

Coriant Transcend™ SDN Hierarchical Controller

SDN Orchestration of Multi-Layer, Multi-Vendor Carrier Networks

MANAGING MULTI-LAYER NETWORK APPLICATIONS

Efficient multi-domain and multi-layer automation are critical in building networks that can support the rapid rate of service activation and distributed application and content delivery systems. To benefit from a next-generation centralized control plane, service providers must be able to integrate computing and storage resources flexibly and efficiently across multiple technologies, vendor platforms, network domains, and technology layers. The Coriant Transcend™ SDN Solution enables network operators to manage and orchestrate this diverse ecosystem of resources with a modular software suite that combines the benefits of an open, programmable, and automated SDN architecture and a proven portfolio of IP/MPLS routing and packet optical transport solutions. The comprehensive solution enables dynamic, end-to-end network control as well as network management system (NMS) and network planning and optimization tools.

EMPOWERING INTEGRATED NETWORK CONTROL

As a global provider of multi-layer transport solutions, Coriant maintains a focus on IP/MPLS and packet optical integration, and the Coriant Transcend™ SDN Hierarchical Controller (H-Controller) is a central element of the integrated control structure. The H-Controller gathers inputs from optical, packet optical, or IP/MPLS SDN domain controllers and builds a stateful topological view utilizing a multi-layer data model. A multi-layer control structure enables a broad range of network configuration, visualization, and reporting functions for advanced multi-layer and multi-domain networks. Since the solution supports open interfaces to domain controllers, both Coriant and third-party networks can be integrated into a single network control environment.

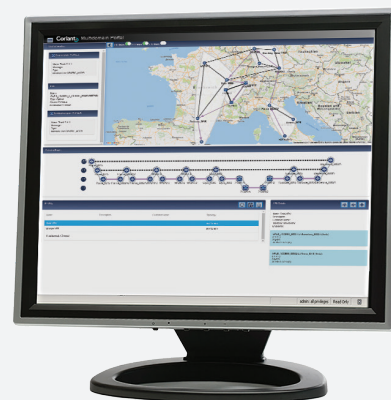
The H-Controller plays an integral role in the Coriant Transcend™ SDN Solution by serving as a single platform where multi-layer topology and network data is gathered, while a multi-layer PCE along with corresponding business logic directs traffic along a cost- or performance-optimized path. The H-Controller provides orchestration of transport and IP network controllers from both Coriant and third-party network vendors through a flexible RESTCONF adaptation layer. The H-Controller extends SDN control to orchestration of multi-layer, multi-vendor networks.

ADVANCING MULTI-DOMAIN, MULTI-LAYER OPERATIONS

The H-Controller leverages the same scalable and resilient high availability control platform as the Coriant Transcend™ Packet Controller but with extensions and expanded logic to support a more comprehensive multi-domain scope. The H-Controller acts as a controller-of-controllers to orchestrate the operations of an IP-Optical transport network. Interfaces on the southbound of the H-Controller point to domain controllers, either from Coriant or third-party vendors. A northbound RESTCONF API supports configuration requests and communication of network topology and state to higher layer applications such as the Coriant Transcend™ Portal.

BENEFITS OF THE CORIANT TRANSCEND™ SDN HIERARCHICAL CONTROLLER

- **Orchestration of multi-layer transport networks** to bring SDN efficiencies to L0-3 access, aggregation, and core networks
- **Context Optimized Routing Engine (CORE) PCE** provides path computation for multi-layer performance-aware services
- **Multi-vendor integration** through open southbound RESTful interfaces to third-party controllers
- **Automated multi-layer optimization** offers transport-aware IP/MPLS networking for enhanced service assurance and performance
- **Multi-layer visualization and service management** delivered through integration with Coriant network management and visualization tools
- **Integration with the Coriant Transcend™ Portal** for simplified point-and-click provisioning and network automation



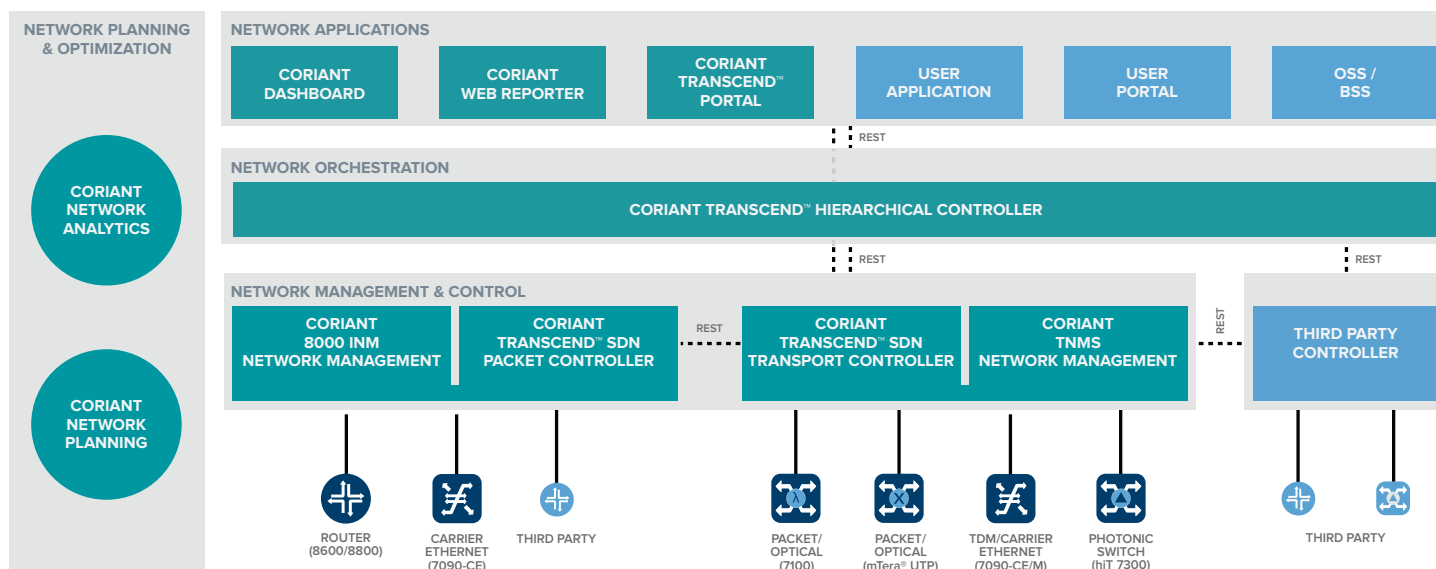


Figure 1: Coriant Transcend™ SDN Solution Architecture

A central network data repository provides a multi-layer network view for the H-Controller. The centralized provisioning engine can build multi-domain services that extend between different vendor or technology domains with an option to activate new transport services in response to shifting demand for IP/MPLS traffic. The H-Controller includes the Coriant® Context Optimized Routing Engine (CORE) that extends traditional path computation with real-time network performance and transport layer topology-aware path computation to support a new generation of optimized network services. Multi-layer visualization and management tools are available to efficiently perform day-to-day operations.

Coriant Transcend™ SDN Hierarchical Controller Features:

- **Carrier-class high availability options** for all system components
- **Scalable, widely deployed** network control platform
- **Open standard interfaces** for flexible integration into diverse workflow orchestration and OSS environments
- **Context Optimized Routing Engine (CORE)** delivers an advanced Path Computation Engine that incorporates network performance, topology-aware protection schemes, routing cost, and user defined parameters into the creation of new services
- **Shared Risk Link Group (SRLG) awareness of transport services** supports optimized resource assignment and multi-layer service status aware routing
- **Integration with the Coriant Transcend™ Portal** for simplified network operations
- **Integration with the Coriant® 8000 Intelligent Network Manager (INM)** enables management of SDN-enabled services through a broad set of visualization and FCAPS tools

DELIVERING INTEGRATION FOR MULTI-VENDOR INTERCONNECTION

Service providers require a wide range of network solutions and an SDN platform must be flexible to support diverse deployment options across many vendor networking systems. Coriant Transcend™ SDN provides several different integration options to interconnect with multi-vendor network elements or SDN controllers:

- Integration between Coriant Transcend™ SDN and third-party controllers using an east/west interface to share information, such as physical network topology to enable SRLG routing
- Integration of third-party hardware platforms through direct interface to the Transcend Packet Controller
- Use of the H-Controller to orchestrate multi-domain control through a southbound RESTCONF/YANG API to Coriant or third-party controllers

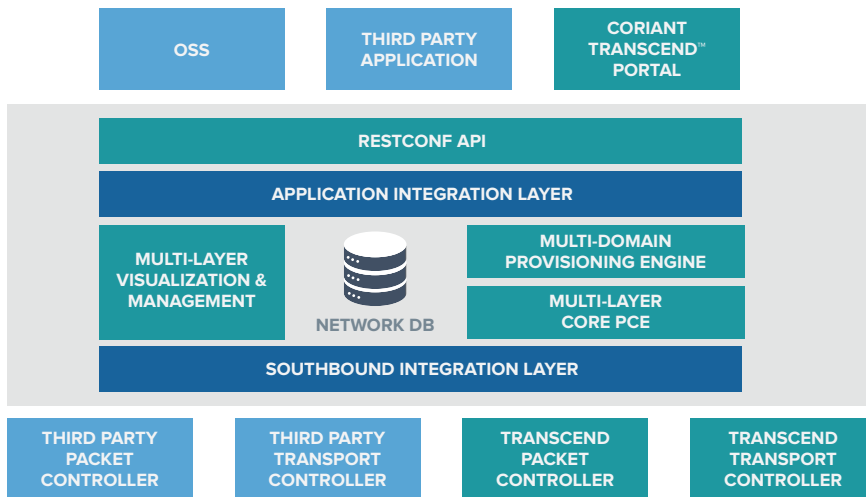


Figure 2: Coriant Transcend™ Hierarchical Controller

KEY APPLICATIONS

The range of integration options available with Coriant Transcend™ SDN supports a number of applications that benefit from proactive multi-layer network automation:

- Automated multi-layer IP-Optical network configuration
- Activation of L0-2 transport services based on IP layer service requests
- IP/MPLS LSP protection routing based on stateful view of physical network topology
- Service activation and management through the simplified web-GUI based Transcend Portal
- Service routing based on comprehensive knowledge of multi-layer performance metrics retrieved directly from the production network environment
- Support for stringent service provider or customer KPIs based on services deployed on low loss, latency, or network load
- Consolidation of multi-vendor network operations through a single RESTCONF API

SPECIFICATIONS

Network Technologies

- IP/MPLS
- Ethernet
- Optical/OTN

Northbound Interface

- RESTCONF/YANG (IETF YANG models)

Southbound Interfaces

- RESTCONF/YANG (IETF, OIF/ONF T-API, and OIF)
- NETCONF/YANG
- SNMP

Operating Platforms

- x86/x64 servers
- CentOS Linux and Red Hat Enterprise Linux
- Windows 2012
- Virtualization environments with VMware or KVM virtualization

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