challenges

- Service creation is becoming programmable, but it is not feasible to automatically verify that services work with traditional assurance systems
- The frequency and rate of configuration changes mean that frequent retesting is required to help ensure uninterrupted service
- Infrastructure-centric assurance systems cannot provide continuous visibility into the true end-user experience
- Test and assurance solutions are generally associated with high capital and operational costs

## The importance of automated configuration and testing

A key factor in successfully delivering services right the first time is to automate otherwise error-prone configuration tasks and actively test that the service works. Testing is important as there are many moving parts in this new, complex network landscape, and many times there are components of the end-to-end service chain that automation does not touch, such as off-net connections or unmanaged network domains. In addition, dynamic behavior such as varying network load can influence end-to-end service quality.

## Programmability is key

When implementing network automation, you need a foundation built upon a programmable platform, like the Cisco CSP 2100, combined with a network-wide automation platform, such as Cisco Network Services Orchestrator (NSO).

As service creation and updates are now becoming programmable, it is crucial to automatically verify that all services work when the initial configuration is created, or later changed, to help ensure uninterrupted service and happy end users. This requires a programmable test solution such as Netrounds that can be initiated at the same time as services are created or updated.

Netrounds helps you actively verify that your provisioned services work at the time of deployment, before your end users begin using them. After successful activation of the service, Netrounds also provides continuous visibility into true end-user experience in a way that infrastructure-centric assurance systems are not capable of. This insight helps you discover issues earlier and resolve them faster, resulting in increased end-user satisfaction.

## Active testing across network layers and domains

Netrounds is a software-based solution that provides out-of-the-box capabilities to actively test and monitor performance metrics for Layer 2 and 3 connections, as well as voice, video, and data services carried across Layers 4 to 7.

Netrounds is composed of two main components:

- Netrounds Control Center
- Netrounds Test Agents

## Solution: Netrounds with Cisco Cloud Services Platform 2100

- Automated verification of network and service quality
- Multitenant central controller with NETCONF/YANG API
- Multiuse and multitasking active Test Agents with comprehensive test support from Layer 2 to Layer 7

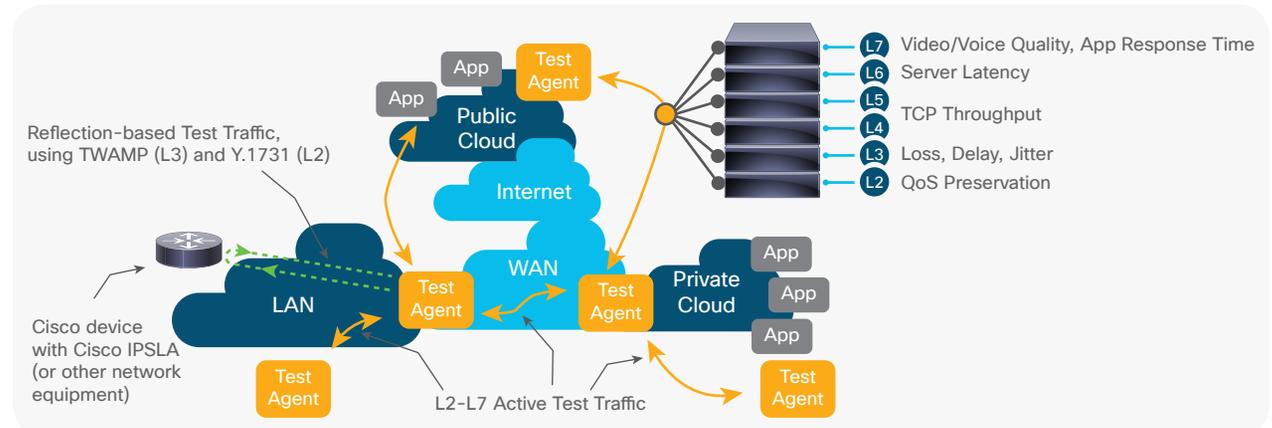
The Netrounds Control Center is a multitenant solution and provides an abstraction for executing tests and managing Test Agents. It also consolidates metrics from multiple Test Agents into service activation reports and real-time Key Performance Indicators (KPIs) for monitoring compliance with Service Level Agreements (SLA).

Netrounds Test Agents are software based and run as virtual machines on the Cisco CSP 2100 or directly on x86 bare-metal devices, such as Cisco Unified Computing System™ (Cisco UCS®) servers.

Test Agents actively generate authentic traffic and analyze detailed, real-time measurements across multiple applications, services, and interfaces. Test Agents support concurrent measurement of network performance (User Datagram Protocol [UDP], TCP, Y.1731, and Two-Way Active Measurement Protocol [TWAMP]), IPTV and Over-The-Top (OTT) video, and the Internet (HTTP, ping, and Speedtest), as well as Voice over IP (VoIP) and Session Initiation Protocol (SIP) telephony.

Test Agents also support standardized test functions such as TWAMP and Y.1731 and can interact with your existing Cisco network devices, as well as networking equipment and devices from other vendors, to increase test coverage and simplify deployment.

Figure 1. Netrounds Test Agents generating active Layer 2 to Layer 7 test traffic across different domains



As shown in Figure 1, Test Agents can be located in private or public cloud locations, or at strategic locations in your WAN and LAN environments. This allows for complete coverage across network layers and domains, which helps you sectionalize and segment affected areas to pinpoint network issues and resolve problems faster.

## Why Cisco Cloud Services Platform 2100?

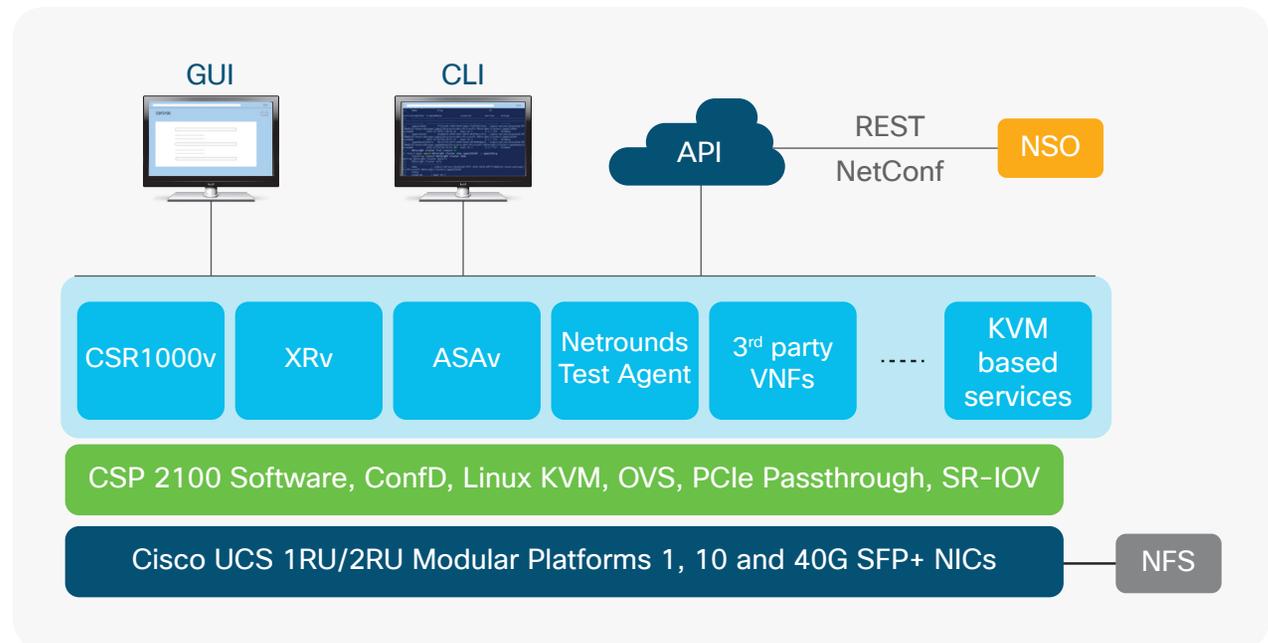
The CSP 2100 is an open x86 Linux Kernel-based Virtual Machine (KVM) platform that delivers NFV capabilities to host software-based and programmable solutions such as Netrounds.

NFV represents a significant change, not only for the networking industry but also for the test and measurement space, as these capabilities have traditionally been restricted to proprietary, purpose-built hardware. NFV virtualizes these functions and runs them as software in cloudlike infrastructures. It represents a fundamental architectural shift for network engineers and network administrators who are concerned about patch management and updates for standard x86 servers and virtual machines in their critical network infrastructure. Delivering network functions on an appliance form factor using standard hardware simplifies server management and provides a scalable approach to network functions. The CSP 2100 is designed to support virtualized networking components and automate network services through:

- Standard x86 servers
- Virtualized and software-based functions
- API-based approach
- Elastic scalability

The Cisco CSP 2100 is built on the Linux operating system and is tightly coupled with Cisco UCS x86 servers with the latest drivers and firmware to help ensure optimal performance and reliability. This combination results in a convenient appliance form factor that provides the agility of software together with the benefits of performance-optimized hardware (Figure 2).

Figure 2. Cisco Cloud Services Platform 2100 high-level architecture



## The value of Netronics together with Cisco CSP 2100 and Cisco NSO

Netronics provides:

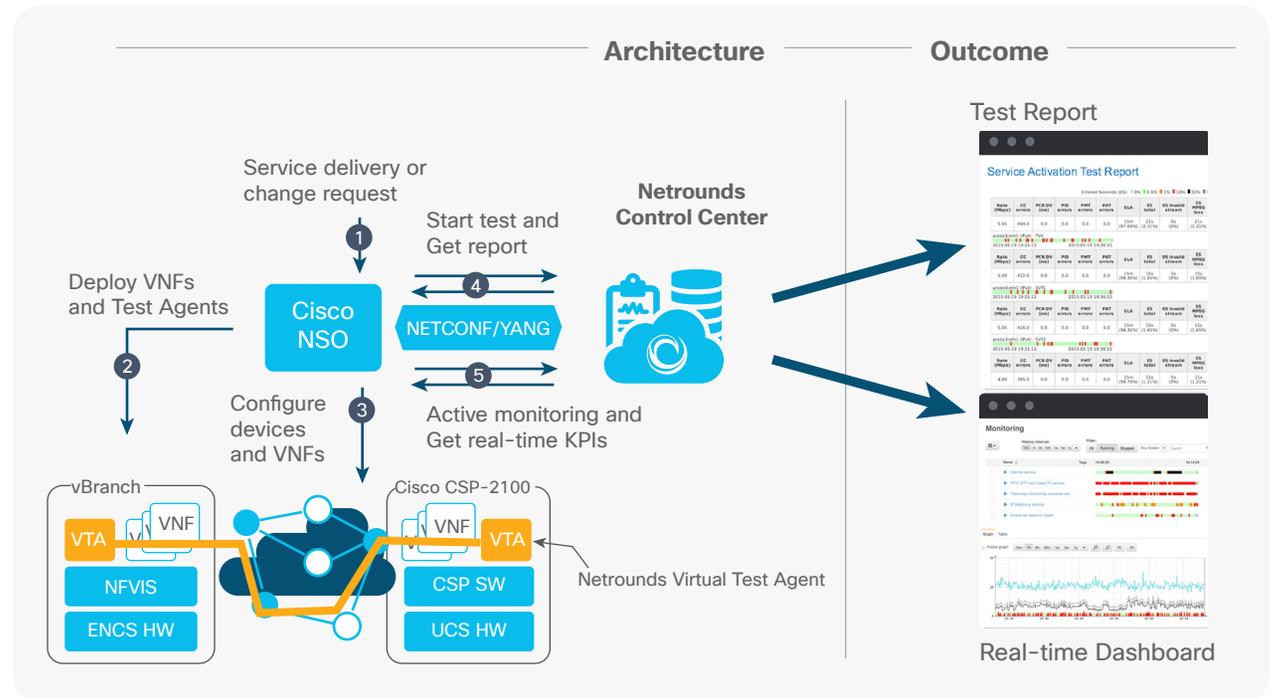
- Full programmability through the NETCONF/YANG API
- Out-of-the-box capabilities to measure KPIs across network layers and domains (Layer 2 through Layer7)
- Unrivaled ease of use and implementation

As shown in Figure 3 below, two important outputs from the Netronics Control Center are the easy to retrieve test reports and the real-time KPIs of actual end user experience, obtained through dashboards and drill-down charts.

For full automation, Cisco NSO can dynamically deploy Netronics Test Agents on the Cisco CSP 2100 at the time of service configuration. Immediately after virtual network functions (VNFs) are deployed in service chains and devices are configured, Netronics Control Center will execute activation and validation tests to help ensure that services are working from end to end and delivering the expected service quality to end users.

After successful activation of the service, Netronics also provides continuous visibility into true end-user experience using unobtrusive, actively-generated traffic, a method that traditional, infrastructure-centric assurance systems are not capable of.

Figure 3. Architecture of Netronics together with Cisco CSP 2100 and Cisco NSO



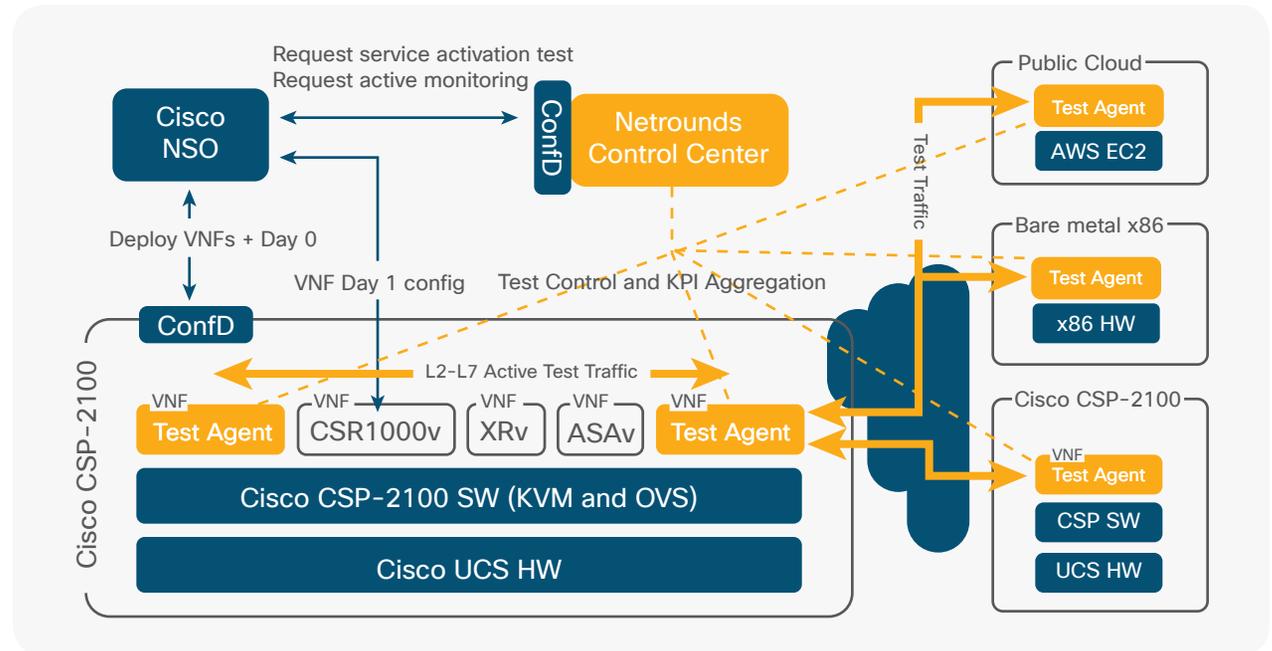
Netronics Control Center provides a graphical designer environment for developers to build activation testing templates and other automatable testing and monitoring sequences. Cisco NSO then triggers these templates using the NETCONF and YANG API to achieve closed-loop automation.

## Deployment of Netrounds Test Agents in CSP 2100 service chains and hybrid environments

Netrounds Virtual Test Agents (vTA VNFs) run on the Cisco CSP 2100 NFV platform and validate service chains, but they also perform measurements toward Test Agents running on other CSP 2100 nodes or in physical networks where Test Agents may run on bare-metal x86 servers. Test Agents can also run on compute nodes in public cloud environments such as Amazon Web Services Elastic Compute Cloud (AWS EC2).

These flexible deployment options, combined with the Test Agents' multitasking capabilities, mean that you can verify virtual service chains while at the same time measuring and validating connections to and from virtual and physical environments – all fully automated through Cisco NSO (Figure 4).

Figure 4. Netrounds Test Agents in service chains and hybrid environments



It is important to note that Test Agents can also be statically deployed outside of NSO control, for instance on bare-metal x86 or in public cloud environments. As Test Agents are multitasking, their capabilities can be shared at run time by Cisco NSO to allow different tenants on the Netrounds Control Center to use them in different roles. This increases the utilization level of your deployed Test Agents.

## About Netronds

Netronds is an active network analytics solution provider for physical, hybrid, and virtual networks. Netronds' programmable, software-based test and service assurance capabilities enable telecom operators and service providers to enhance the end-user experience of IP-based services such as Internet, TV, voice and other quality-demanding business services. Netronds solutions are used by more than 250 network operators, service providers, and enterprises worldwide. Its headquarters are in Luleå, Sweden, with offices in Boston, Massachusetts, and Stockholm, Sweden. For further information, please visit <https://www.netronds.com>.

## About Cisco

Cisco (NASDAQ: CSCO) is the worldwide leader in IT that helps companies seize the opportunities of tomorrow by proving that amazing things can happen when you connect the previously unconnected. For ongoing news, please go to <https://thenetwork.cisco.com>.

## Achieve agile, assured service creation and delivery with Netronds together with Cisco CSP 2100 and Cisco NSO

Combining the flexibility and agility of the Cisco CSP 2100 with Cisco NSO and active testing and monitoring from Netronds allows enterprises to quickly and dynamically deploy new assured services. Implementing this solution leads to significant operational costs savings and improved efficiency resulting from:

- Increased end-user productivity due to pretested and assured services
- Fewer trouble tickets caused by undiscovered issues in service delivery
- Avoidance of internal escalations

**For more information or to request a demo of the solution, visit:**

<https://www.netronds.com>

<https://www.cisco.com/go/csp>

<https://communities.cisco.com/community/partner/solution-plus-partners/netronds>

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