

Data Sheet

Virtuora[®] WDM Control Suite

Software-Defined Applications that Automate and Control Layer 0/1 WDM Services

The consumerization of Information Technology is changing the way people communicate, seek entertainment, and engage with consumer services. Streaming entertainment is having a profound impact on the way carriers deliver goods and services. In the business world, the rise of digital services is fueling exponential growth in big data analytics, social media collaboration, and cloud commerce. This application economy requires carriers to rethink the way they manage network traffic; the capacity of the entire network must be optimized and utilized as close to 100% as possible.

In this environment, value, revenue, and competitive advantage have new meaning and urgency. Service providers need an intelligent network that allows innovation with the speed and agility customers expect—and an intelligent network needs intelligent software.

Software-Defined Networking (SDN) is no longer limited to the data center or even the wide-area network. Now service providers can leverage the tremendous scale of the optical transport network in their customers' global network with a multidomain, multilayer, multivendor SDN controller like Virtuora Network Controller (NC). Virtuora NC provides automated control of the converged network and the business applications that traverse it, driving optimal usage of the global network, including WDM fiber-optic networks.

Virtuora Network Controller

The Virtuora WDM Control Suite automates services using applications that are integrated with Virtuora NC. Virtuora NC centralizes the network control plane by logically consolidating it into a single software system connected to the diverse devices, tools, and interfaces that make up the network's infrastructure. Regardless of physical location, traffic route or data delivery mechanism, Virtuora NC communicates with and controls network elements automatically, effectively and reliably.

This virtually centralized control plane architecture delivers unified operations and resource control, with universal abstractions that enable global network programmability and automation. Virtuora NC also provides for decision-making based on up-to-the minute information about the characteristics of the network itself.

Each Virtuora WDM control application includes a set of external interfaces for analytics and data collection; active and available inventory; and integration with BSS/OSSs. Because these interfaces



comply with open REST standards, Virtuora WDM control applications can be used with any controller that supports these protocols.

The Virtuora WDM Control Suite

The Virtuora WDM Control Suite automates WDM services, such as:

- Wavelength design and activation
- Optical path computation, including wavelength routing and assignment that ensures end-to-end path viability
- Dynamic optical reach verification
- Transponder and muxponder management
- CD ROADM systems' automatic contention constraints
- Simplified CD ROADM operations
- Zero-touch configuration and provisioning using design data from the Virtuora Design and Planning Application

Applications in the Suite

The Virtuora WDM Control Suite includes these applications:

- Resource Discovery
- Service Activation
- WDM Path Computation

Modular WDM Applications for the Disaggregated Network

Resource Discovery

After installation and commissioning, this application automatically discovers all topology elements, including equipment and links, and shows automatic service routing and provisioning/activation for:

- Active services
- Pending services
- Unprotected services, including diversely routed unprotected services
- Service-based provisioning templates for edge facilities

Resource Discovery updates the network inventory state to indicate that installed resources are ready for use. As the application provisions wavelength and sub-rate services, the circuit and utilization inventory is updated and available for automated capacity monitoring.

Service Activation

Virtuora Service Activation engages with the optical layer and assesses its capacity and physical bandwidth. From there, it can activate an optimized service with or without constraints, and provide a new path or route around faults when issues arise. Once the application designs a circuit path, it performs the necessary provisioning and reports successful completion, reports the circuit as a link, and passes the circuit details to the inventory data store.

Path Computation

The Virtuora Path Computation application is different from traditional path computation in that it functions in a multilayer, multivendor, multidomain network, as opposed to residing at the node or switch level. The application considers available equipment and infrastructure links when selecting a path.

The path computation engine dynamically computes an optimal path based on routing constraints such as:

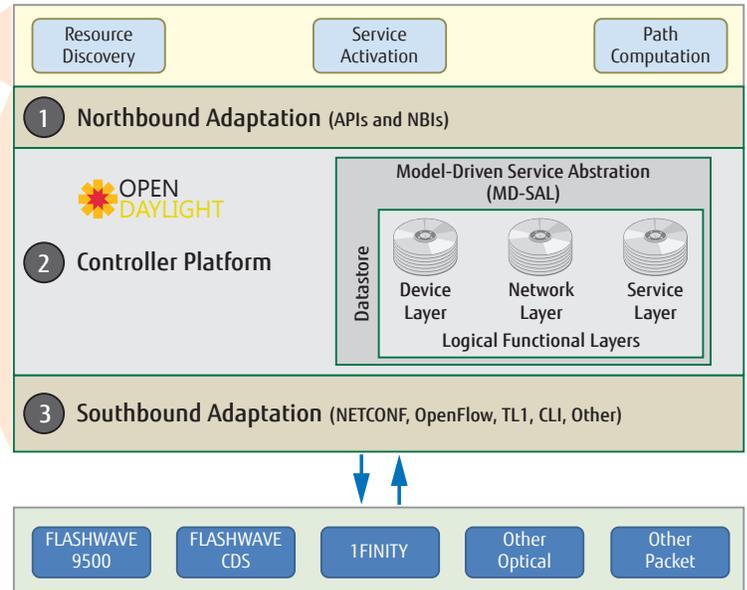
- Bandwidth availability
- Faults
- Resource include/exclude requirements
- Latency and co-routing
- Node, link, SRLG, site, and service diversity

SRLGs and intra-office fiber information can be imported into the inventory data store, allowing Virtuora to manage the fiber connecting the optical network to the routed network.

Every Virtuora application can take advantage of Virtuora Path Computation. The output is JSON formatted data, delivered via a REST call with the best path calculated, which means separate, integrated systems can use it. Even proprietary OSS/BSS systems can leverage it.

WDM Applications

Core SDN Platform Features



The Virtuora Product Suite

The Virtuora Network Controller and supporting applications demonstrate the value of disaggregated SDN architecture, an open source controller, and modular applications. By separating the control functions from the hardware and logically centralizing and managing them, Customers can work across multiple devices, layers, and vendors quickly, efficiently, reliably, and best of all—automatically.

By implementing a Fujitsu Virtuora solution, you can:

- Cut long-term operational and capital costs
- Speed up service launch and delivery
- Maintain support for current revenue-bearing services
- Preserve the useful life of existing network assets
- Choose equipment and technology without vendor dependence
- Improve quality of service and customer experience
- Quickly identify, anticipate and meet customer needs
- Open up a vibrant ecosystem of new revenue opportunities

Expert Integration Services for Custom SDN/NFV Solutions

Beyond the Baseline: Value-Added SDN/NFV Services

Integration

Fujitsu offers expert support to assist with end-to-end automation and integration of all system elements, including network elements, management functions, controllers and orchestrators.

Verification

Validation testing in a multivendor environment presents complex challenges because of the unpredictable ways in which components from multiple vendors interact, as well as the need to engage different design and engineering groups to analyze issues. As new products are identified for deployment, Fujitsu can conduct validation testing in a secure, vendor neutral laboratory under your direction and control.

Fujitsu takes the lead in developing test plans based on customer requirements, executing the test program, and reviewing final reports with all parties involved. All interoperability testing is structured to ensure the combinations meet all customer requirements and planned deployment guidelines.

Platform Integration

Virtuora NC provides a REST interface supporting all functionality available in a Fujitsu SDN solution. These REST interfaces can be used to integrate into other components within the SDN ecosystem. The Fujitsu team can analyze the systems to be integrated and develop interface mapping to support custom functionality beyond that of the Virtuora platform.

YANG Model Development and Maintenance

YANG modeling is utilized to model behavior between various layers of the SDN solution. As new services and components are added to the SDN architecture, the YANG models need to be updated to include support for these changes. Fujitsu can provide new or updated YANG models based on new service definitions, new or updated equipment, and other changes. The new YANG models can then be used in the SDN environment to provide the new or updated functionality.

Virtuora Network Management Suite Requirements

Hardware platform

- Standard x86 server
- 8 multi-threaded CPU cores (or 16 vCPU)
- 32 GB RAM
- 200 GB disk (CPU: Intel Xeon E5 series or higher)

Operating System

- Server: Red Hat Enterprise Linux version 7.2 or compatible
- Client: HTML5-compatible browsers such as Mozilla Firefox or Google Chrome

Platform Architecture

- OpenDaylight or ONOS SDN platform for configuration and provisioning
- Northbound APIs and southbound device drivers
- YANG models
- Apache HDFS (Hadoop) data store
- Apache Spark analytics engine
- Apache Karaf environment with Apache Karaf Cellar clustering
- Apache Kafka distributed streaming platform

Interfaces

- Northbound: Shared HTTPS port for GUI and REST API
- Southbound: TL1, NETCONF, SNMP, CLI

Clustering

- Supported

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