



NetACE TONAS™

Use Case Overview:

Enhancing Network Assurance and Service Quality for Broadband Access Networks with TONAS™

Introduction

In today's highly competitive telecommunications market, maintaining an optimal level of network performance and service quality is crucial for Communication Service Providers (CSPs) offering high-capacity fiber-optic broadband services to residential and business customers. TONAS™, a modular, cloud-native OSS solution by Atrinet, is designed to address this challenge by providing comprehensive network assurance capabilities, including network discovery, fault management, performance monitoring, event correlations, and AI/ML-driven analytics. In this particular use case, the TONAS™ solution focuses on multivendor broadband access networks, aggregation, and edge networks, consisting of Optical Network Terminals (ONTs), Optical Line Terminals (OLTs), Routers, Switches, and Broadband Network Gateways (BNGs). Delivering high-speed internet, voice, and video services to a large number of subscribers, TONAS™ is aligned with Broadband Forum standards and best practices, ensuring optimal performance and service quality across diverse network environments.

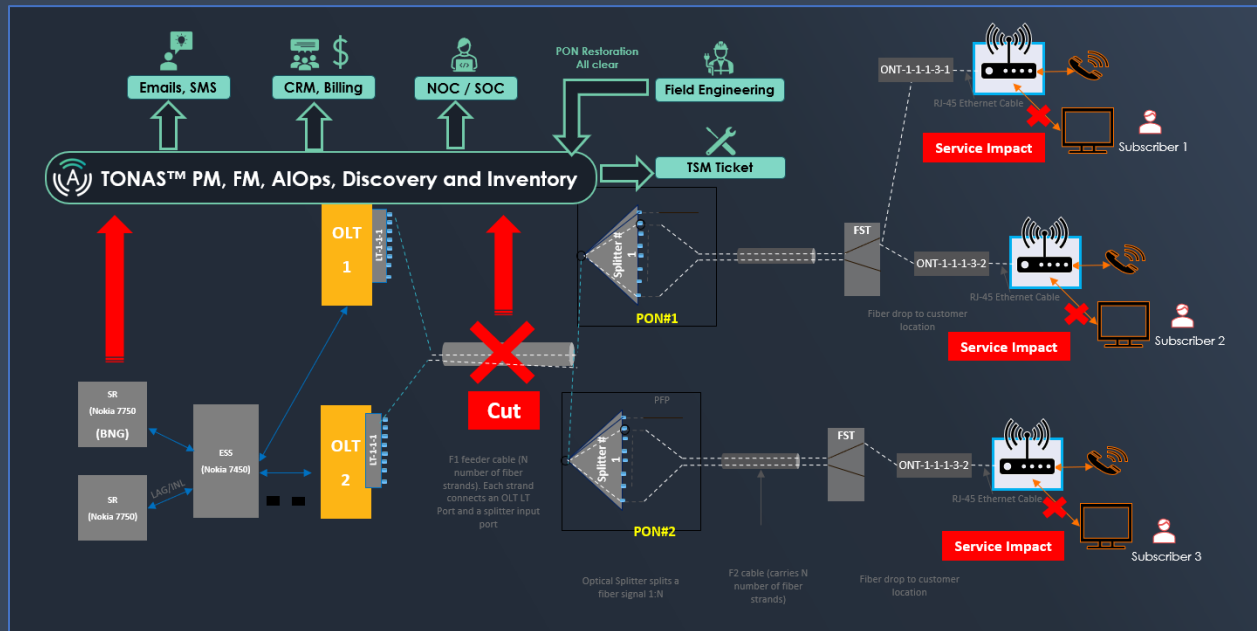
Customer Impacting Network Event - Fiber Cut Downstream of OLT

A customer operating a fixed access network experiences a fiber cable damage that affects 180 customers due to third-party construction. The damage occurs between ONTs and OLTs before the split, resulting in a loss of service for multiple customers across various OLTs. As construction crews splice the affected cable, ONTs are restored at different times.

VP Operations of Tier-2 CSP in the US says:

"It is critical for CSPs to effectively address the issue of downstream cable cuts from the OLT, as approximately 85% of all network failures occur as a result of this!"

The Location of the Fiber Cut:



Solution Deployed: TONAS™ Cloud-native OSS

NetACE TONAS™ is built on a containerized cloud-native architecture, open-source software, TM Forum Open APIs and streamlined continuous integration and continuous delivery (CI/CD), which makes it highly scalable, flexible, and lightweight, allowing it to be rapidly customized, integrated, and put into operation.

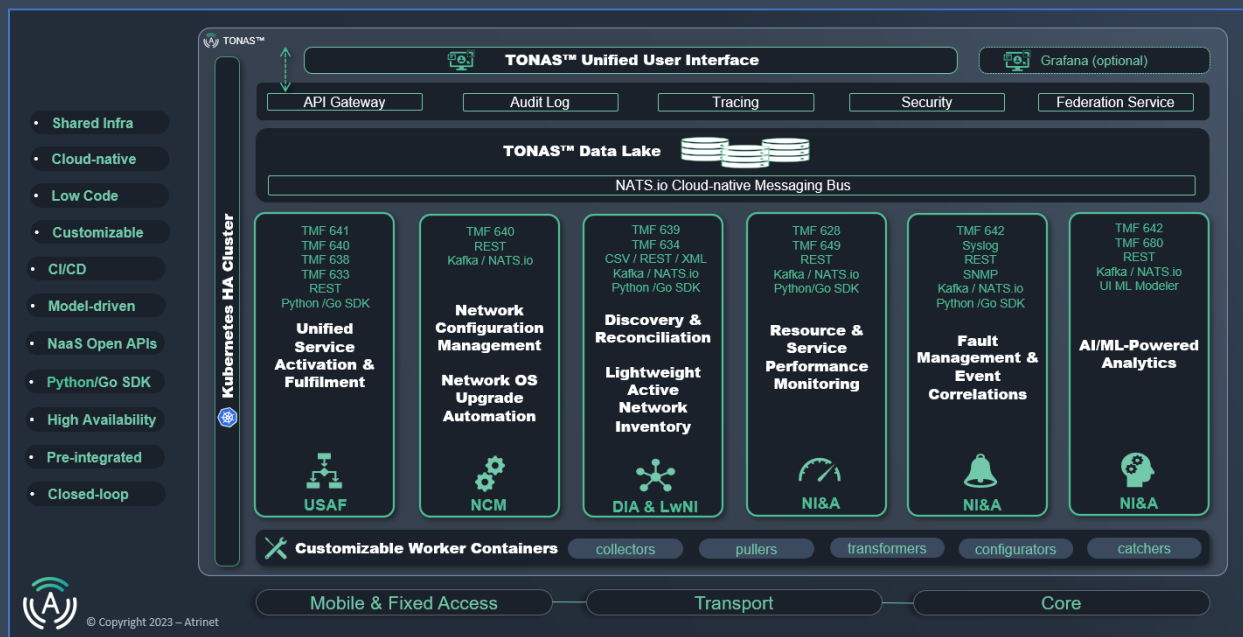
Atrinet offers several open and low-code solutions within NetACE TONAS™, including Inventory Data Integrity Assurance (DIA), Lightweight Active Network Inventory (LwNI), Network Insights & Assurances (NI&A), AI/ML-driven Analytics (AIOps), Network Configuration Management (NCM), and Unified Service Activation & Fulfillment (USAF). These solutions are designed to help Telecom Operators optimize their operations and reduce both their operating expenses (OpEx) and capital expenses (CapEx) by automating manual processes and consolidating multiple systems into a single open platform.

To address this specific use case, the TONAS™ solution is deployed, consisting of the following components:

- **TONAS™ Network Insights & Assurance (NI&A):** includes TONAS™ Fault Management (FM), TONAS™ Performance Monitoring (PM), and TONAS™ AIOps, which is AI/ML-driven Analytics. It provides actionable insights into network performance and service quality, as well as comprehensive event-to-service/subscriber correlation capabilities, enabling Telecom Operators to identify and resolve issues quickly and proactively.

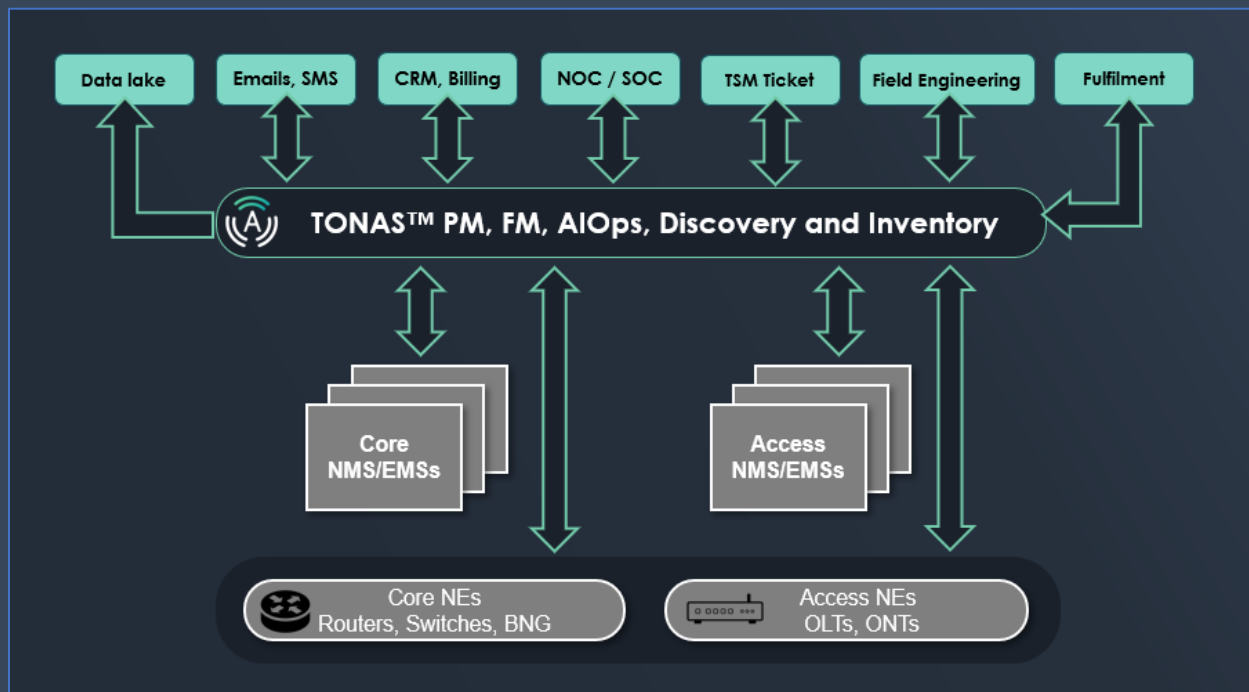
- TONAS™ Inventory Data Integrity Assurance (DIA):** comprised of Federated Network Auto-Discovery & Real-time Reconciliation modules, ensures the accuracy and completeness of network inventory data and supports the automated and manual resolutions of data inconsistencies. The DIA can be easily integrated with one or more 3rd party Network Resource Inventories, fully automating the network discovery, synchronization and discrepancy resolution tasks.
- TONAS™ Lightweight Active Network Inventory (LwNI):** is an active network inventory that is constantly updated in real-time by TONAS™ DIA. As part of the TONAS™ Platform, it smoothly integrates with TONAS™ NI&A and other solutions modules.
- NetACE TONAS™ Common Visualization, Federation and Security:** is the foundation upon which all of the modular products in the NetACE TONAS™ solutions are built. It comprises a unified user interface (UI) for all solution modules and functionality that is based on React, an open-source front-end JavaScript library for building user interfaces using UI components. It also includes security features such as single sign-on (SSO), API Gateway, and Federation Services.

TONAS™ High-level Solution Architecture:



TONAS™ Northbound and Southbound Integrations

TONAS™ offers a comprehensive and flexible network management solution by seamlessly integrating with a variety of network elements, IT systems, and third-party OSS/BSS solutions. This section describes TONAS™ northbound and southbound integrations and the protocols used for these integrations.



Northbound Integrations:

Northbound integrations involve communication between TONAS™ and higher-layer management systems, such as OSS/BSS solutions. TONAS™ supports a wide range of northbound integrations, including:

- **CRM:** TONAS™ integrates with CRM systems via REST APIs, allowing for real-time synchronization of outage and connectivity status at the customer level.
- **Billing:** TONAS™ integrates with billing systems via REST APIs, providing updates on customer usage, outage durations, and other billing-related data.
- **Ticketing:** TONAS™ integrates with ticketing systems via REST APIs, enabling automated ticket creation and updates for network outage incidents.
- **Order Fulfillment and Orchestration:** TONAS™ supports TM Forum's Open API (TMF639) for integration with order fulfillment and orchestration systems.

- **Email and SMS:** TONAS™ integrates with email servers and SMS gateways, facilitating the sending of notifications, alerts, and reports to stakeholders through multiple channels.
- **Data Lake:** TONAS™ integrates with data lakes using Python and Go connectors, allowing for efficient data storage and analysis across various network elements and systems.

Southbound Integrations:

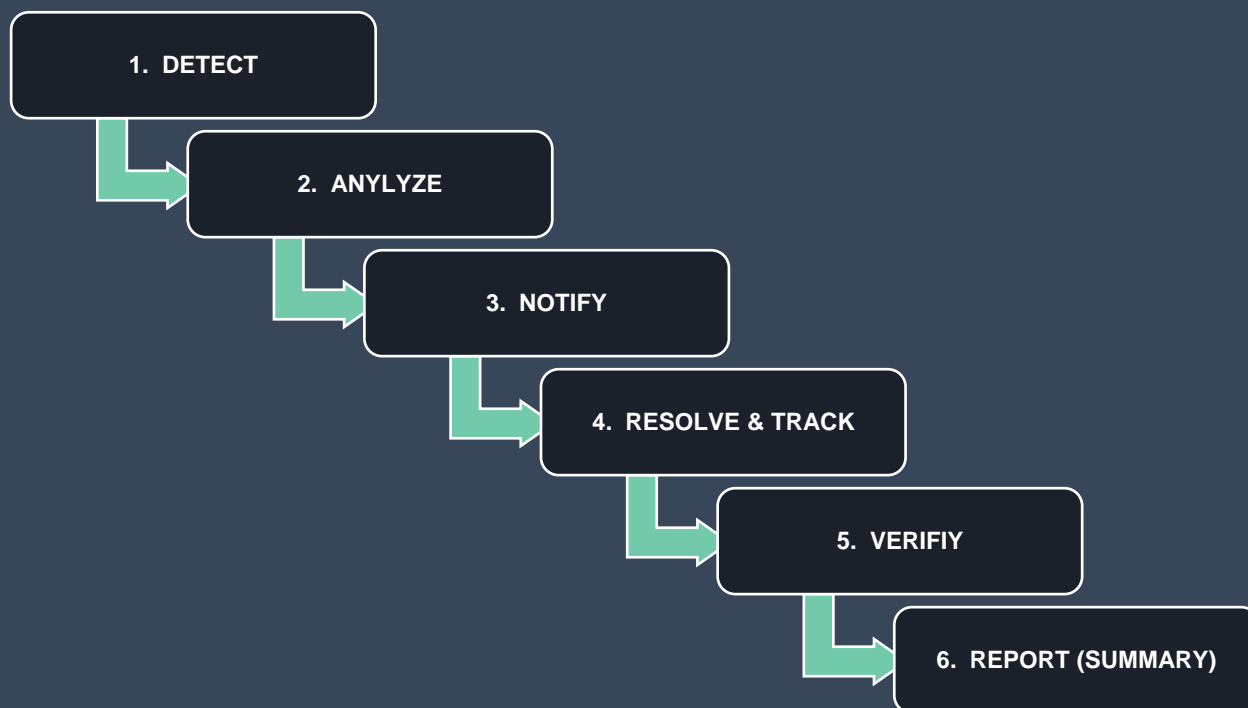
Southbound integrations involve communication between TONAS™ and lower-layer network elements, such as ONTs, OLTs, routers, switches, BNGs and their network management systems. TONAS™ supports a wide range of southbound integrations and protocols, including:

- **NETCONF / YANG:** TONAS™ uses the NETCONF protocol, which is an IETF standard protocol used for configuration management and communication with network devices. This XML-based protocol provides a robust and standardized method for managing network devices and their configurations. It is used to retrieve, configure and monitor network devices' operational parameters and states. The YANG modeling language is used to define data models for these network devices, allowing for consistency and automation in configuration and monitoring. TONAS™ provides support for NETCONF/YANG-based device configuration and management, enabling seamless integration with devices that support these protocols.
- **Telemetry:** TONAS™ support protocols such as gRPC, OpenConfig, and RESTCONF for Telemetry integration with network elements. These protocols allow NI&A to receive real-time streaming telemetry data from the network elements and process it to provide actionable insights into network performance and service quality.
- **CLI over SSH:** TONAS™ supports Command Line Interface (CLI) integration for interacting with network devices which do not support NETCONF, enabling direct access to device configurations and operational data.
- **SNMP:** TONAS™ uses the Simple Network Management Protocol (SNMP) for monitoring and managing network devices. SNMP provides a standardized framework for collecting performance data, fault information, and device status updates.

- **NMS/EMS/Controller Integration via REST, SNMP and TL1 and File Export:** TONAS™ also integrates with Network Management Systems (NMS) and Element Management Systems (EMS) to collect and analyze fault, performance, and configuration data from network devices.

How TONAS™ Handles Fiber Cut on Fixed Access Network

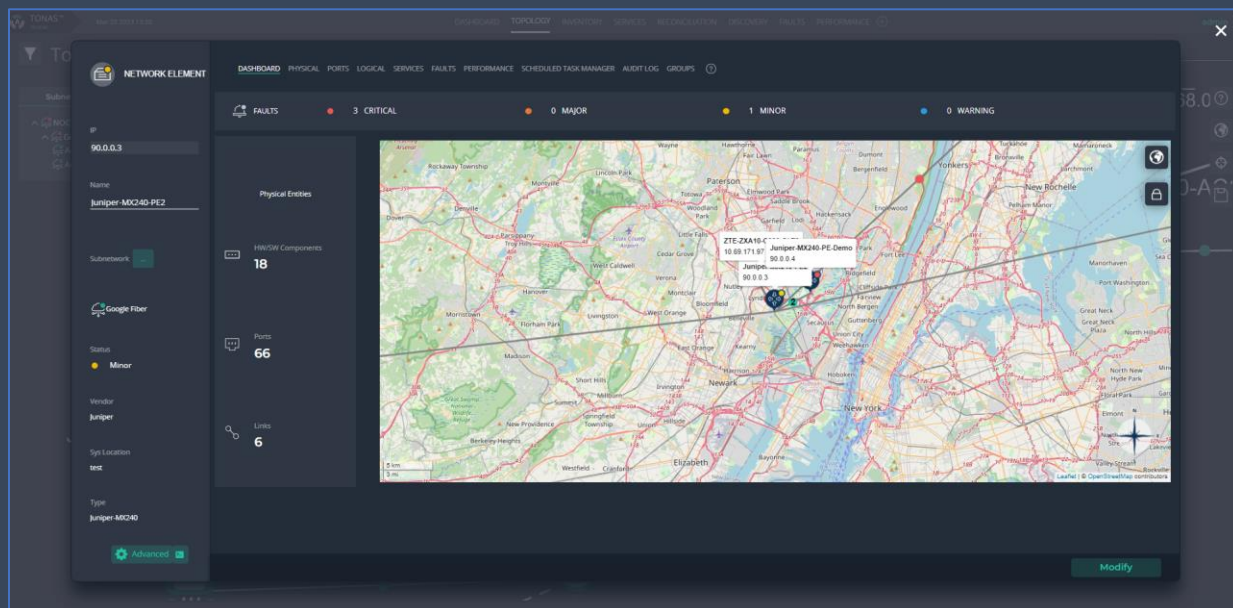
High-level Solution Flow:



1. **Detect:** TONAS™ detects the failure event using various methods, such as alarms, traps, performance readings, and proactive probing of network element (NE) statuses.
2. **Analyze:** TONAS™ analyzes the impact of the event by identifying the affected region, damaged fiber, affected OLTs and ONTs, and performing event correlation. The system uses advanced algorithms to correlate faults, resources, and services, providing a comprehensive view of the network status. This correlation helps to identify root causes and affected services, enabling the generation of aggregated alarms such as regional outages.

3. **Notify:** TONAS™ notifies the appropriate personnel and systems, such as field technicians, NOC staff, and CRM, providing information about the location of the damage, the number of affected customers, and the estimated time to restore service.
4. **Resolve & Track:** TONAS™ tracks the progress of the restoration process, providing real-time updates to NOC staff, upper-layer systems, and stakeholders. As each customer's service is restored, TONAS™ updates the CRM and Billing systems in real-time, synchronizing outage/connectivity statuses and calculating customer credits.
5. **Verify:** After service restoration, TONAS™ verifies that all affected OLTs and OLTs are operational and that service has been restored for all customers. It also logs the details of the restoration process for future reference and analysis.
6. **Report:** TONAS™ generates a report summarizing the event, including the total number of affected customers, the time of the event, the time to restore service, and any other relevant information.

TONAS™ Unified User Interface (UI):



Business Benefits of TONAS™

TONAS™ offers several business benefits for CSPs operating fixed access networks:

- **Enhanced Network Assurance:** TONAS™ provides comprehensive network assurance capabilities, including fault management, performance monitoring, event correlation, and AI/ML-driven analytics, resulting in more reliable and resilient networks.
- **Faster Issue Resolution:** Leveraging AI/ML technologies, TONAS™ enables quick identification of network issues and root causes, leading to faster issue resolution and minimized downtime.
- **Predictive Assurance:** With its AI/ML-driven analytics, TONAS™ offers predictive assurance capabilities, helping CSPs proactively detect and address potential network issues before they escalate, reducing the impact on customers.
- **Improved Service Quality:** By quickly detecting, analyzing, and resolving network failure events, TONAS™ helps CSPs maintain a high level of service quality for their customers.
- **Operational Efficiency:** TONAS™ streamlines network management processes, enabling CSPs to quickly respond to and resolve network issues, ultimately improving operational efficiency.
- **Customer Satisfaction:** By minimizing service disruptions and prioritizing the restoration of services based on customer importance, TONAS™ enhances customer satisfaction and helps CSPs retain their customer base.
- **Data-Driven Decision Making:** TONAS™ provides real-time network insights, enabling CSPs to make informed decisions based on accurate data and performance metrics.
- **Scalability and Flexibility:** TONAS™ is a cloud-native, low-code solution that can easily adapt and scale to accommodate the evolving needs of CSPs.
- **Seamless Integration:** TONAS™ integrates with existing network elements, NMS/EMS systems, and third-party OSS/BSS solutions, providing a unified and comprehensive network management solution.

Conclusion

In summary, TONAS™ is a powerful network assurance solution that addresses the challenges faced by CSPs operating fixed access networks. By detecting, analyzing, and resolving network failure events efficiently, TONAS™ helps CSPs maintain optimal network performance, improve service quality, and enhance customer satisfaction. With its advanced features, seamless integration capabilities, and scalability, TONAS™ is an ideal choice for CSPs looking to future-proof their network management strategies.

About Atrinet

Atrinet is a leading provider of innovative, next-generation operations and network automation solutions for the telecom industry. With a strong focus on innovation and a commitment to delivering exceptional customer experiences, Atrinet has earned a reputation for delivering top-quality solutions that help telecom operators and CSPs simplify their operations and achieve their business goals. With a highly experienced team of experts and a state-of-the-art development center, Atrinet is dedicated to delivering the most advanced, reliable and scalable solutions for the telecom industry, making it the ideal partner for businesses seeking to achieve their digital transformation goals.

For more information on NetACE TONAS™, visit: www.atrinetOSS.com

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