

Going Global with Network Automation

Level 3 Uses Cisco Network Services Orchestrator to Power Full-Featured Network as a Service



Overview

In the old days, implementing a new network service was a slow and stately affair. Customers carefully planned ahead for what they thought they'd need. They ordered a new circuit or service from a network service provider, and a few weeks (or months) later, it was up and running.

Today, that kind of static, slow-moving approach won't fly. Businesses in all industries are facing fierce competition from nimble, cloud-powered competitors. If they're going to keep their customers happy and beat the competition to new markets, they need new network resources—on demand, wherever and whenever business needs dictate.

For service providers, these trends represent a huge market opportunity. But to capture it, they need to operate their networks much differently than in the past. The key: automation.

If service providers can dynamically activate and orchestrate end-to-end network resources for their customers, they can deliver new services much more quickly, in a self-service manner. They can empower customers to spawn new applications and development environments with a click of a button. They can enable applications that always have the resources they need both within the customer's network and scaling elastically in the cloud. And they can stitch together multiple third-party cloud services into a single solution and deliver it to customers under a service-level agreement (SLA).

This might sound like an impressive vision for the future. But Level 3 is making it a reality right now. Using Cisco® Network Services Orchestrator (NSO) enabled by Tail-f, Level 3 is delivering a broad portfolio of network-as-a-service (NaaS) solutions on demand, fully automated and available around the globe. Drawing on programmable networks and software-defined networking (SDN), Level 3 is empowering its customers to be more agile and competitive.

The Challenge

Level 3 has been a longtime purveyor of advanced network solutions for enterprises and video providers. But company leaders recognized that their customers' needs were changing.

When businesses need a new remote office Ethernet connection, data backup service, or just more capacity to meet demand, they need it now, not a month from now. Inside the enterprise, customers are embracing agile development methodologies and DevOps approaches to continually bring new innovations to their customers and employees. They want faster, easier ways to bring applications from test environments to full-scale production. And they're looking to integrate new third-party cloud services and applications more easily, with less complexity and overhead.

Level 3 leaders saw an opportunity to expand the company's share of the rapidly growing WAN and Hybrid Cloud markets and set the standard for on-demand network services. They recognized the value of network automation and SDN to deliver better solutions to their customers more quickly. But they also knew firsthand how complex the transition to programmable, on-demand network resources can be.

Automating network services in 'brownfield' environments with tens of thousands of heterogeneous underlying network devices can be a monumental undertaking. Finding a way to do it consistently in markets around the world—offering the same automated services, using the same tools and processes—is even more so.

The Solution

Over the past several years, Level 3 has been acquiring a number of networks and technologies. At the same time, it has been working closely with the Cisco NSO team to develop programmable wide area networks that could support automated lifecycle service orchestration. The acquisitions have greatly expanded Level 3's global network footprint and portfolio capabilities. And the parallel work with Cisco NSO has helped Level 3 use these new networks to further its underlying strategy: build one of the world's most innovative NaaS platforms.

Cisco NSO provides end-to-end automation to design and deliver services more quickly. It provides a single network-wide interface to all network devices and services using a common YANG modeling language and common data store. Operators such as Level 3 can easily create and change services using standardized models, without lengthy custom coding or service disruptions.

With Cisco NSO, Level 3 can automate the full range of data services and multivendor devices in its markets around the world. The company can orchestrate the entire service lifecycle—including activation, testing and ongoing service-level assurance—through a single data model. And it can continually refine and repackage its network services at the speed of software.

Abstracting Away Complexity

Cisco worked with Level 3 to take its detailed automation scripts and model them in the standardized YANG modeling language for Level 3's customer-facing services. The service models encompass exacting details about each service: SLA parameters for different classes of service (CoS); how services are tested, assured, monitored and administrated.

Cisco NSO stores all service models, as well as device configuration models for Level 3's entire global infrastructure, in the same database. By precisely describing both service-level intent and device-level configurations in a common language, Level 3 can map service models to device models programmatically, without custom coding. And, because these models are exposed through open APIs to both upstream management systems (using JSON/REST) and downstream network devices (using NETCONF), they allow for true end-to-end automation across practically any vendor's software or equipment.

Cisco NSO takes the service-level parameters from Level 3 and then derives all the steps needed to achieve the desired final network state at runtime, without administrators needing to provide details about each specific step. The system then converges the network toward that desired state automatically. It also keeps constant track of all Level 3's networks and services. If a customer requests a service change, or if there is a device change anywhere in the underlying network infrastructure, the system automatically adapts to account for it—in minutes or even seconds, at runtime, without disrupting running services.

Accelerating Deployments

Level 3 can reuse the same service models over and over again, even when applying them to different customers, locations and even WAN technologies. The company does not have to hard-code service logic and continually write new workflows to address different networks and multivendor devices, which means it can deliver new services more quickly, across multiple continents, in an entirely automated way.

At the same time, Level 3 can automate a broader range of service offerings to align to different customer needs. For example, it can incorporate third-party cloud services into unified service offerings under a single SLA. Level 3 customers can now order or change services, spawn new development environments, and access third-party cloud resources through a self-service portal. The system automatically measures and adjusts the underlying network environment to deliver what the customer needs immediately, with no manual steps required.

Business Results

With the help of Cisco NSO, Level 3 is now offering a growing portfolio of automated NaaS solutions. It is giving its customers:

- **Agile Hybrid Cloud connectivity:** Customers can order Ethernet services such as E-Line, E-Access and E-Lynk, Level 3's public cloud connection service, with flexible bandwidth options. Level 3 can activate new services automatically and deliver them with "five nines" reliability and guaranteed performance under SLAs.
- **Level 3's Dynamic Capacity:** When customers order Level 3 services with Dynamic Capacity, the system can scale bandwidth up to 300 percent, on demand, scheduled in advance or automatically based on configurable network threshold triggers. The system instantly doubles or triples bandwidth and adjusts CoS allocation to address critical application needs. For example, customers can automatically scale capacity during spikes in cloud workloads or end-user application demand and scale back down when demand falls, paying for only the capacity they use.

- **Optimized data backup and recovery:** Customers can schedule Dynamic Capacity for regular or ad-hoc events such as data replication. Level 3's system can schedule additional capacity in advance on an hourly basis to ensure that the workload happens within the required time window. If a recovery is required additional capacity can be made available through the "Activate Now" feature to ensure that recovery happens as quickly as possible.
- **Accelerated time to market for new applications:** With cloud connectivity between public and private infrastructure domains, Level 3 customers can quickly move applications from development to production. For instance, they can connect with the public cloud provider and use Dynamic Capacity as required. They can instantly spawn new development environments and take applications from development to full-scale production in a fraction of the time needed for traditional rollouts.
- **End-to-end visibility through Level 3's Enhanced Management:** Level 3 administrators and their customers can view granular real-time information about the performance and utilization of networks and services. They can access key performance metrics (latency, jitter, packet delivery) by location, product, and CoS on an end-to-end, site-by-site basis.

With network services that immediately adapt to changing demands, Level 3 customers get the services and performance they need to effectively transform their IT. They have the insight to predict their needs and WAN costs more accurately. Their IT and development teams spend a lot less time integrating network services and more time focusing on competitive innovation.

Going Global

Level 3 has the ability to expand its Adaptive Network Control Solutions (ANCS) to other regions around the world and has already enabled much of its North American and European footprint. With other regions quickly following, Level 3's global customers will benefit from a uniquely controllable user experience of their WAN services wherever they are located. With much of the effort modeling services over an existing multivendor network completed through its early-stage work with the Cisco NSO team, Level 3 was able to expand ANCS internationally very quickly. Using Cisco NSO as a universal network device abstraction layer, the company was able to port the same service models it was using in North America to new infrastructures worldwide.

Level 3 now manages more than 75,000 different network devices around the world. It is offering the same automated services, with the same scalability, high availability, and redundancy across geographies, regardless of the underlying infrastructure.

For Level 3 leaders, the biggest difference has been the business conversations they can now have with customers. It wasn't long ago that they had a static network, where any kind of change would take weeks or months, and where new services could be rolled out only to select markets with specific infrastructures and scripts in place. Today, Level 3 offers customers lifecycle service orchestration through the automation of tens of thousands of tasks on a monthly basis. Infrastructure limitations and complex integration efforts have largely disappeared. Wherever there's an opportunity to capture new business or enter a new market, Level 3 is ready, with an automated NaaS portfolio that few service providers can match.

Learn More

To find out what Cisco NSO can do for your business, visit <http://www.cisco.com/go/nso>.