FUJITSU

Data Sheet
Virtuora® OTN Control Suite

Software-defined applications that automate and control OTN services

Global network traffic, driven by mobility, social media, cloud commerce, big data, and the Internet of Things, is projected to increase demand for data services beyond the capabilities of existing networks. Many service providers are struggling to meet this growing demand with typical optical transport network operations that take months to introduce new revenue-generating services. Other providers are starting to design leading-edge transport networks that deliver additional capacity, higher spectral efficiency, and lower cost per bit.

Key strategies include adopting the concept of a centrally controlled, software-defined network and optimizing the existing available resources of a converged, multilayer network. The architecture must enable an on-demand, automated, and highly programmable transport network to meet the crucial requirement for increasing network performance without costly capital investments.

One way to improve network resource utilization, optimize the traffic running on the network, and manage capacity and inventory is to automate Optical Transport Network (OTN) service provisioning.

The Virtuora OTN Control Suite is a set of software-defined control applications designed to automate OTN services, such as:

- Wavelength partitioning
- Subdividing and allocating pieces of the network into smaller segments
- Virtualizing the bandwidth within a wavelength
- Providing protection and restoration in a wavelength
- Selecting the services that are protected inside a wavelength

The Virtuora OTN Control Suite automates these services using applications that reside on top of the Virtuora Network Controller (NC). Each Virtuora OTN application includes a set of external interfaces to the controller; analytics and data collection engines; active and available inventory; and BSS/OSSs. Because these external interfaces comply with open REST standards, Virtuora OTN applications can be used with any controller that supports the same standards.

Virtuora OTN Control Suite

The Virtuora OTN Control Suite includes these applications:

- Resource Discovery
- Service Activation
- Service Restoration
- OTN Path Computation

Resource Discovery

After a network has been installed and commissioned, the Resource Discovery application automatically discovers all topology elements. Resolurces discovered include equipment, nodes, and links. The application updates the network inventory state to indicate that resources are installed and ready for service. As wavelength and sub-rate services are provisioned, the circuit and utilization inventory is updated and available for automated capacity monitoring.

Service Activation

The Service Activation application engages with the optical layer and assesses the capacity on the layer, as well as the physical bandwidth. From there, it can activate an optimized service with or without constraints, provide a new path when a protected or non-protected path goes down, or route around faults that trigger a network alarm.

Modular OTN Applications for the Disaggregated Network

Once a path has been designed, the Service Activation application performs the necessary provisioning and reports successful completion. The circuit is reported as an abstract router link to the controller, and a record of the circuit details is maintained in the Virtuora inventory data store.

Service Restoration

The Virtuora Service Restoration application enables service providers to provision and restore services automatically or on-demand, ensuring resilient networks and avoidance of SLA breaches.

Network services are restored based current network conditions and traffic load. If a critical service goes down, the Service Restoration application can invoke the Path Computation application, automatically move service to an available route, and then gracefully revert to the original path once conditions clear.

OTN Path Computation

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

Triggered by a request from the controller or the service activation GUI, the path computation engine dynamically computes an optimal path based on routing constraints, such as available bandwidth, network faults, and 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.

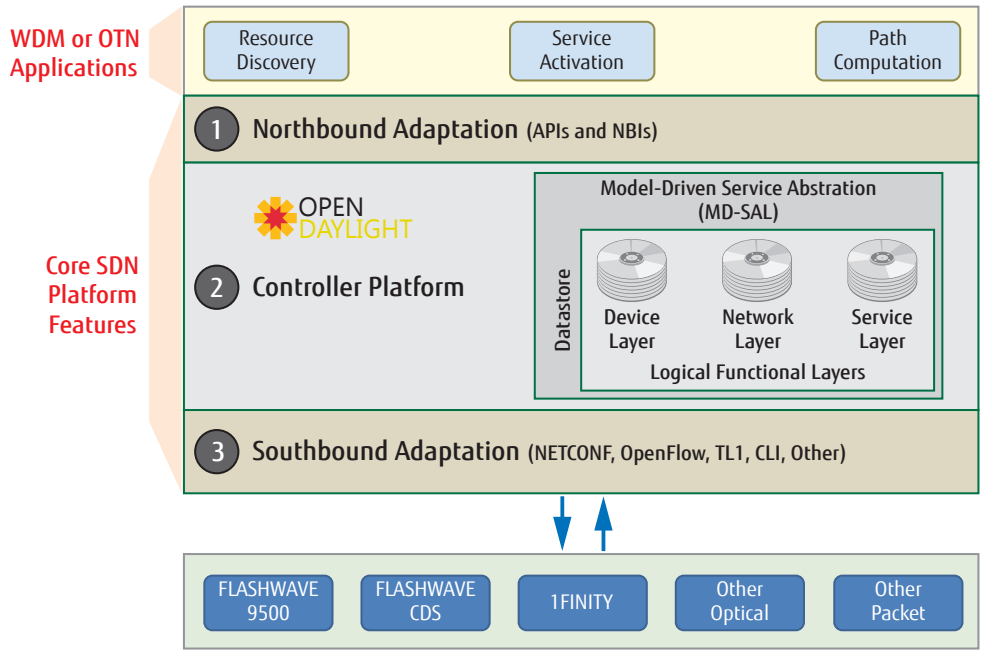
Every Virtuora application can take advantage of Virtuora Path Computation. Because its output is in the form of a REST call with the best path calculated, separate, integrated systems like the NFV Orchestrator can use it. Even proprietary OSS/BSS systems can leverage it.

The Virtuora Product Suite

The Virtuora Network Controller and supporting Virtuora 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, Virtuora customers gain the ability to 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 rich ecosystem of new revenue opportunities



Expert Integration Services for Custom SDN/NFV Solutions

A Full Range of Support and Integration Services

Fujitsu offers a wide range of expert services to support successful implementation of the Virtuora Product Suite.

Some of the main benefits of SDN are the end-to-end automation and integration of all elements in the SDN ecosystem, including network elements, management functions, controllers and orchestrators. Integration of these systems is built around standard interfaces and data modeling of services and functionality.

The VIRTUORA components provide 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. Fujitsu Services 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 Services 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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