anuta networks

Key Features

➢ Extensible, model driven configuration management using YANG (RFC 6020)

➢ Device and Service abstraction using a vendor-agnostic data model

➢ Rich set of APIs based on RESTCONF and full support for CRUD operations

➢ High degree of customization for frequently used operations on ANY network device for ANY service

Solution Benefits

➢ Zero Touch provisioning, Day 0 configurations, best practice templates supported

➢ Handles configuration data as well as state data

➢ Works with or without NETCONF support on devices

➢ Entire services such as L3VPN, Routing, ACL creation can be automated

Configuration management and Service abstraction using YANG

Anuta Network Services Orchestration Platform (NCX) uses an extensible, model-driven configuration and service management engine based on industry-standard YANG modeling language for configuring and managing devices using NETCONF, CLI, API, XML, and SNMP etc.

Anuta NCX enables customers and partners to develop their own device, service and operational models to match their specific network service delivery needs.

Traditional challenges in configuration management

Device abstraction: In a diverse, multi-vendor deployment, it is extremely difficult to keep track of all services, device communication methods, CLI syntax, proprietary features etc. to come up with a consistent view of the network.

Service abstraction: Traditionally, configuration management is done in silos by maintaining the configuration templates of each and every device in the network and service-level awareness is often missing in most Management tools.

Vendor-agnostic data representation: Network information such as IP Addresses, VRFs, VLANs, and ACLs etc. are often represented differently for different vendor platforms making visual comparison and standardization impossible without the use of a data model.

Because of this complexity, it is expensive for operators to bring services to market or make changes on the go as per customer requests. This also makes them vendor dependent.

The NCX Data Model

YANG: RFC 6020 addresses the need to represent network configuration and state data into a model. Anuta NCX has adopted the RFC definitions for its Data Model but in addition to the YANG/NETCONF framework, NCX is capable of using the framework on legacy devices that are not NETCONF capable and supports a wide variety of device families, vendors and configuration operations.
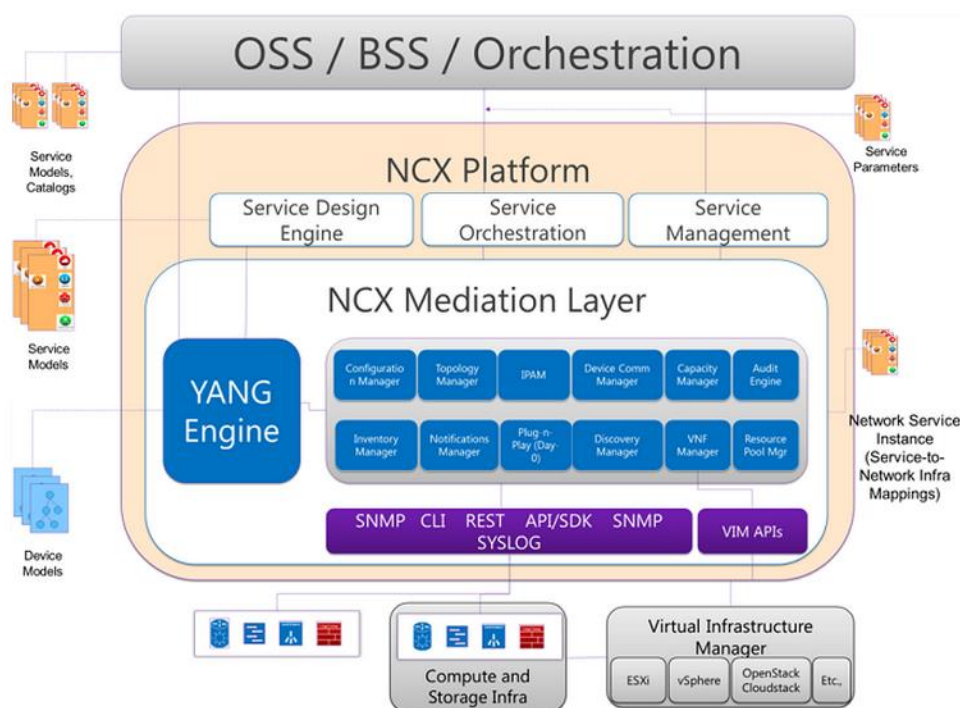
Device and Service Models: NCX supports various device models using the YANG framework thereby giving the network administrator a consistent view of the network data. In addition, popular services such as L2VPN, L3VPN, Routing, ACLs etc. are available out-of-the-box.

Customized Operations: Using NCX Data Model, the administrator can define highly customized operations that will be executed on a multi-vendor install base. Any network configuration task can be defined as an operation. Operations can be executed via API or UI with ease.

Transaction support with commit/rollback: NCX supports transactional operations both on the model itself as well as the devices under the model. Create, Read, Update, Delete functions are supported giving full flexibility to the administrator to define granular operations. Each transaction supports Commit and Rollback options and all tasks on the model can be executed via a rich API set based on RESTCONF and readable in simple XML.

The following figure illustrates how NCX YANG mediation engine combines the device models and service models to deliver service orchestration on a multivendor network. Northbound integration is via the NCX RESTCONF API.

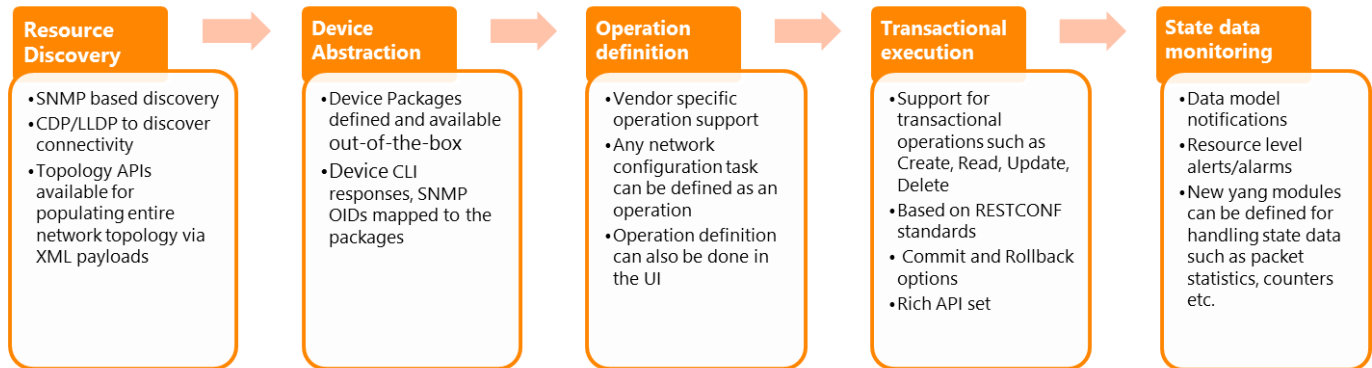**Figure 1:** Configuration Management using NCX YANG Engine

YANG workflow using NCX

NCX discovers the network devices and topology and populates its data model. After defining the requisite device support (over 500 devices from different vendors already supported - http://www.anutanetworks.com/managed-devices/), operations can be executed within a Service paradigm or as a standalone task. The rich API set provided by NCX allows administrator to Create, Update or Delete ANY data in the model or any configuration on any network device. NCX then collects and analyzes state information of the network and reports in the form of alarms and notifications.

Below is the summary of a typical YANG workflow using NCX.

Figure 2: NCX YANG Workflow summary

Resource Discovery	Device Abstraction	Operation definition	Transactional execution	State data monitoring
• SNMP based discovery • CDP/LLDP to discover connectivity • Topology APIs available for populating entire network topology via XML payloads	• Device Packages defined and available out-of-the-box • Device CLI responses, SNMP OIDs mapped to the packages	• Vendor specific operation support • Any network configuration task can be defined as an operation • Operation definition can also be done in the UI	• Support for transactional operations such as Create, Read, Update, Delete • Based on RESTCONF standards • Commit and Rollback options • Rich API set	• Data model notifications • Resource level alerts/alarms • New yang modules can be defined for handling state data such as packet statistics, counters etc.

Solution benefits

Comprehensive Resource Management: NCX is aware of topology changes, device reachability to management network, inventory, configuration files, SNMP OIDs, MIB support and CLI/API communication patterns for any vendor device and manages all the resources via its centralized Resource Manager.

Day Zero automation, Zero Touch Provisioning: NCX Yang engine can be used for Day 0 configuration tasks as well as fully Zero Touch Deployments. Best practice configurations are available out-of-the-box and can also be changed at any time by the administrator. Several devices can be configured in a single go by leveraging the API interface of NCX.

Ability to handle state and configuration data: Network state data such as interface counters, packet statistics, show command outputs and SNMP information is often difficult to represent in a model. NCX models state data as well.

Rich API set: NCX provides a full REST interface for its Data Model compliant with RESTCONF standards for CRUD operations (Create, Read, Update and Delete) for each operation on the devices. This allows for highly automated workflows and tight integration with other NMS systems.

Service Modeling: End-to-end services such as L3VPN, Routing, ACL creation, EVPN, VPLS, SNMP, NTP etc. can be automated using YANG. An administrator can create a service on several devices in a single transaction.

Summary

Anuta NCX YANG engine enables customers and partners to develop their own device, service and operational models for specific network service delivery needs and talk to the network devices in a variety of methods such as CLI, API, XML, NETCONF, SNMP and maintain the entire configuration and state information of services defined in the network. The rich API set enables Create, Update or Delete actions on any configuration on any network device and also collect statistics for monitoring.