

VIAVI NITRO

Anomaly Detection



VIAVI NITRO[®] ANOMALY DETECTION

Overview

The complexity of modern mobile networks is growing exponentially, with over **5,000 KPIs per network technology and dimension**. The sheer volume, velocity, and variety of data make it impossible for human engineers to manually analyze and detect anomalies in real-time. Traditional alarm-based systems generate numerous false positives, making it difficult to pinpoint critical issues. A more advanced, automated anomaly detection solution is required to streamline network operations, enhance performance, and improve service quality.

Introduction

To address the complexity of modern network operation challenges, VIAVI provides NITRO Anomaly Detection for its NITRO Core and NITRO Location Intelligence products. Available as a licensed add-on, users can leverage AI-powered anomaly detection that transforms network operations by intelligently identifying critical issues in RAN and Core networks, reducing false alarms, and enhancing efficiency. VIAVI leverages its years of network expertise and AI/ML to deliver faster, smarter, and more precise fault detection and resolution.

In addition, Data collected can be fed into the NITRO AIOps platform to automate incident resolution via its own proprietary anomaly detection, providing an end-to-end set of NITRO solutions that seamlessly integrate across multivendor, multi-technology, and multidomain environments. Only from VIAVI.

Benefits

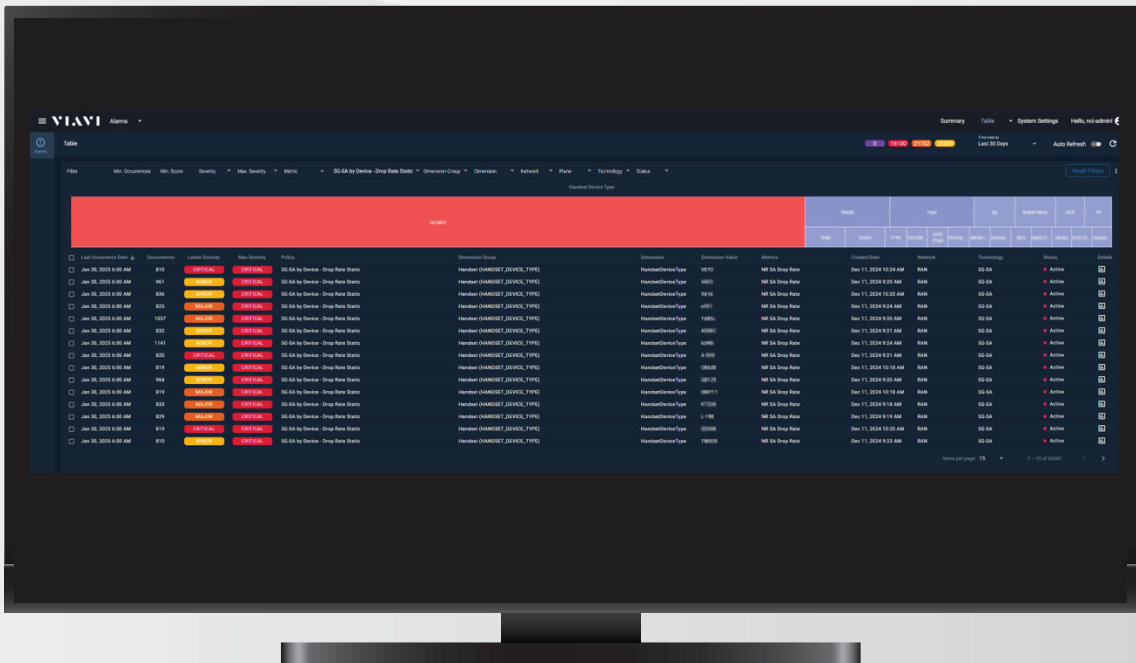
- **Automates Early Detection:** Identifies network issues before they escalate, reducing downtime and improving service quality
- **Reduces Costs:** Minimizes operational expenses by reducing manual troubleshooting and false alarms
- **Handles Data Volume and Velocity:** Processes vast amounts of data efficiently, providing comprehensive analysis and insights
- **Improves Network Transparency:** Offers a holistic view of network performance and anomalies
- **Minimizes False Alarms:** Leverages AI/ML models to detect genuine anomalies, reducing noise from static threshold-based systems





A single pane view of all alarms and anomalies detected

The Alarmogram view provides a comprehensive visual representation of all your policies over multiple days, allowing you to see them simultaneously in a structured format. The intuitive layout helps to quickly identify patterns, anomalies, or specific policies at a glance, making it easier to analyze and manage alerts efficiently.



A detailed view of the anomalies detected

The Alarms Details view allows to drill down into a specific policy to access in-depth insights. It provides detailed information on the network elements that have reported the policy through Anomaly Detection, helping you pinpoint issues, analyze trends, and take informed corrective actions.

USE CASES

	RAN based (NITRO Location Intelligence)	CORE Network based (NITRO Core)
1	<p>Throughput Degradation</p> <p>Low throughput per user, cell, or area indicates an anomaly. Anomaly detection can proactively identify underperformance in real-time.</p>	<p>Network Element Failure Identification</p> <p>Detects abnormal spikes in failure rates, indicating core network issues such as:</p> <ul style="list-style-type: none"> • VoLTE registration failures • Call setup failures • Dropped call volumes • LTE attach request failures • 5G standalone (SA) registration and handover failures
2	<p>Overshooters Detection</p> <p>Detects cells overshooting their coverage areas due to changes in tilt, power, or interference, optimizing network performance.</p>	<p>VoLTE/VoWiFi/VoNR Voice Quality Degradation</p> <p>Identifies drops in MOS scores (UL/DL), pinpointing voice quality issues impacting end users.</p>
3	<p>Signalling Storm Detection</p> <p>Identifies signalling storms that cause network congestion and potential DDoS attacks, enabling rapid mitigation.</p>	<p>User Plane Transport Degradation</p> <p>Detects anomalies in TCP/QUIC retransmission rates, indicating issues in data session establishment and stability.</p>
4	<p>Energy Efficiency Optimization</p> <p>Detects inefficiencies in power consumption across network elements, reducing operational costs.</p>	<p>User Plane Throughput Degradation</p> <p>Identifies drops in average throughput per SGW/UPF gateway, customer group, or device type, ensuring optimal user experience.</p>
5	<p>Coverage and Quality Degradation</p> <p>Monitors key RF metrics (RSRQ, RSRP, CQI, SINR) and detects anomalies affecting network quality and user experience.</p>	

NITRO Anomaly Detection solution seamlessly integrates into existing network monitoring systems, leveraging real-time KPI generation and AI-driven analytics to detect and prioritize network anomalies.



Alarm Metric Stats



Real-Time KPI Generation – The solution continuously collects and processes network KPIs on the fly, ensuring flexibility for troubleshooting and deep-dive analysis.



Advanced Anomaly Detection Mechanisms – The Alarm/Anomaly Detection (AD) module tracks deviations using a **policy-driven configuration of KPIs** with two detection methods:

- **Static Thresholds** – Predefined limits for KPI deviations
- **AI-Driven Anomaly Detection** – Identifies deviations dynamically based on historical trends and network behavior



Event Correlation and Alerting – Detected anomalies, along with KPI history, are analyzed to pinpoint network or service issues. Events are **prioritized and scored** to reduce false alarms and highlight critical incidents.



Intelligent Event Management UI – The **Event UI** enables efficient **isolation, visualization, and investigation** of anomalies, ensuring network teams can swiftly act while leveraging existing applications for deeper analysis.

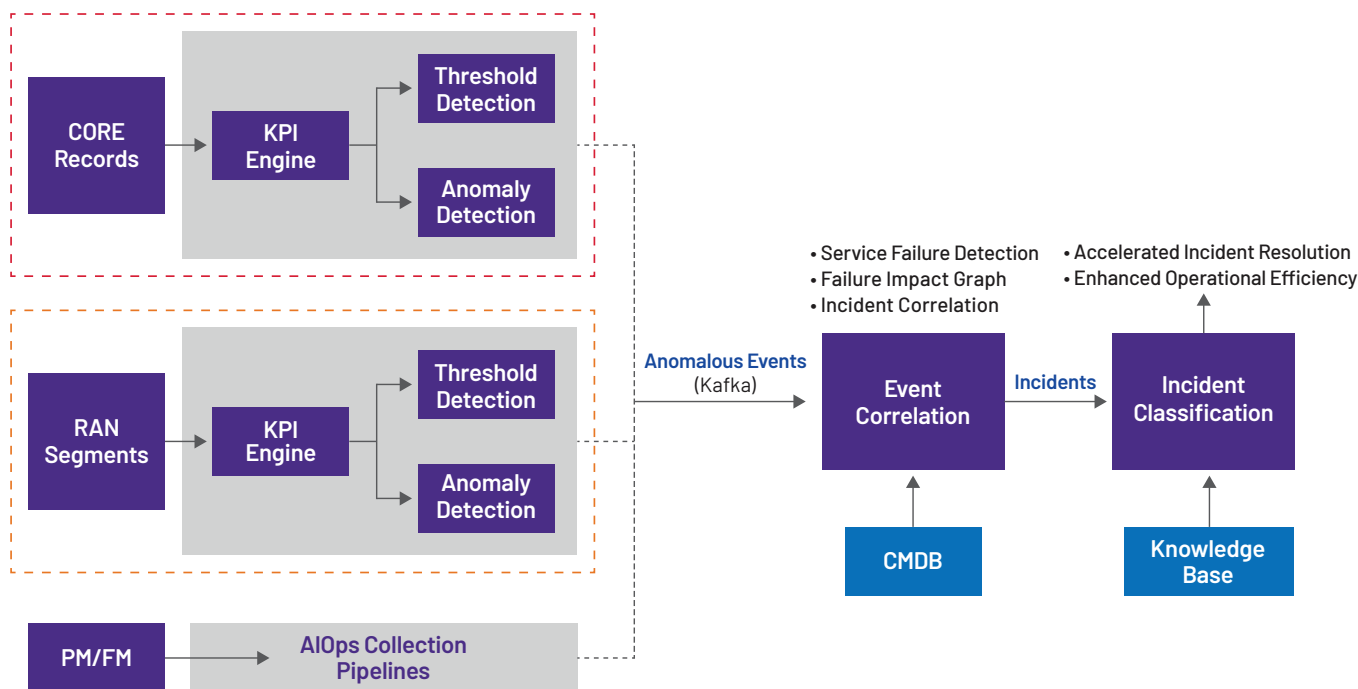


Seamless System Integration – The solution provides **real-time notifications** and integrates anomalous events with **external systems** for automated workflows, incident management, and closed-loop automation.

By combining real-time KPI monitoring with AI-driven anomaly detection, the architecture designed ensures **accurate issue identification, reduced operational complexity, and proactive network optimization**—empowering engineers with actionable insights while maintaining system flexibility.

WHY VIAVI

VIAVI brings years of expertise in network intelligence, leveraging the latest AI-driven technologies to transform anomaly detection in RAN and Core networks. The solution is designed to eliminate alert fatigue by allowing AI to determine whether a detected deviation is significant enough to trigger an alarm. Unlike traditional rule-based systems that flood engineers with unnecessary alerts, our adaptive anomaly detection model reduces false positives, ensuring that only real, actionable issues are flagged.



NITRO Location Intelligence/Core

NITRO AIOps

Data collected at the RAN and CORE can be fed into NITRO AIOps to automate incident resolution.



The solution assigns a priority score based on the severity and context of deviations, which enables network engineers to focus on the most critical problems first aligning with their operational needs and decision-making processes. This intelligent prioritization ensures faster root-cause analysis, minimizes downtime, and improves overall network efficiency.

Reduced Costs

Runs on commercial off the shelf (COTS) hardware/VMs – No need for expensive GPUs, reducing infrastructure costs.

Faster Execution

Minimal training time and achieves meaningful results in just 2–3 days

Plug-in Architecture

Rapid integration of latest deep-learning models from academic research.

Unified Implementation for RAN and Core

Seamlessly integrates with existing VIAVI solutions (NITRO Core and Location Intelligence) for a holistic view.

AI-driven Closed-loop Automation

Feeds alarms from RAN and Core (via NITRO Location Intelligence and NITRO Core) into NITRO AIOps, correlating FM/PM data for automated incident resolution.

Leveraging AI and automation, VIAVI NITRO Anomaly Detection ensures faster, smarter, and more precise anomaly detection—enabling network operators to stay ahead of issues, reduce costs, and enhance user experience.



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