Nokia Altiplano Access Controller

The Nokia Altiplano Access Controller is a SDN domain controller, which offers a wide range of APIs, FCAPS tools and virtual network functions (VNFs), to visualize, optimize, and enhance the fixed access network. The cloud-native platform delivers powerful automation tools and flexible programming via open interfaces. Its open modular extendable architecture allows for the introduction of new network capabilities and integrates easily with OSS/BSS, IT and cloud platforms.

The Altiplano platform offers a complete suite of network management as well as SDN control functions that operators need to run a broadband network today. Altiplano automates network lifecycle management activities, providing operators a single unified pane of glass for the entire access network domain, supporting SDN-native, disaggregated, legacy and third-party equipment.

The cloud-native architecture provides logic and primitives to efficiently program and monitor millions of nodes through programmable APIs, caters for various OSS environments with a rich set of protocols and helps operators conduct daily FCAPS operational activities - without compromising on scale and openness. The versatile set of carrier-grade microservices enables network visualization, zero-touch automation, easy OSS integration and flexible service programming, network provisioning, telemetry streaming, network slicing, intent-based abstraction, policy enforcement, health checks, alarm monitoring, diagnostics for troubleshooting, automated workflows and network upgrades.
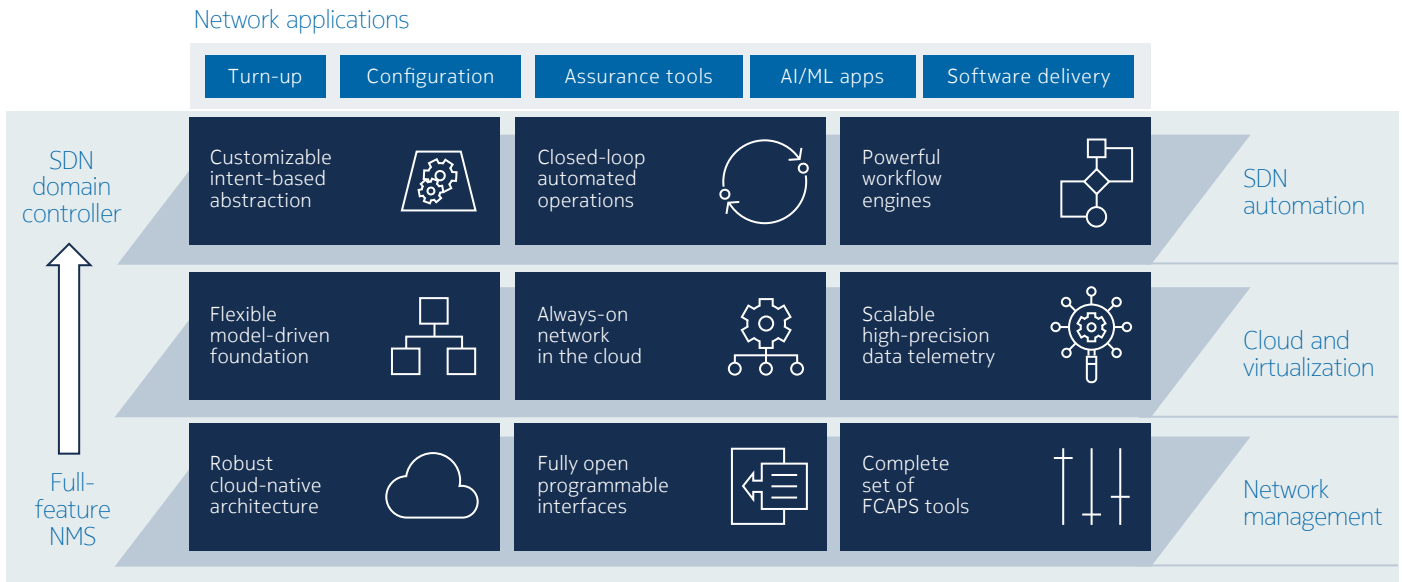
Features

- Single domain controller for multi-vendor multi-technology fixed access networks
- Applicable to both PNFs (physical network functions) and VNFs (virtual network functions)
- Highly scalable modular architecture with micro-services deployed in Docker containers
- Pre-integrated with standard IT tools and compatible with cloud or MANO systems
- Full programmability through a set of open APIs and Developer Portal with SDKs
- Integrated policy/workflow engines for network automation

Benefits

- Eases the introduction of new services by applying changes rapidly and consistently
- Reduces labour costs and manual interventions with integrated network automation
- Improves and simplifies service fulfilment and service assurance for operators
- Ability to adopt SDN agile principles when and where they are needed
- Integrates easily across third-party systems, networks and partners
- Open platform innovation: ability to onboard and develop own apps and build extensions

Figure 1. Overview

Network applications

| Turn-up | Configuration | Assurance tools | AI/ML apps | Software delivery |

SDN domain controller

| Customizable intent-based abstraction | Closed-loop automated operations | Powerful workflow engines | | SDN automation |

| Flexible model-driven foundation | Always-on network in the cloud | Scalable high-precision data telemetry | | Cloud and virtualization |

Full-feature NMS

| Robust cloud-native architecture | Fully open programmable interfaces | Complete set of FCAPS tools | | Network management |

Deploy the management and SDN control functions you need and have a path to grow the platform as new requirements arise.

Altiplano cloud platform

Unified management

The Altiplano cloud-native platform serves as a single management interface for the operator's OSS/BSS using open standardized APIs. It provides tools to visualize, automate and optimize multi-generational multi-vendor networks, across various technologies and deployment models. It equips providers with the means to enforce business rules independent from the underlying implementations and bridges both traditional and software-defined networks (PNFs and VNFs).

Powerful automation and abstraction

Altiplano reduces the total cost of ownership via automation applications, such as software campaign management, zero-touch operations, policy engines and troubleshooting workflows. It simplifies complexity by using intent-based abstractions, which hold the logic for the intelligent realization of device deployment and infrastructure and subscriber fulfilment in the network. Finally, it provides monitoring insights by rolling up various key performance indicators into a health indicator

and closes the loop by optimizing the network through policies that auto-correct configuration misalignments.

Programmable modular design

Altiplano is an open and programmable framework of modular and scalable microservices. A fundamental principle is the decoupling of device and service layers, which inherently reduces the risk of introducing new technologies allowing investment in new systems and services to be incremental. Its open and standard interfaces allow easy integration and flexible programming of the access network.

Cloud integrated

Altiplano is a cloud-native solution, pre-integrated with common tool chains and IT platforms. The always-on network offers logic and primitives for efficiently configuring and monitoring the network elements. It shields the operator from having to worry about challenges such as device reachability, cloud elasticity and network scalability, when connecting to hundreds of thousands of devices.

Technical specifications

Altiplano variants

- Altiplano Access Controller can operate as a sophisticated SDN domain controller that adds automation tools and intent-based abstraction
- Altiplano NMS can operate as a traditional full-feature network management system that offers all the needed FCAPS operational tools.

Device management

- Device inventory
- Pre-provisioning with default or customized template configuration
- Secure call home (transport layer security [TLS]) or direct (secure shell [SSH]) connection modes
- Device synchronization with cloud configuration
- Quick and easy device replacement
- Supports Nokia Lightspan devices (NETCONF)
- Supports Nokia Intelligent Services Access Manager (ISAM) devices (SNMP)
- Supports third-party access nodes

Zero-touch provisioning (ZTP)

- ZTP for nodes and auto-activation for customer premises equipment (CPE)
- Built on PMA, policy manager, workflow engine and intent-based networking (IBN)

Intent-based networking

- For infrastructure and service provisioning agnostic to the underlying hardware.
- Customizable YANG model abstraction and mapping code to NETCONF/YANG or Simple Network Management Protocol (SNMP) devices
- Powerful intent life cycle management: create, monitor, suspend, resume, audit, resynchronize, modify and delete
- Reports intent health with drill-down capabilities to the health of all objects involved in intents

Software campaign management

- Bulk operations and batch processing
- Supports managed (Altiplano) and unmanaged file servers
- Smart scheduling (for example, rate based) with monitoring and reporting

Network sharing and slicing

- Powerful and flexible slicing engine giving autonomy and detailed network feedback to tenants
- Enables powerful resource sharing defined through slicing models
- Supports both BBF fixed access network sharing (FANS) open access and service partitioning

Virtualized fault management

- Performs alarm transformation on behalf of devices
- Threshold crossing alerts (TCAs) policies on any data stored in PM data lake
- Alarm and notification streaming over Kafka and/or using NETCONF notifications
- Active and historical alarms persisted in Elasticsearch and accessible through REST northbound interfaces (NBIs) and Kibana

Virtualized performance management

- Supports push mode (IPFIX collectors) and pull mode (Live collectors)
- Persists performance data as time series in PM data lake and/or restreams decoded information over Kafka
- KPI calculation engine (for example, intent health index, network utilization)

Virtualized ONU management

- Decouples optical line terminal (OLT) and ONU management.
- Supports various ONU types with various feature sets
- Plug-and-play software stack for Nokia and third- party ONUs and ONU management control interface (OMCI) stacks
- Support for embedded and virtualized ONU management

Always-on configuration

- Persisted and scalable NETCONF/YANG device configuration in the cloud with prevalidation

- Scalable PMAA [BBF TR-301]

- Device configuration versioning in the cloud with instant restore to any point in time

Network troubleshooting

- Rich set of device and network troubleshooting capabilities (for example, connectivity fault management [CFM])

- Alarm and service troubleshooting workflows

Telemetry, logging and tracing

- Extensive Altiplano telemetry data pushed to PM data lake

- Altiplano logging and protocol tracing bridged to Elasticsearch

- Device logging bridged to Elasticsearch

Programmability and customization

- Powerful set of hot-pluggable, programmable and/or customizable capabilities

- Applicable to intent YANG modeling and mapping, network views YANG modelling and mapping, troubleshooting workflows, ad hoc dedicated tasks, data collection models, TCA models and device plug-in

- Programming logic in JavaScript is accessible to customer and Nokia professional services

Open and standard interfaces

- Vast choice of NBI protocols: NETCONF, RESTCONF, Kafka, HTTP REST, CLI, SNMP traps, SOAP/XML and WebUI

- Powerful southbound interface (SBI) protocols: NETCONF, SNMP, IPFIX and HTTP REST

- Wide use of YANG for both NBIs and SBIs

Deployments

- Runs on bare metal services, virtual machines (VMs) and in all cloud environments

- Deploys as microservices in Docker containers with Kubernetes and can share microservices

- High scalability and high availability with Kubernetes for disaster recovery

- Designed and scalable to millions of devices in an access network

Standard compliances

Performs the role of BBF TR-384 CloudCO/TR-411 Access SDN Management and Control (M&C) function, with Broadband Access Abstraction (BAA) integrated.

- BBF TR-301/TR-384/TR-411/TR-413/TR-370/ TR-436

- RFC 4741/RFC 6241

- RFC 5277

- RFC 6020/RFC 7950

- RFC 6242

- RFC 6728

- RFC 7011

- RFC 7589

- RFC 8071

Service support

- Nokia support and professional services available for integration and migration to a software-defined access network (SDAN)