

Data Sheet

Virtuora® Network Management

A Unified System for Optimal Service Delivery and Performance

Effective network management demands a combination of methods to ensure that traffic is handled with the right mix of speed, reliability, and capacity that best fits the individual applications and services traversing it. Factors such as budget or different blends of capacity, latency, and reliability, must be controlled to ensure the right balance. A unified network fabric is therefore essential to satisfying growing demand for communications services that meet customers' needs. With Virtuora, network architects can build this unified fabric and enable delivery of high-quality, profitable services.

Virtuora Network Management (NM) automatically tunes and optimizes network elements (NEs) to proactively prepare for, and even prevent, performance degradation and optimize service delivery in a complex, multilayered network.

Data-Driven Network Management

Virtuora NM uses Apache Hadoop for intensive data gathering such as performance management and alarm monitoring. Hadoop's ability to store and analyze large data sets in parallel on a large cluster of computers yields exceptional performance, while taking advantage of low-cost commodity hardware. Apache Spark's general compute engine is used to analyze the data.

Functional Capabilities

Virtuora NM provides the following capabilities:

- Element Management
- Fault Management and Correlation
- Performance Management
- Network Analytics

Element Management

Element management provides a view of the network element configuration inventory, in addition to a powerful feature set for managing NEs and their operation:

- Add, modify, and delete NEs and gateway network elements (GNEs.)
- Updating equipment details and facilities using simple inline editing
- Correlation of performance management to selected objects
- Use custom operations on a network element
- Remote NE backup and restore



- Scheduled or on-demand software upgrades and backups
- Suppression of alarms to accommodate maintenance

Fault Management and Correlation

Virtuora NM's Fault Management and Correlation monitors and gathers performance data from NEs. When a fault occurs, Fault Management and Correlation identifies the root cause and creates an alarm that can be cleared either automatically or via technician intervention.

- Review comprehensive statistics, charts and reports
- Identify problems proactively with "threshold crossing" alerts
- View alarms by severity and distribution
- Investigate alarm causes using intelligent, contextual detail
- Correlation of alarms to affected circuit(s)

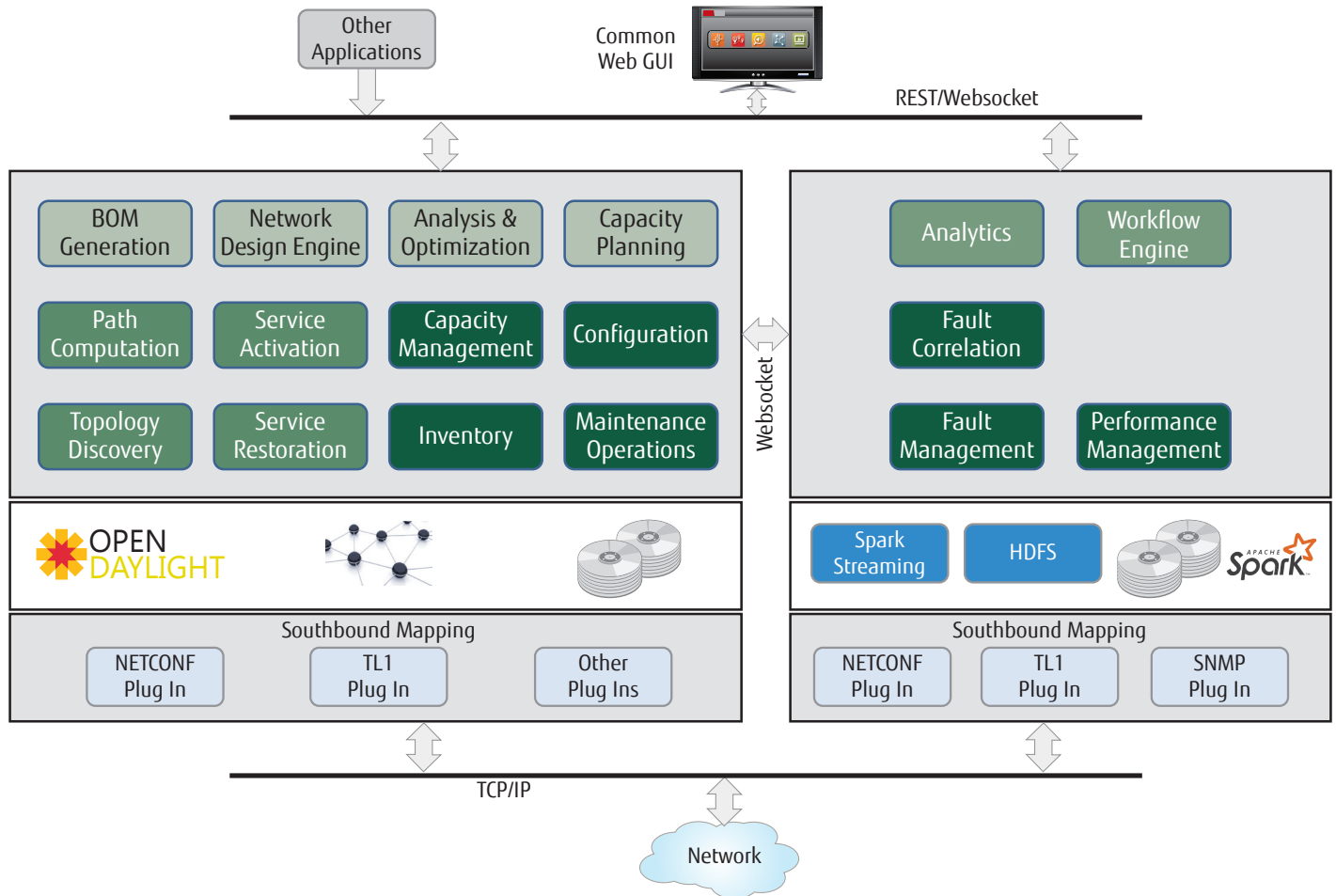
Performance Management

Performance Management optimizes efficiency by collecting and analyzing NE variables such as throughput, load, service demand, and demand elasticity:

Network Analytics

Network Analytics collect and analyze data to ensure efficient use of network resources. Virtuora uses Hadoop and Spark to analyze and correlate alarms and performance data back to NEs, links and circuits.

Scalable, Extensible Network Element Management



Virtuora NM's Network Analytics provide the following information:

- High-level visualization of the entire network topology
- NE configuration, including properties and attributes
- Discovery of neighboring NEs
- Realistic shelf viewst to aid clear communication with field techs
- Service templates to speed configuration
- Optimize network utilization and efficiency:
 - Analyze and correlate alarms to NEs, links, and circuits
 - Analyze and correlate performance data to NEs, links, and circuits

Beyond the Baseline: Value-Added SDN/NFV Services

Integration

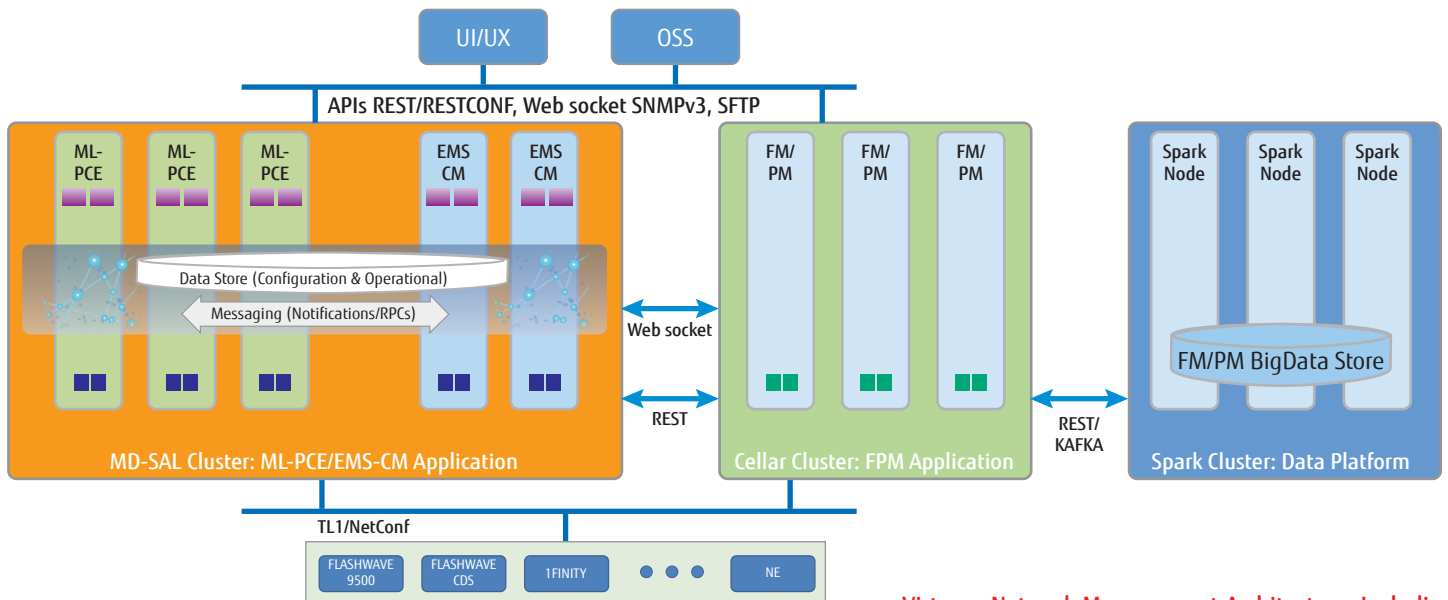
Fujitsu offers expert support to assist with end-to-end automation and integration of all system elements, including network elements, management functions, controllers and orchestrators.

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.

Virtuora Network Management Architecture



Virtuora Network Management Architecture, Including Network Elements (NEs)

Platform Integration

Virtuora NC provides a REST interface supporting the functionality available in a Fujitsu SDN solution. These REST interfaces can 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.

A Complete Solution for Open, Agile Networks

Virtuora Network Management 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 7.4 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 Cassandra data management platform
- 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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