Aliro Orchestrator Data Sheet

Aliro Orchestrator simplifies quantum network management by providing a centralized intuitive visual application and API through which network operators can view everything, control everything, and automate network operations.

Overview

Bringing modern Software Defined Networking (SDN) best practices to quantum networking empowers operators to coordinate network resources, monitor component status, prioritize critical services, and automate operations.
This saves time, optimizes utilization, and transforms uptime, all of which are required for success in scale deployments and enterprise environments.

- Centralized orchestration across distributed quantum network resources.
- Visibility into nodes, links, and system performance.
- Integration with AlirOS, diverse quantum networking components, and external software environments.
- Automation-ready workflows for scalable network operations.

Use Cases

Quantum Secure Communications (QSC): orchestrate quantum secure key generation to protect critical traffic from Harvest Now Decrypt Later (HNDL) attacks.

Entanglement based key generation (BBM92 protocol) with AlirOS
Third party key generation hardware

Entanglement Distribution: orchestrate entanglement services to support diverse applications in security, position verification, sensing, and distributed quantum computing.

Quantum Network Testbeds: orchestrate shared research resources to accelerate learning, development, and experimental demonstrations, while facilitating collaboration, interoperability, and standards development.

Features

Device Management

Manage and monitor all the devices in your network in one place.

- Periodic health checks ensure visibility of live connection status.
- Notifications surface details from the device interfaces.
- Administrative and Operational Status keep operators and automation logic appraised of current device conditions.

Services

- Create network services with simple, application requirement oriented workflows.
    - To create a QSC service, users specify the following:
        - Communication endpoints: manual route specification is obviated by Aliro Orchestrator's built in path compilation.
        - Key buffer duration: This represents the amount of time the system should be prepared to maintain key availability in the event of an outage.
        - Key rollover: This allows the system to anticipate the frequency of key consumption by classical network switches.
- Monitor live service health and performance metrics over time.
    - Metrics for QSC services include key generation rate, Qubit Error Rate (QBER), and key buffer size.

Sessions

Aliro Orchestrator intelligently schedules individual sessions to meet the configured service requirements.

- This optimizes resource allocation and balances service priorities.
- In the case of QSC, the system maintains appropriately sized reserves of keys to ensure reliability for downstream applications.

Global Network View Dashboard

View an interactive map of the network topology, configured services, and corresponding sessions automatically provisioned across the network.

- Oversee how service level performance compares to targets.
- Delve into session level telemetry visualizations for granular link and protocol visibility.

Alerts and Alarms

Continuous, automatic metric monitoring detects issues early, before they impact application performance.

- Alert and Alarm Types
    - Evestropper detection
    - Component failures
    - Connection issues
    - Insufficient resources to meet service requirements
- Alert and Alarm Management
    - Isolate the specific service, session, node, and/or link associated with the alert.
    - Push notifications and dashboard pop ups highlight critical issues.
    - Maintain a log of historical incidents.
    - Allow operators to document updates, investigation notes, and resolution steps for manual intervention.
    - Automated network operations triggered by alerts and alarms can diagnose and remediate network issues.

Device Interfacing

Robust, flexible hybrid device interface framework that allows the best of multiple architectures

- Device Controller (DC) communicates directly with model-driven, YANG-described interfaces.
- Device Driver Component (DDC) integrates the DC with devices that do not provide a YANG data model and programmatic interface.
    - **Northbound interface** implements a gNMI server for model registration and data validation.
    - **Datastore** supports get, set, and subscribe RPCs.
    - **Translator** provides a mapping between the datastore and the device driver.
    - **Device Driver:** handles issuing VISA/SCPI commands, API calls, or whatever else needed to control the actual device.

API for Automation and Third Party Integration

Aliro Orchestrator functionality is accessible via a graphical user interface (GUI) and a REST-based API, facilitating automation and integration with third-party tools and systems to streamline integration with existing infrastructure.