

Coriant Transcend™ SDN Packet Controller

Flexible SDN Control Platform for IP/MPLS Network Automation and Service Agility

The Coriant Transcend™ SDN Packet Controller serves as the IP/MPLS data network controller within the Coriant Transcend™ SDN Solution. This innovative platform supports a broad range of network control capabilities to enable network automation and optimization. Transcend SDN provides a valuable tool for enabling workflow process acceleration and application-aware services as modern telecom infrastructure evolves to support 5G mobile standards, on-demand virtualized services, IoT applications, and massive bandwidth growth. The Packet Controller provides the technical foundation for service providers to address these new service requirements with advanced path computation options, centralized path computation, open APIs for network programming, and multi-vendor network integration.

ENABLING DYNAMIC NETWORK CONTROL WITH ADVANCED SYSTEM ARCHITECTURE

The Coriant Transcend™ SDN Solution is a modular SDN software suite that combines the benefits of an open, programmable, and automated SDN architecture. The Packet Controller plays an integral role in the Coriant Transcend™ SDN Solution by serving as a single platform for multi-vendor control over IP/MPLS networks. The Coriant Transcend™ SDN Transport Controller provides control over Coriant optical and packet transport, while the Coriant Transcend™ SDN Hierarchical Controller delivers orchestration over both transport and IP network domains through a flexible RESTCONF adaptation layer. New applications such as the Coriant Transcend™ Portal and ADAPT Optimization Engine are available to help operationalize the benefits of SDN control.

DELIVERING PROGRAMMABLE NETWORK AUTOMATION

Network automation has been identified as a leading benefit of SDN in industry surveys. Too often, internal processes are managed through an array of manual system inputs and process hand-offs between employees in order to configure, install, modify, monitor, or terminate network services. These manual processes can result in multiple weeks of lead time to process orders and respond to network events. A shift toward SDN-enabled automation provides integrated process improvements that can shrink these times to minutes. The central element in this transformation is the SDN controller which acts as a bridge between the intent based service request network applications and the detailed network element configurations.

Several components of Transcend SDN enable this new control structure. Northbound from the controller is an interface abstraction layer that offers several management APIs for network control, including both a RESTCONF API as well as an SNMP interface. Service configuration and network queries are received as transactional, intent-based service requests such as a request to build an end-to-end IP-VPN between a set of endpoints. At this level, the application does not need to have knowledge of the network element configurations or even to know which vendor product was used to build the service.

BENEFITS OF CORIANT TRANSCEND™ SDN FOR IP/MPLS NETWORKS

- **Model-driven SDN interfaces** to the OSS/Application layer provide full visibility and programmable control over network infrastructure and services
- **Transcend CORE PCE** uses a network and performance-aware path computation algorithm to deliver KPI-optimized services and maximize network utilization
- **Automated multi-layer optimization** enables transport-aware MPLS protection paths and service updates based on internal or external network events
- **Multi-vendor router support** for programmable network control over both Coriant and third-party routing platforms
- **Scalable, robust controller architecture** to support thousands of network elements with high-availability design options for 99.9999% platform uptime
- **Integration with Transcend applications** including the Transcend Hierarchical Controller, Transcend Portal, and ADAPT Optimization Engine



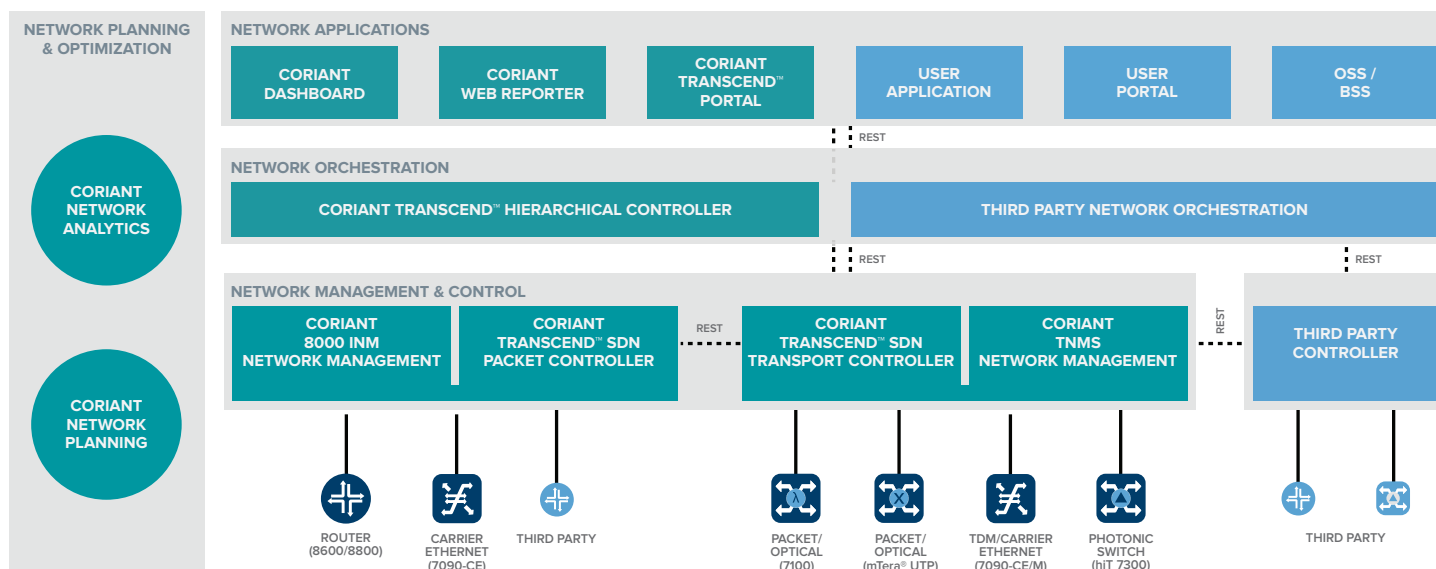


Figure 1: Coriant Transcend™ SDN Solution Architecture

Central to the Packet Controller is a unified network data repository that stores all relevant information about the multi-layer topology, element configurations, services deployed, and current network state. This database may be populated from information retrieved directly from the network elements or from external systems. Information about the network may be queried from this stateful network view by external applications, and all service requests can be validated at this level. Service requests are pushed to the network via southbound APIs from an adaptation layer that faces the network elements. The current network state is also retrieved from the network through the adaptation layer.

In order to accelerate the introduction of SDN, Coriant offers the Transcend Portal application that is available in conjunction with the Packet Controller to speed network delivery and simplify service management. Through the use of the portal application, users with limited knowledge of IP/MPLS networking can create, modify, and delete complex network services through an intuitive point-and-click interface. QoS policies, service assurance options, and performance-aware routing policies may be selected. Compliance with service-affecting KPIs can be easily verified. Services are automatically configured to meet customized performance thresholds. With access through a web GUI, field technicians can turn up and verify services upon node activation. Extension of the Transcend Portal to customer facing applications is also available.

PROVIDING PERFORMANCE-AWARE SERVICES

Use of the Packet Controller shifts path computation from the network elements to the SDN controller allowing it to take over network-wide path computation based on a single consolidated network view in the Unified Database. This database contains not only network topology and link state, but a multi-layer network view, full visibility into all services configured, per-link performance, and awareness of current network alarms and notifications.

To take advantage of this complete view of the network state, Coriant introduced the Context Optimized Routing Engine (CORE) PCE. The CORE PCE is an IETF standards compliant PCE with an advanced routing algorithm that takes into account not only network topology and link cost but also a much broader set of inputs to determine path routing decisions. The CORE PCE integrates current network performance, including link latency, utilization, and packet loss, to build services customized to meet the performance requirements of the overlay applications. User defined weightings, as specified through the RESTCONF API, help to determine the optimal path for any given service. SRLG route decisions take into account not only IP/MPLS logical links but also the network topology at the optical layer to ensure physical path diversity for back-up and protection tunnels. Applications such as the Transcend ADAPT optimization engine use the RESTCONF API of the Packet Controller to configure and modify services based on the CORE PCE routing options.

MULTI-VENDOR, MULTI-LAYER, MULTI-DOMAIN NETWORK CONTROL

The Transcend SDN Solution supports multi-vendor IP/MPLS networks with two options for integration of third-party network elements. With the first option, routers may be integrated directly into the Packet Controller using a direct interface from the controller to the network element. This integration is available for a number of router platforms with additional integrations planned for the future. A second integration option is the Hierarchical Controller, which can orchestrate service between network controllers.

Optical transport networks may be integrated via the Hierarchical Controller, or transport network topology may be directly imported to the packet controller for SRLG routing. Multi-domain networks are also supported, for example with SDN controlled LSPs that extend between multiple autonomous systems (seamless MPLS designs) or IP networks that overlay on top of aggregation and core networks served by different optical network controllers. All integration options may be used in the same network deployment as required.

Packet Controller features enable the efficient development of new revenue-generating opportunities and offer significant OpEx savings. Typical applications include:

- Bandwidth-on-demand
- Multi-layer optimization of IP-over-optical transport
- Service provider and customer service portals
- Performance-aware routing (latency, utilization, etc.)
- Multi-domain IP network control
- Dynamic traffic distribution for efficient resource utilization
- Application-initiated services
- Self-healing and self-optimizing networks

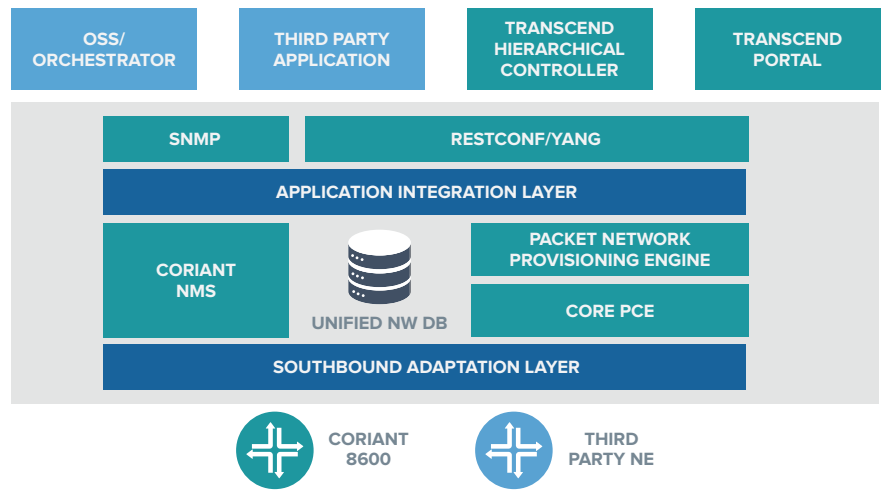


Figure 2: Coriant Transcend™ SDN Packet Controller

KEY FEATURES OF THE PACKET CONTROLLER

- **Carrier-class high availability options** for all system components
- **Open standard northbound and southbound interfaces** for flexible integration in diverse operational environments
- **Context Optimized Routing Engine (CORE)**, 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
- **Multi-vendor support** for control over Coriant and third-party network elements
- **East/West interfaces** to retrieve information from transport network controllers
- **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 and ADAPT optimization engine** for simplified network operations
- **Integration with the Coriant® 8000 Intelligent Network Manager (INM)** for management of SDN-enabled services through a broad set of FCAPS tools
- **Integration with the Coriant Transcend™ SDN Hierarchical Controller** for multi-domain and multi-layer network integrations
- **Optional deployment as a virtualized platform** provides fast and simple horizontal scaling

TECHNICAL SPECIFICATIONS

Network Technologies

- IP/MPLS
- Ethernet

Configuration APIs

- RESTCONF/YANG
- NETCONF/YANG
- SNMP

Equipment Supported

- 8600 Smart Routers
- Cisco ASR 9000, 1900, 2900
- Juniper MX Series
- Brocade SLX
- Additional platform support in development

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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