Detect Anomalies with AI to Improve RAN Performance

Running Aspire's rApp on VMware Centralized RIC to Oversee Configuration Management with AI/ML

PARTNER SOLUTION AT A GLANCE

The anomaly detection rApp from Aspire provides early identification of network degradation, allowing faster resolution of issues. Early intervention will reduce the number of network parameter rollbacks, leading to greater application operating efficiency and providing OpEx savings.

MWC rAppathon PARTICIPANT

Aspire's rApp was one of seven applications demonstrated during the rAppathon RIC developer's competition hosted by VMware and Intel at MWC 2023 Barcelona.

COMPANY OVERVIEW

Aspire Technology delivers Network Solutions, Open Networks and Consulting Globally to fixed and mobileoperators, vendors, system integrators and various technology partners across the whole network lifecycle. Solutions from Aspire Technology leverage Aspire's deep RAN and legacy vendor knowledge built over the past four years with an Open Networks Lab in Dublin featuring over 30 vendors across Core, CU/DU, RU, NFV, IT and testing. See
https://www.aspiretechnology.com/

The Need to Manage Change

The Open RAN vision of multiple rApps optimizing the network in tandem has many advantages. However, it also presents challenges. One potential problem is the lack of intelligent coordination between rApps. Changes made concurrently may interfere with each other, leading to overall performance degradation. This problem may be compounded as rApps respond to the drop in performance and attempt to make further changes.

What is requred is an intelligent, centralized governance application that can ensure that other applications can operate simultaneously without interfering with each other.

Aspire Technology's Governance rApp

To solve this challenge, Aspire Technology has developed a governance rApp. This rApp monitors network performance and uses AI and machine learning to detect KPI anomalies. When it detects severe performance degradation, it rolls back configuration changes initiated by other rApps, mitigating cross-rApp interference and restoring RAN performance. It also records which changes caused drops in performance to help developers evaluate rApp performance and improve their rApp stack.

Aspire Technology's Governance rApp, powered by VMware Centralized RIC, uses AI and Machine Learning to detect KPI anomalies caused by conflicting configuration changes requested by other rApps. It automates configuration management corrections, ensuring that RAN performance is immediately switched back to its expected level.

The rApp acheieves this by monitoring network performance KPIs. The automatic detection, reporting and visualization of anomalies allows operators to better monitor networks. leading to reduced OpEx and improved network quality.
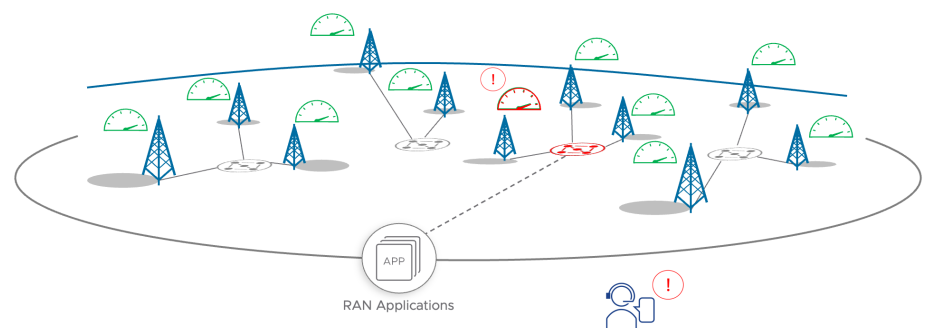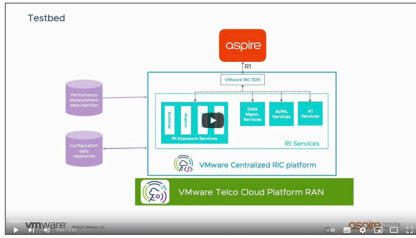

FIGURE 1: The need for managing change in open RAN environments..

VIDEO DEMONSTRATION OF THE PARTNER'S SOLUTION ON VMWARE RIC

Running Aspire's rApp on VMware Centralized RIC to Oversee Configuration Management

FIGURE 2: How Aspire's rApp works with VMware RIC to perform configuration management.

Components of the solution include:

- Data preprocessing module that performs amalgamation and reformatting of the network performance data obtained from the RIC.
- The AI/ML Detection Model that is the core intelligence of the rApp. It groups KPIs into variable and stable categories. Generalized Extreme Studentized Deviate (GESD) is used to to detect anomalies in the variable KPIs. Thresholds based on percentiles are use to detect anomalies in the stable KPIs.
- Processed data is stored in a database with a frontend module providing an interactive GUI to query and view results

Anomaly Detection

Network KPIs are divided into two categories: stable and variable. Different algorithms are used to detect anomalies in both categories. Stable KPIs are expected to remain close to a constant value through time. Examples include success rate, drop rate and packet loss. Because they should remain stable, each is evaluated against a threshold defined as the 99th percentile of the KPI's historical data.

On the other hand, variable KPIs are expected to change over time. Examples of variable KPIs would include volume, latency and throughput. They are tested for anomalies using the Generalized Extreme Studentized Deviage (GESD) test. GESD is used to detect outliers in univariate data assumed to come from a normally distributed population.

To detect anomalies, the rApp periodically requests performance management (PM) data from the RIC and applies a detection algorithm to the performance KPIs.

RAN PROGRAMMABILITY

The RAN intelligent controller gives applications from different vendors access to the functions running in the control and management planes of your radio access network, empowering you to program and optimize your RAN by using methods like artificial intelligence and machine learning.

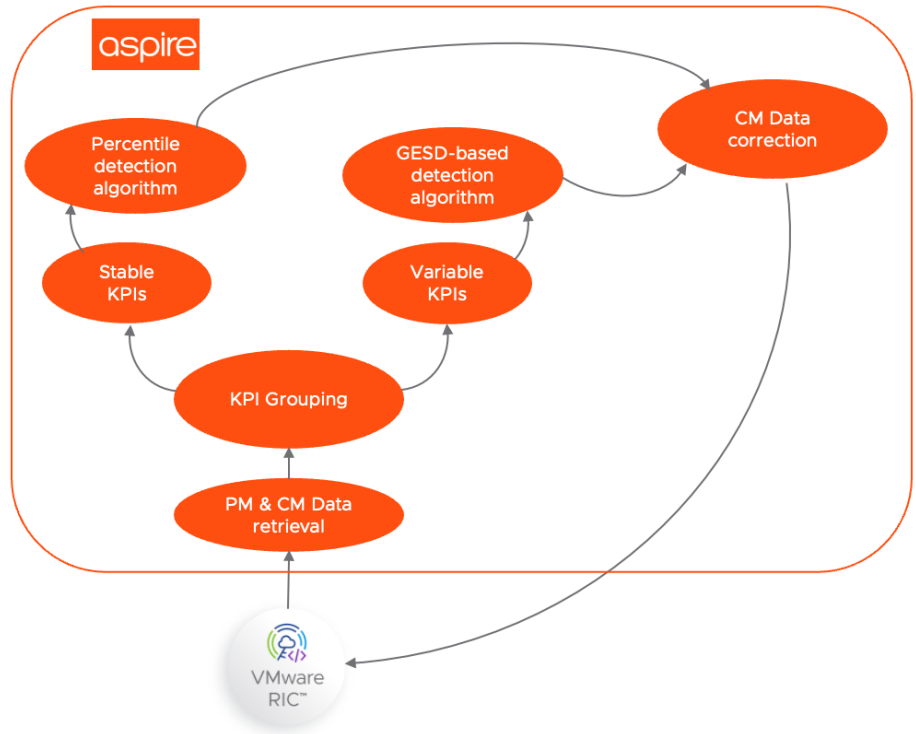*Demo Video: Activating Network Programmability with VMware RIC*

VMWARE RIC AT A GLANCE

VMware RIC lets you programmatically manage and control your radio access network (RAN). The RAN intelligent controllers from VMware enable third-party application developers to tap into network data, process it, and use it to modify RAN behavior.

VMware Distributed RIC hosts near-real-time applications (xApps), and VMware Centralized RIC runs non-real-time applications (rApps). These apps introduce new use cases — automation, optimization, and service customization — that fuel innovation across a telecommunications network.

KEY BENEFITS
- **Multi-vendor interoperability and a vibrant partner ecosystem** – use a vendor- and technology-agnostic platform and tap pioneering solutions.
- **Network optimization** – gain network-wide observability and automate optimization with AI/ML.
- **Efficiency** – reduce energy consumption and improve spectrum utilization by using applications from various partners.

RIC SDK PARTNER PROGRAM

A rich developer ecosystem is critical to the successful adoption of open RAN technology. The VMware RIC SDK Partner Program expands access to and simplifies the development of RIC applications. The program gives partners access to RIC SDKs as well as training videos and application developer support. To find out more, visit
https://techpartnerhub.vmware.com/programs/vmware-ric

LEARN MORE

For more information about the VMware Telco Cloud or VMware RIC, call 1-877-VMWARE (outside North America, dial +1-650-427-5000) or visit
https://telco.vmware.com/

Benefits

An open ecosystem of RIC application development partners promises many advantages for CSPs, but this promise is predicated on the existance of an effective mechanism for monitoring the activities of all applications, and ensuring that conflicting configuration changes are detected and corrected before network performance is impacted.

Aspire's Governance rApp and VMware Centralized RIC work together to ensure that CSPs can take advantage of the O-RAN ecosystem and fast-track innovation in their networks. With effective governance in place, the potential of O-RAN can be realized and CSPs can forge ahead with a range of rApps for different use cases.

VMware and the Path to a Disaggregated, Programmable RAN

For the past five years, VMware has been methodically introducing new telco cloud solutions and changing expectations in the service provider industry about modernization. With an established footprint in telco cloud deployments globally, VMware has been expanding its capabilities to address the challenges in the disaggregation of the RAN.

With a horizontal platform that enables workload consistency from the core and the RAN to the public cloud, we've revealed what is possible—simplicity, speed, agility, and far-reaching automation. The objective is to enable our customers to modernize their entire networks, simplify their operations with end-to-end consistency, and further disaggregate their RAN.