

# Deliver Premium 5G Services with Automation and Assurance

An exploration of VMware  
Telco Cloud Service Assurance

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## Introduction

Advances in technology and innovations for 5G are creating new use cases and monetization opportunities for communications service providers (CSPs)—but it's also bringing a new set of challenges. As CSPs look to provide on-demand as well as mission-critical services, end-to-end service assurance has become essential to ensure the quality of these digital services. New services must be operationalized in real time and managed proactively to meet quality expectations and service level agreements (SLAs)—and downtime is not an option.

With the increased complexity and volume of data sources, both network operation centers (NOCs) and service operation centers (SOCs) need modernized tools and/or service assurance platforms to help them monitor and manage the entire 5G network, from the core to the radio access network (RAN), built with complex, multivendor technologies.

VMware® Telco Cloud Service Assurance™ empowers CSPs to simplify the operations of their 5G networks and services by providing the end-to-end visibility, root cause analysis and remediation from the core to the RAN. With the right combination of VMware products and virtualization technologies, CSPs can reduce their costs while increasing their operational efficiency.



# VMware Telco Cloud Service Assurance

VMware Telco Cloud Service Assurance is a holistic service assurance solution that allows CSPs to monitor and manage both their traditional physical infrastructure and virtual networks as one. It provides an automated assurance across the entire 5G network domain, from the core, the edge and the RAN to the public cloud, as shown in Figure 1. It provides CSPs and large enterprises a unified platform to manage their multilayer infrastructure to rapidly resolve network performance issues and ensure consistent delivery of services to its subscribers.

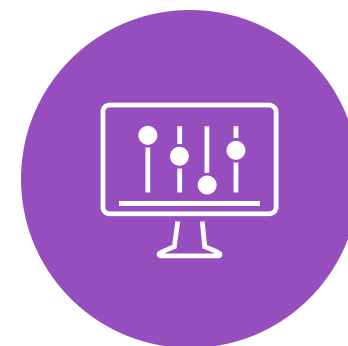
VMware Telco Cloud Service Assurance reduces complexity for operation teams in the NOC and/or the SOC and provides a single pane of glass for fault management, performance management and service management, as well as configuration management, root cause analysis (RCA) and service impact analysis in a multivendor, multi-cloud environment.



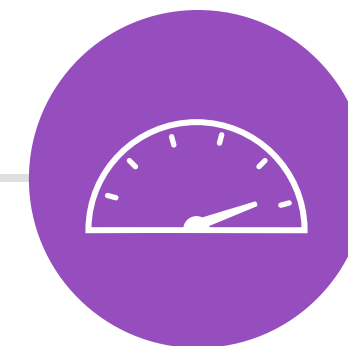
## At a glance

### Holistic service assurance solution

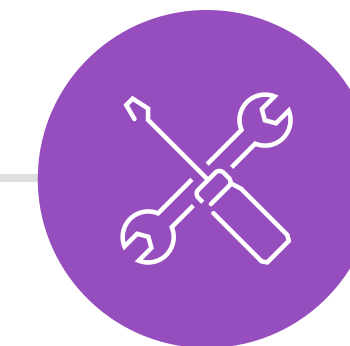
- Multilayer visibility, troubleshooting and monitoring with deep insights
- Real-time health and performance dashboard
- Prioritized RCA and business impact
- Closed-loop automation/ remediation and artificial intelligence (AI) / machine learning (ML)-based analytics



Service Management



Performance Management



Fault Management



Root Cause & Impact Analysis

# Multilayer Visibility and Automated Assurance

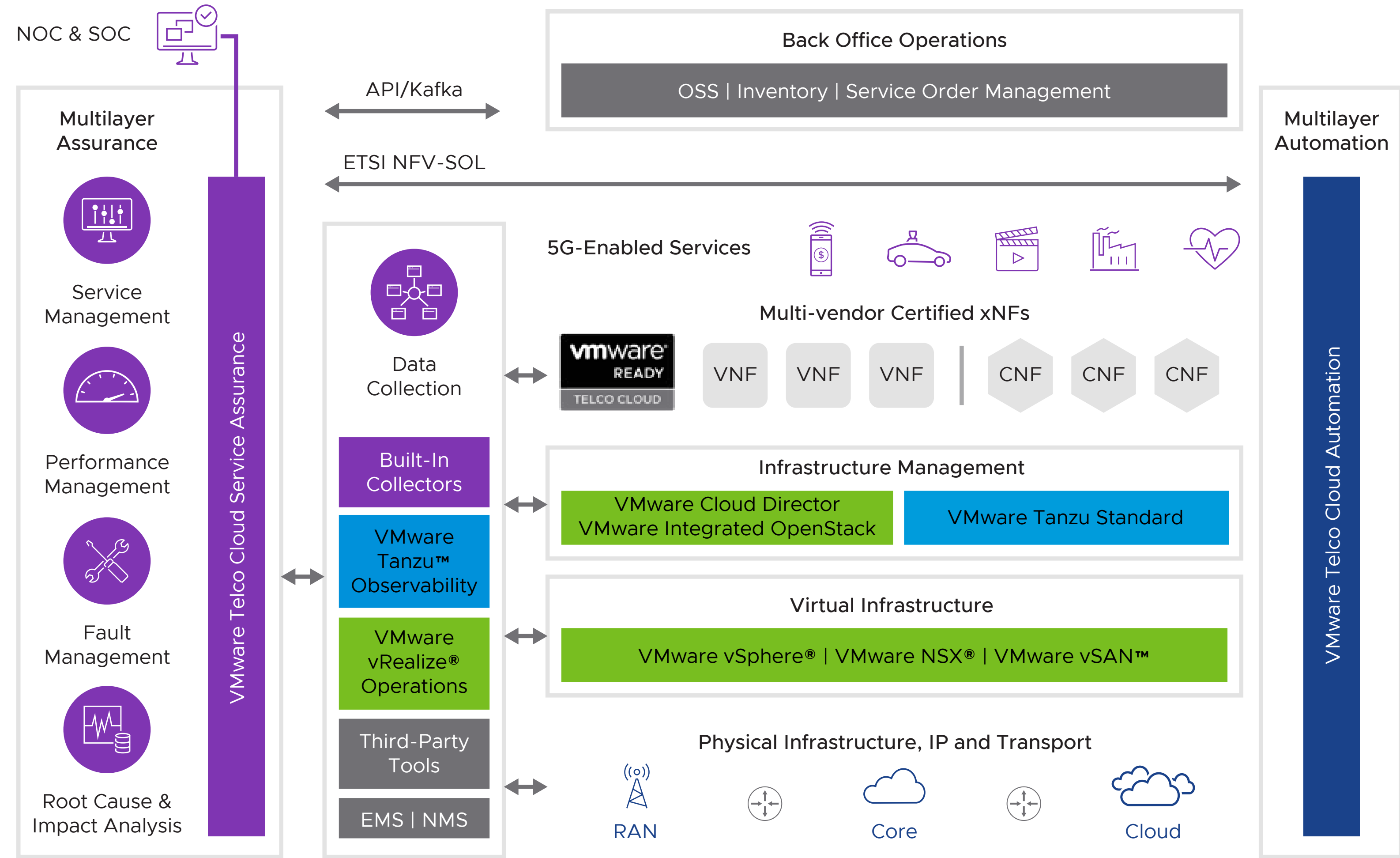


Figure 1: Telco Cloud Service Assurance—Multi-layer, cross-domain.

## Service Assurance

Service assurance is the application of policies and processes by a CSP to ensure that its network services meet a predefined service quality level for an optimal subscriber experience. Service assurances allow CSPs to be confident in every aspect of their telco service delivery, from the 5G mobile core and transport to the RAN.

### 5G core assurance

The 5G core is the central part of the overall 5G network. It establishes reliable connectivity, provides visibility and control of traffic and applications, and allows subscribers to get access to the services they are entitled to use. But operations teams are facing challenges as they try to monitor and manage these complex cloud-native network environments.

- NOC teams are overwhelmed with underlying cloud infrastructure, containers as a service (CaaS), multivendor network functions (xNFs) and physical network alarms and are therefore unable to quickly analyze the symptoms and zero in on the most serious issues.
- Information is lacking on which layer of the infrastructure or network element is causing the faults and which services, customers and SLAs are being impacted.

- Thousands of hours are spent manually updating EMS/NMS remediation rules each time a new issue is identified in the network.
- A huge volume of change request and service request tickets are created that delay resolution, impacting SLAs and response time.

VMware Telco Cloud Service Assurance helps operators achieve 5G assurance by allowing them to fully monitor the multilayer telco cloud infrastructure and provide automated root cause and impact analysis, as well as remediation. The result is reduced OpEx for CSPs and increased operational efficiency.

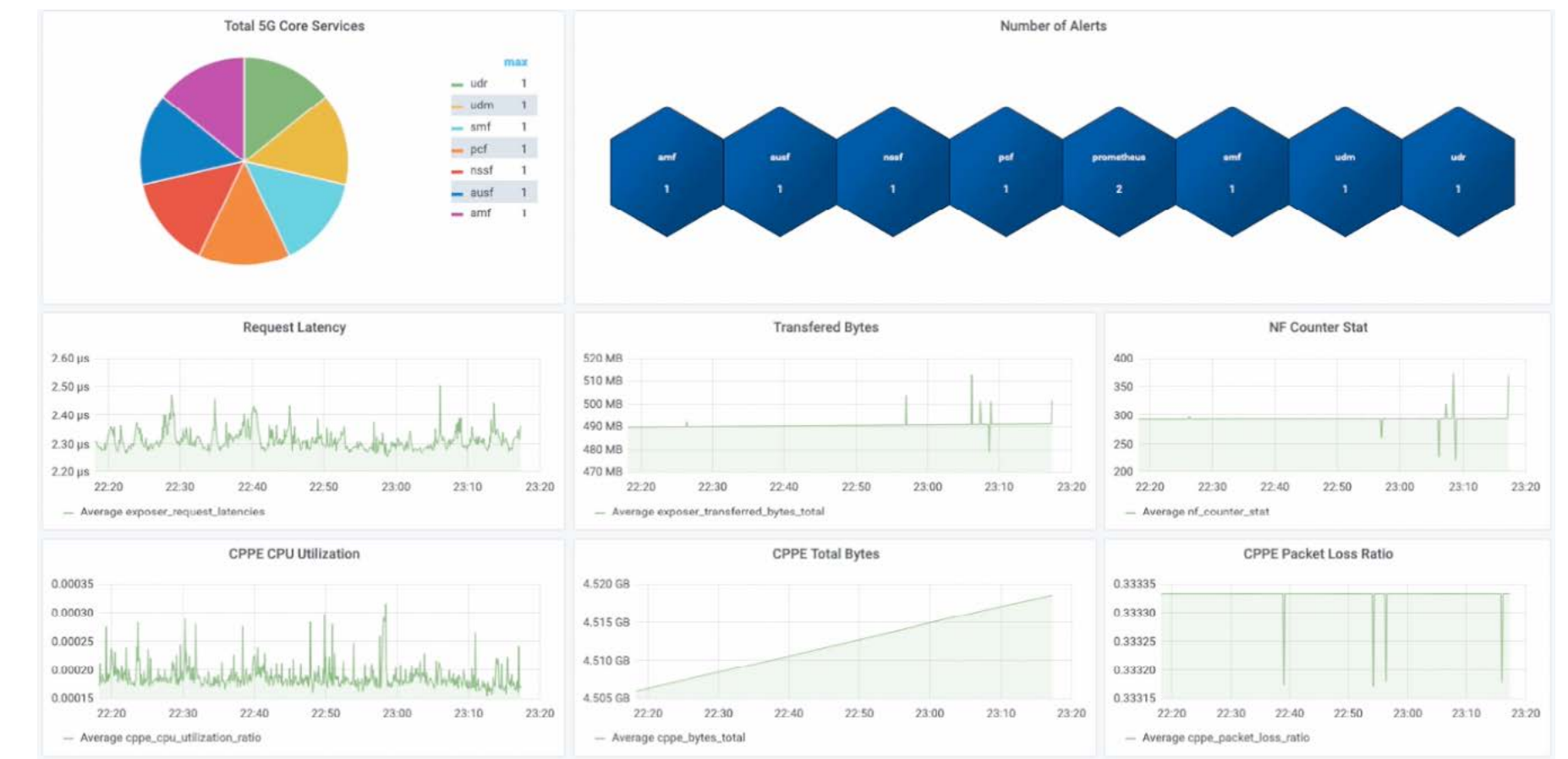


Figure 2: Service Management.

## RAN assurance

RAN assurance requires not only the monitoring of the RAN but also the intelligent mining and correlation of the data between the RAN and the core, including the transport networks that interconnect them. Both CNFs and virtualized network functions (VNFs) are automatically discovered to optimize 5G network performance to deliver superior quality of services for better monetization.

CSPs are positioned to benefit from the new revenue opportunities brought about by 5G use cases, including:

- **Network slicing** to meet the specific SLAs of applications, services, devices and customers
- **Open-RAN** to reduce the CapEx of RAN building blocks using new vendors and adding new services using RIC to optimize the network
- **Multi-access edge computing (MEC)**, which enables ultra-low latency and high bandwidth, along with data and radio network information, to be used by applications in real time

Providing RAN assurance in the face of increasingly complex multivendor environments becomes more challenging as network functions combine physical, virtual and containerized assets. VMware Telco Cloud Assurance automatically discovers all network resources using standard APIs and provides an end-to-end topology map on a single pane of glass. This enables operators to see the physical and logical connectivity and relationships between the underlying network infrastructure and the various software components, including networking, hardware, virtualization, CaaS, application and functions layers.

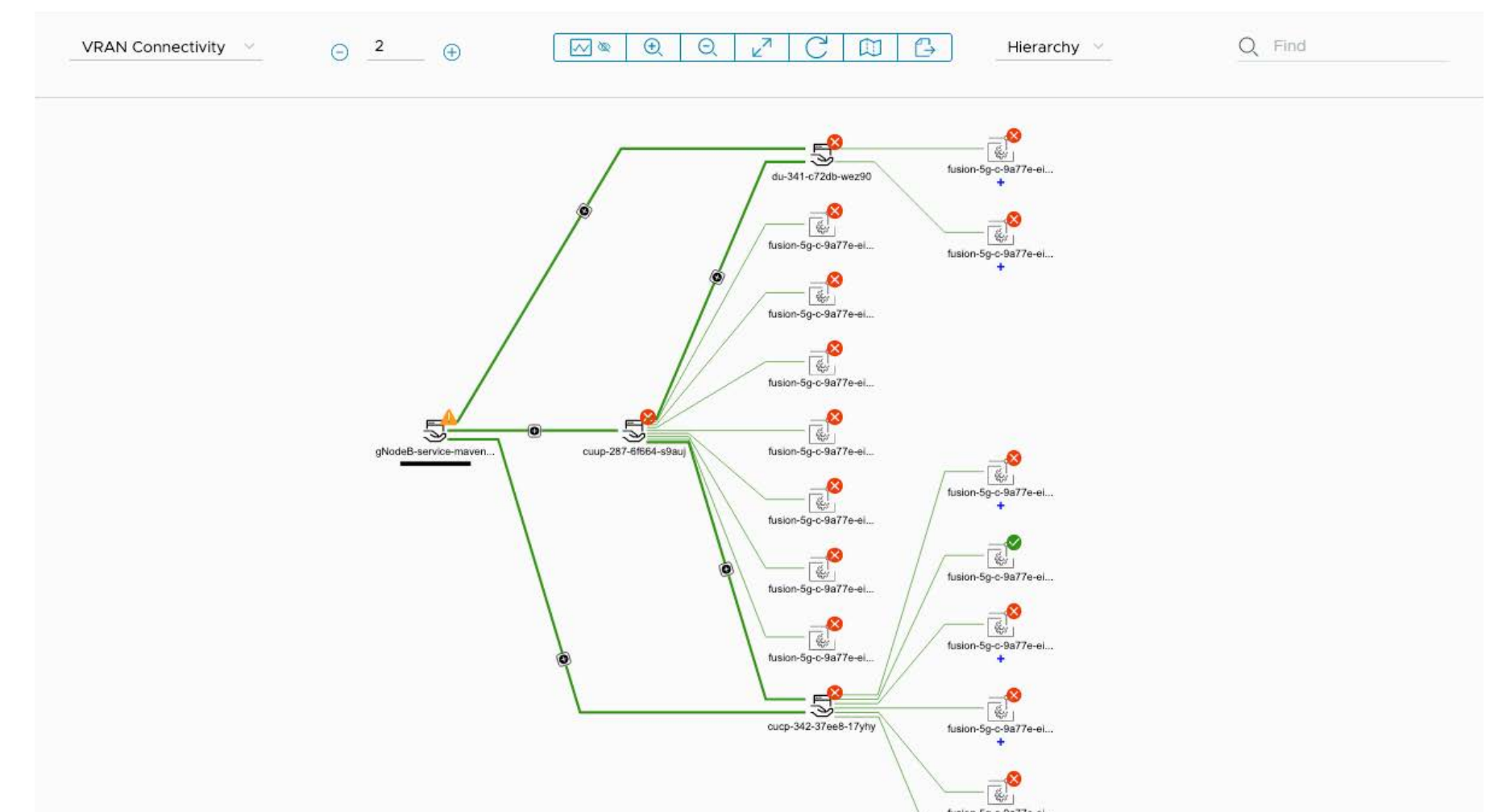


Figure 3: Topology discovery and mapping across core, transport and RAN infrastructure.

## Intelligent Fault and Performance Management

Using AI and ML, VMware Telco Cloud Service Assurance automatically establishes dynamic performance baselines and calculates real-time performance metrics. It identifies anomalies or performance degradation and alerts operators when anomalous behavior is detected.

- Operational efficiency is increased by automatically suppressing extraneous alarms and eliminating the upkeep of static rules.
- Resources are dynamically allocated to meet decreases and surges in edge and service requirements.
- End-to-end fault and performance monitoring across physical and virtual layers is visualized graphically.
- A contextual topological view shows the physical and logical connectivity of networks so CSPs can accurately triage situations and take proactive steps to prevent serious impacts to application performance.

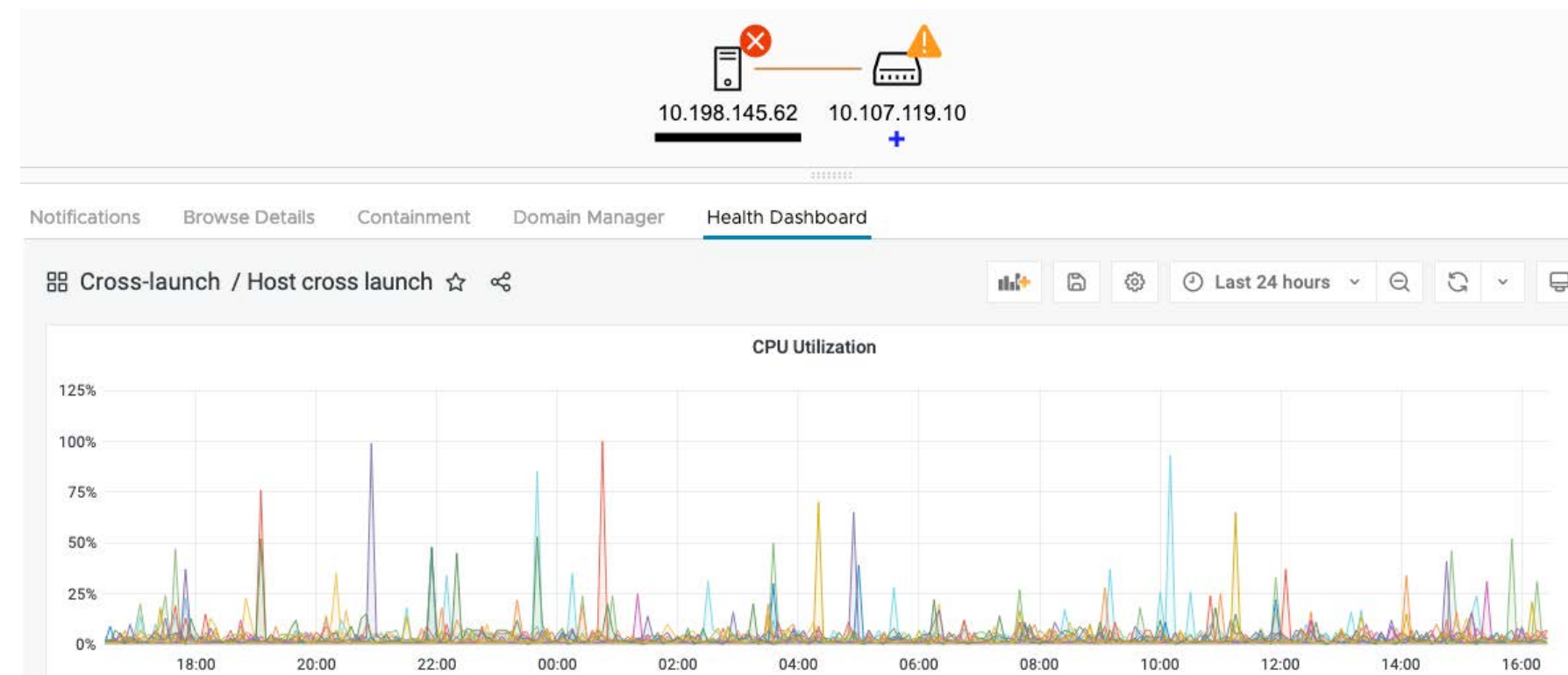


Figure 4: Fault management and performance management with root cause analysis.

## Automated Root Cause and Service Impact Analysis

With VMware Telco Cloud Service Assurance, CSPs can quickly find the problems that require priority remediation. The platform correlates all the active, inactive and unknown alarms together with the network topology to rapidly identify the problem's root cause. Infrastructure failures are automatically translated into customer service impacts by identifying the technology and business objects affected by each problem and then analyzing the value of the failure's impact on the service and the customer.

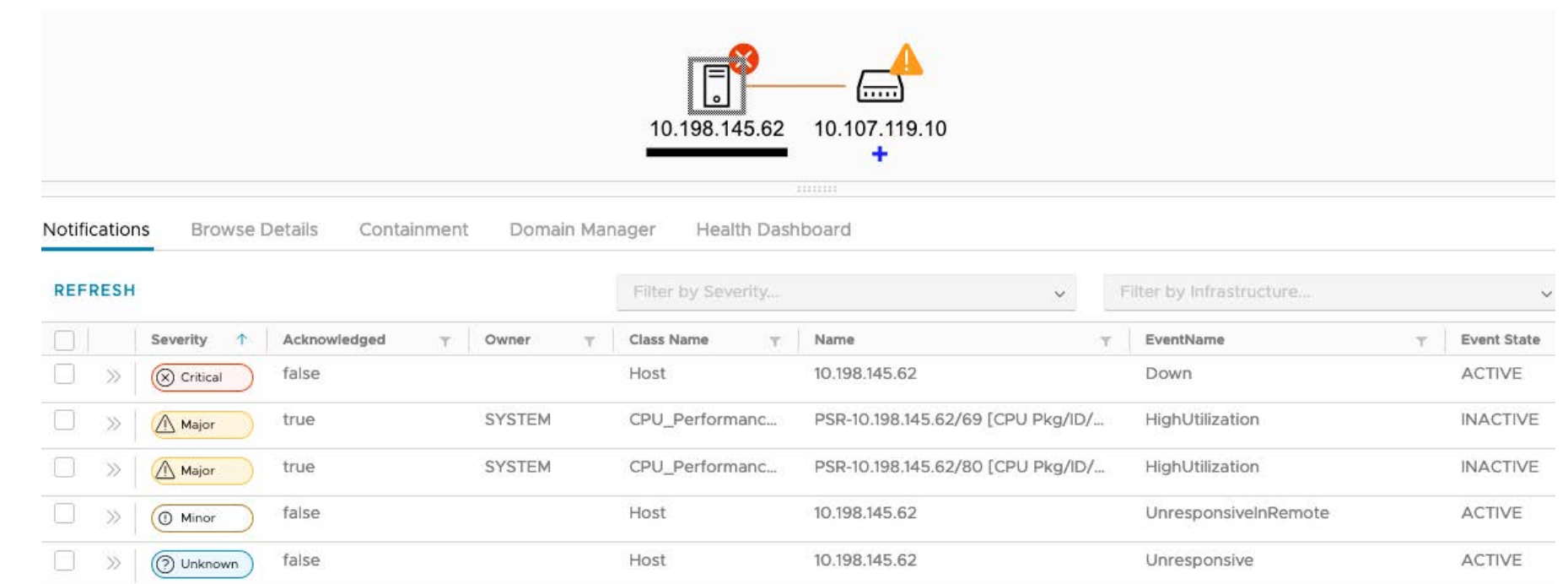


Figure 5: Automated Root Cause Analysis.

By putting infrastructure problems in a business context, CSPs can prioritize their responses in real time according to the business impact, such as tenants who have contracted higher-value services and SLAs.

## Closed-Loop Automation and Remediation

Meeting SLA and service quality expectations in real time requires automated remediation across the infrastructure, orchestration and service layers when faults occur. VMware Telco Cloud Service Assurance provides a remediation policy framework that automates these processes and procedures for common NOC faults so they can be handled without human involvement.

VMware Telco Cloud Service Assurance drives closed-loop remediation actions for infrastructure lifecycle management by making recommendations to orchestrators based on identified root cause issues, such as a need to allocate more vCPUs on a specific video to handle increasing traffic. Through these automated closed-loop actions, 5G service quality is maintained and delivered consistently.

## Unified Data Collection Framework

VMware Telco Cloud Service Assurance provides a powerful and efficient data collection framework to collect large amounts of data and alarms from different layers and from different sources including third-party monitoring tools (EMS, NMS, Probes, etc.).

VMware vRealize Operations is a widely deployed product that monitors the virtual infrastructure manager (VIM) and CaaS

infrastructure. VMware Telco Cloud Service Assurance leverages VMware vRealize Operations to build a complete end-to-end topology map that includes the virtual infrastructure (from VMware vRealize Operations), physical infrastructure (gathered from built-in collectors), RAN fault and performance metrics (from Kafka collectors and EMS), and L2/L3 networking assurance capabilities. VMware Telco Cloud Service Assurance's root cause and service impact analysis capabilities provide fast problem resolution by automatically correlating symptoms from the many layers of the infrastructure stack and pinpointing the problem's root cause and service impact.

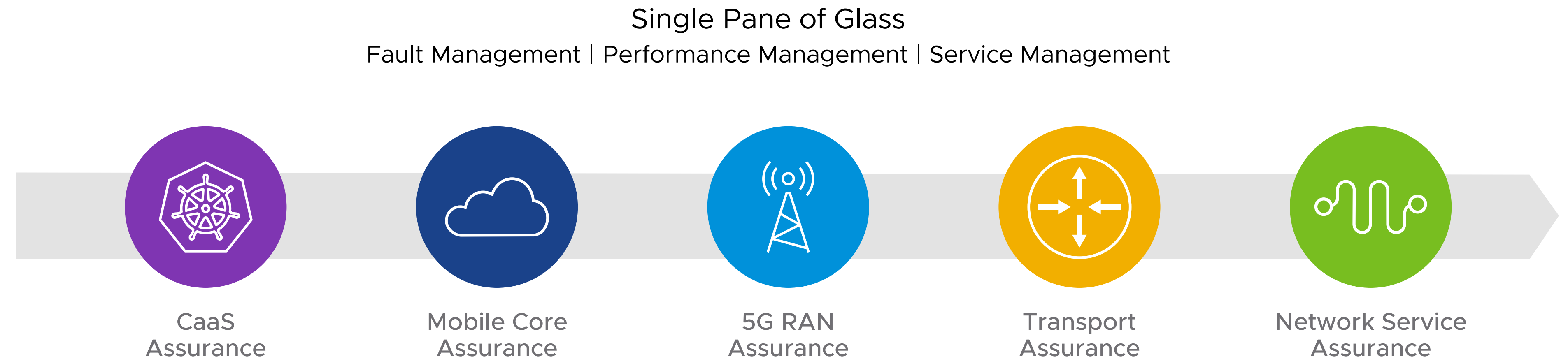
The framework's enhanced capability provides a platform to onboard third-party data sources based on various protocols such as REST, Kafka, SNMP and so on. VMware has jointly engineered with Atrinet to integrate their NetACE solution into the ecosystem for fault and performance metrics collection over NETCONF protocol. The Accedian Skylight solution, which is a cloud-native performance assurance platform, can be implemented along with VMware Telco Cloud Service Assurance to provide end-to-end service assurance and continuous network performance monitoring applied at the DU and CU locations.

In addition, by leveraging VMware vRealize Operations, VMware Telco Cloud Service Assurance provides specialized CaaS use cases for technologies such as VNFs, CNFs and network slices.



## 5G Use Cases

VMware Telco Cloud Service Assurance allows CSPs to address a variety of use cases from a single pane of glass with the following assurances:



### Mobile core assurance

VMware Telco Cloud Service Assurance significantly reduces the time to identify the root cause of an issue in a multidomain, multi-vendor core network by correlating events across domains, from the connected network equipment, physical servers, VIM, CaaS and CNFs to service layers. For example, a disconnected cable in a network switch connected to a physical server can cause alert storms in a user plane function. Without cross-domain correlation, root cause would need to be determined manually by evaluating faults identified by different siloed monitoring tools.

VMware Telco Cloud Service Assurance automatically discovers on-premises and cloud network resources in real time and creates an end-to-end topology map. The topology map shows the physical and logical connectivity and relationships between the underlying network infrastructure and the various software components that compose the 5G service. In case of new network resources instantiated by VMware Telco Cloud Automation, an automated discovery is triggered that discovers the newly added resources and starts capturing fault and performance data.

## 5G RAN assurance

VMware Telco Cloud Service Assurance uses rich sets of data collection techniques to gather fault and performance data from the RAN sites. Data is gathered all the way from the physical hardware layer to the transport network and VIMs and CaaS layers. This is done by using built-in smart collectors that can collect data from third-party monitoring tools, including VMware Aria Operations (formerly VMware vRealize). Events from all the data sources are correlated and analyzed across the RAN in real time to pinpoint the root cause and its impact on 5G services.

Whenever VMware Telco Cloud Automation or another orchestrator deploys a mobile RAN service, it sends a notification to VMware Telco Cloud Service Assurance, which receives the service blueprint and starts the auto-discovery process throughout all the layers of the service. It then rebuilds an end to end topology network diagram, illustrating the physical and logical connectivity and relationships between the underlying network infrastructure and the software components that compose the 5G service.

## Pipeline reporting for RAN sites

Telco operators leverage VMware Telco Cloud Automation as an orchestrator to deploy and configure numerous vRAN sites. The orchestration process involves deploying and configuring various layers of VMware Telco Cloud Platform RAN infrastructure (DU, node pool, pods, VMs, VMware vCenter Server, hypervisor, etc.) on top of bare-metal servers. At every stage of deployment, network operations center (NOC) teams are provided a dashboard view on the status of deployment in terms of success or a failure under a single view. In case of failures, the NOC team can take required actions immediately to troubleshoot the issue.

## End-to-end 5G core and RAN assurance

When deploying VMware Telco Cloud Service Assurance for Mobile Core and VMware Telco Cloud Service Assurance for RAN together, this solution provides end-to-end monitoring of a rich set of vendor products and solutions across vertical tiers from physical to CaaS to application, as well as horizontal domains from fixed line to transport to core to RAN. Fully integrated discovery and topology, automated alarm reduction and automated root cause analysis are performed across the entire infrastructure and all layers.

## Closed-loop remediation and automation

VMware Telco Cloud Service Assurance brings 5G orchestration, automation and service assurance together by integrating with a network functions virtualization orchestrator such as VMware Telco Cloud Automation that complies with the ETSI NFV-SOL005 API. The platform's root cause and service impact analysis capabilities resolve problems quickly by automatically correlating symptoms from the layers of the infrastructure stack (physical, virtual, Kubernetes, CNFs, VNFs and services) and pinpointing the problem's root cause. After identifying the root cause, VMware Telco Cloud Service Assurance provides a rich set of manual and automated remediation capabilities, from an SSH connection to the device and opening tickets in third-party systems to full remediation workflows, including integration with various third-party systems and orchestrators.

## Network slice assurance for core and RAN sites

VMware Telco Cloud Service Assurance with VMware Telco Cloud Automation provides monitoring and assurance of network slices extended to RAN and core networks. The slices are discovered to provide visibility between network slice instance, network slice subnet instance and hosted virtual infrastructure to customers' configurations enabled over the RAN and core infrastructure. It provides end-to-end management and optimization to assure network slices in a 5G network by monitoring performance and health of virtual network slices. In addition, the solution provides signature-based root cause analysis to isolate network degradations across a multidomain service delivery stack.

## Summary

VMware Telco Cloud Service Assurance provides the best of virtualization and cloud technologies plus service management, performance management and fault management on a cloud-native platform. It simplifies the complexity of 5G by providing CSPs the operational intelligence and use cases they need to manage their wide-ranging multivendor virtual, physical and service layers—all in a single tool that acts as a unified control plane.

### Learn more

For more information about VMware Telco Cloud Platform Call 877-4-VMWARE (outside North America, +1-650-427-5000), visit [telco.vmware.com](https://telco.vmware.com).



**Simplify complexity**  
End-to-end, multivendor  
5G environment



**High QoE & Improved SLA**  
RCA and impact analysis



**Reduce OpEx**  
Closed-loop automation  
and remediation

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VMware Telco Cloud Service Assurance allows telco operators to manage and operate their 5G networks with automated service assurance and the agility and efficiency required to meet the stringent SLA requirements for their most demanding customers.

Get Started Today

## Explore the VMware Telco Cloud Platform

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