

# Netrounds Control Center

*Centralized, multi-tenant controller for full closed-loop automation*

The core component of Netrounds is a unifying multi-tenant Control Center, which provides a consolidated GUI for operations staff as well as a cloud API allowing external OSS and NFV orchestrators to remotely control Netrounds’ traffic-generating, active Test Agents.

The Control Center is either hosted by Netrounds and offered as a SaaS solution, or deployed on-premise in a private cloud. In either case, it displays both second-by-second and aggregated real-time results, as well as KPIs and SLA monitoring metrics.

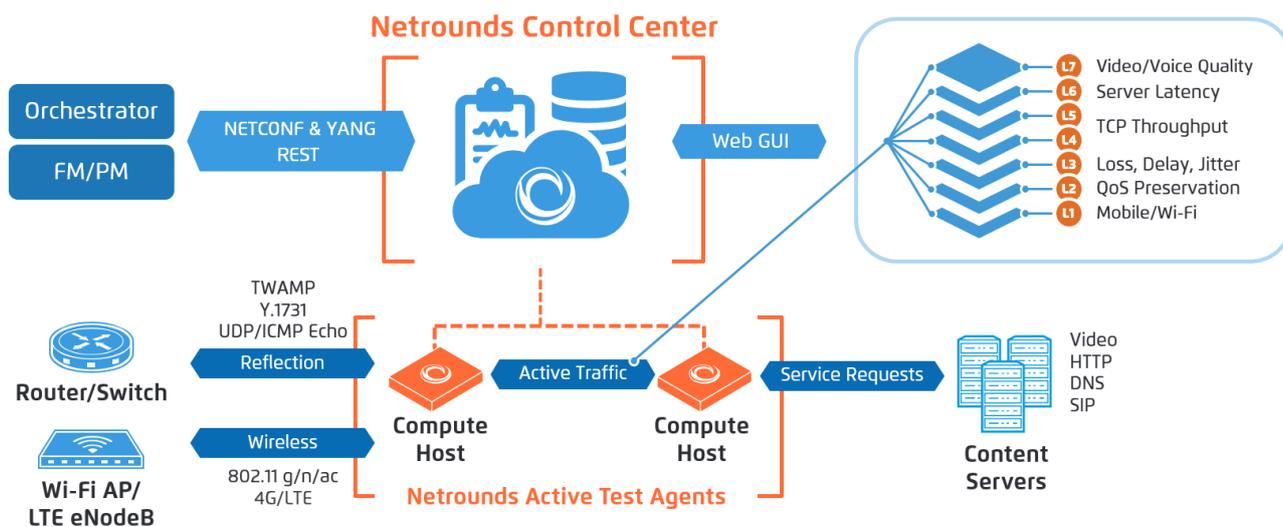
## Netrounds Control Center Key Features

Key feature	Main benefits
Feature-rich cloud API for distributed on-demand tests and active monitoring of end user KPIs	Enables closed-loop full automation workflow by providing KPIs of actual end user experience to NFV and service orchestrators/OSS
Web portal for creation and initiation of test scenarios and automation templates	Supports design-time and run-time dynamic test processes and remote troubleshooting
Real-time KPIs, dashboards and drill-down charts	Provides real-time actionable insights into how your network and services perform from an end user perspective
Centralized and dynamic inventory of distributed, traffic-generating Test Agents	Consolidated user/programming interface towards all Test Agents – no need to manage Test Agents individually
Centralized storage and aggregation of test results and SLA monitoring metrics	Instant alarm generation based on SLA definitions and scheduled periodic reports on historical data
Available as securely hosted solution, scalable from single Test Agents to nationwide deployments	No need for internal IT staff to maintain the platform; also suitable for small projects and easy evaluations
Remote updates of Test Agent software	Reduced maintenance cost

Netrounds Control Center has a wide range of built-in core features that are exposed over either an intuitive Web Portal user interface or a complete read/write API. The Web Portal is used for test design, on-demand initiation of tests, remote troubleshooting, and real-time reconfiguration of service assurance scenarios and thresholds. The API is used by external systems such as OSS and NFV orchestrators to dynamically launch new Test Agents and initiate activation tests and quality monitoring scenarios.

Netrounds Control Center can be made available in two ways: either hosted in the Amazon AWS public cloud infrastructure or installed on-premise or as a private cloud solution. Both deployment options share the same core features, Web Portal and API.

## Netrounds Complete Controller-based Solution



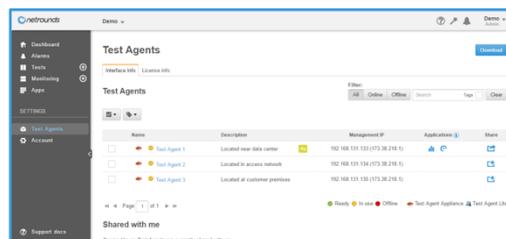
## Netrounds Control Center Operation

Netrounds Control Center – Hosted	Netrounds Control Center – On-premise
Deployed as a securely hosted SaaS solution in the Amazon AWS public cloud infrastructure	Installed on-premise in private cloud infrastructure or private data centers
Flexible subscription business model	Offered as licensed software
Operated and managed by Netrounds as part of the subscription agreement	Operated and managed by Netrounds as a service or managed by Netrounds customer
Scales from single Test Agent deployments to nationwide or multinational rollouts	Starts at deployments of 50+ Test Agents to nationwide or multinational rollouts
A subscription corresponds to one individual tenant account in the hosted, multi-tenant Control Center	Dedicated multi-tenant solution with individual dashboards for the service provider and their enterprise customers
Frequent updates for Netrounds Control Center software, as well as for repository of software for all Test Agent types	Update frequency determined by customer for Netrounds Control Center, as well as for repository of software for all Test Agent types

## Overview of Netrounds Control Center Functionality

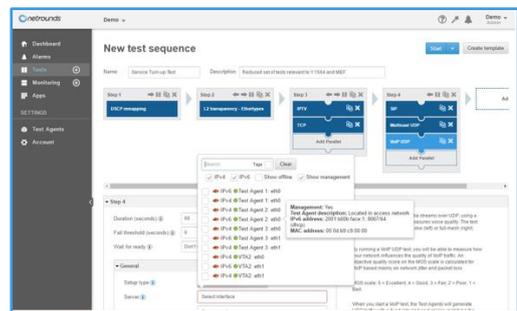
### Dynamic Test Agent inventory

- Test Agents automatically discover and register towards Netrounds Control Center login servers
- Test Agents appear as resources in inventory once launched by NFVO or OSS, or when connected physically to the network
- Test Agents can be tagged for simple grouping and structuring
- Remote configuration of Test Agent interfaces
- Test Agents can be shared between tenants on the same Netrounds Control Center



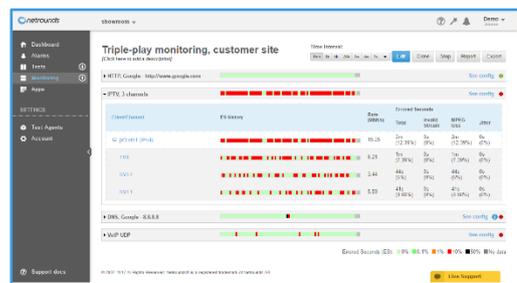
### Builder GUI for scenarios and templates

- Intuitive sequence and scenario builder
- Tests from each Test Agent’s comprehensive toolbox can be freely mixed (refer to Netrounds Test Agents datasheet)
- Custom topologies can be built with configurable traffic directions specified (upstream and downstream)
- SLA compliance thresholds can be set
- Tests can be scheduled to run periodically or at a specified future date and time
- Scenarios and templates can be triggered by OSS and NFV orchestrators through cloud API
- Scenarios and templates can be shared between tenants on the same Netrounds Control Center



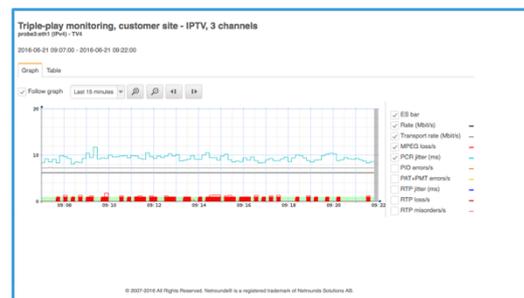
### Real-time aggregated views of ongoing monitoring and tests

- Errored Second (ES) calculation and visualization
- Aggregated result views from large numbers of distributed active measurements
- SLA compliance indicators
- Historical views with timespan adjustable from last 15 minutes to years backward in time
- Results can be shared between tenants on the same Netrounds Control Center



### Periodic reports and alarm generation

- Comprehensive and configurable reports
- Summary of Errored Seconds (ES) for all ongoing monitoring and periodic tests
- Reports can be scheduled and emailed to stakeholders at custom intervals
- Alarm triggering using SNMP traps or emails
- Multiple severity levels for alarms: Critical, Major, Minor, and Warning
- Manual and automatic suppression of active alarms



### Netrounds Control Center Server: SaaS

- Managed by Netrounds and scales transparently and elastically with the number of Test Agents deployed – no need for any involvement from Netrounds end users
- Server software always up to date
- Repository of remote software for all Test Agent types always up to date

## Netrounds Control Center Server: On-premise – Hardware and OS Requirements

Below are requirements for a typical setup. They may require adjustment depending on the use case.

<b>Processor</b>	8 × vCPU or Intel Xeon E5-1660v4, 8-core, 3.2 GHz (or better)
<b>RAM</b>	40 GB
<b>Disk space</b>	1 TB SSD
<b>OS</b>	Ubuntu Server 16.04 LTS

## Netrounds Control Center Interfaces

### Northbound user interface towards operations staff

#### Browser GUI towards Web Portal

- Native HTML with Javascript
- HTTPS for secure access to Web Portal
- Support for all common Web browsers: Chrome, Firefox, Internet Explorer, Opera and Safari
- Mobile browser support
- HTTP basic authentication
- Multi-user support with different user levels and credentials

### Northbound application programming interface (API) towards OSS and NFV orchestrators

#### REST

- Follows REST API best practices
- Web browsable, extensive documentation
- See separate REST API datasheet for further details

#### NETCONF & YANG

- Support for service modeling with YANG
- NETCONF supported for mapping YANG specifications onto easy-to-use interfaces
- See separate NETCONF & YANG API datasheet for further details

### Southbound interfaces for remote control and configuration towards active Test Agents

#### Virtual, Software, and Preinstalled Test Agents

- Proprietary control protocol using OpenVPN carried over TCP Port 443
- Firewall-friendly communication, initiated by Test Agents towards Netrounds Control Center
- One second response time to user interaction
- Local storage on Test Agent in case Netrounds Control Center is temporarily unreachable