

# Cisco Crosswork Hierarchical Controller

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# Contents

Product overview	3
Features and benefits	5
Product specifications	6
Prominent features	6
SDN controllers and network management systems supported	6
Product sustainability	7
Cisco Capital	7
Document history	8

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Cisco Crosswork® Hierarchical Controller is a multidomain, multivendor software controller designed to provide end-to-end automation, visibility, and control across complex IP and optical transport networks.

## Product overview

Cisco Crosswork Hierarchical Controller intelligently gathers network data from various domain controllers, unifying and normalizing this information into a centralized internal database. Beyond just data collection, it builds a comprehensive model of the network by mapping and storing usage relationships across all physical and logical network objects, delivering deep, actionable insights for more effective visibility, automation, planning, and control. Crosswork Hierarchical Controller covers a variety of use cases throughout the network and services lifecycle.

### Powerful, intuitive network discovery and visualization

Crosswork Hierarchical Controller delivers rich, real-time visualizations of multidomain, multilayer networks through an intuitive web-based interface. Operators can instantly view the topology of physical and logical elements, including routers, switches, optical links, and services, all from a unified and contextualized map.

Key visualization capabilities include:

- **End-to-end topology views** across IP, optical, and microwave-ready layers.
- **Dynamic drill-down** from global to granular views, down to individual nodes, circuits, and service paths.
- **Color-coded overlays** for link utilization, health status, or alarms.
- **Service and path trace** to analyze how traffic flows across domains.
- **Topology filtering** by technology, domain, vendor, or custom parameters.
- **Timeline-based views** to visualize changes and track historical events.

### Business benefit

Enables faster operational decisions with a holistic view of IP, optical, and service layers—improving troubleshooting speed and network awareness.

### Proactive network assurance

Crosswork Hierarchical Controller delivers end-to-end network assurance by continuously validating service performance, topology integrity, and policy compliance across multilayer, multidomain environments. It empowers operators to move from reactive troubleshooting to proactive, predictive operations.

Key assurance features include:

- **Service health monitoring:** Tracks the performance and availability of services across IP and optical layers, helping ensure SLA adherence.
- **Topology integrity checks:** Continuously verifies that the actual network matches the intended design and topology, detecting anomalies or mismatches in real time.
- **Automated impact assessment:** Identifies the ripple effects of failures, degradations, or planned changes across services and domains.
- **Policy-driven validation:** Helps ensure that configurations and services align with predefined business and operational policies.

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- **Closed-loop assurance:** Integrates with telemetry and analytics to trigger automated corrective actions based on real-time conditions.
  - **Alarm correlation and root cause identification:** Reduces noise and accelerates problem resolution by linking related events across different network layers and domains.

#### **Business benefit**

Minimizes downtime and SLA violations with early detection of service-impacting issues, improving customer satisfaction and operational reliability.

### **Advanced analytics and provisioning for smarter network operations**

Crosswork Hierarchical Controller integrates powerful analytics capabilities that transform raw network data into actionable intelligence. By continuously collecting, normalizing, and correlating data across multiple domains and layers, Crosswork Hierarchical Controller delivers deep insights that enhance decision making, automation, and service assurance.

Key analytics features include:

- **Topology analytics:** Understand complex interdependencies between physical and logical network elements.
- **Path and resource utilization analysis:** Identify underused or congested links to optimize performance and capacity planning.
- **Anomaly detection:** Detect unusual patterns and performance deviations across layers and domains.
- **Impact analysis:** Simulate potential service disruptions or configuration changes to understand their effects before implementation.
- **Historical trend analysis:** Monitor long-term usage patterns, failure trends, and capacity shifts for strategic planning.

Helps reduce capacity waste and avoid outages by proactively identifying performance issues and optimization opportunities—driving smarter network planning.

#### **Business impact**

Turns end-to-end service activation into a push-button experience, eliminating hundreds of manual steps and weeks of coordination work.

- **90% faster service turn-up:** Activate complex IP plus optical offerings in hours instead of weeks.
- **Consistent, compliant configurations:** Every service follows the same gold-standard template.

## Features and benefits

**Table 1.** Crosswork Hierarchical Controller features and applications

Discovery and visualization	Benefit
<b>3D Explorer</b>	Visualizes IP and optical links/tunnels/services between geo sites on a satellite or schematic map, with correlation between layers.
<b>Layer Relations</b>	Shows relationships between links in different layers (for example, shows all Segment Routing [SR] policies over all or specific physical links).
<b>Network Inventory</b>	Shows a full tabular view of devices, cards, ports, links, SR policies, and services.
<b>Time Machine</b>	Goes back to a date in the past and analyzes the network as it was at that point in time.
<b>Dashboard</b>	Displays visual widgets containing inventory, topology, and services information. Users can define rule-based widgets with SHQL queries.
<b>SHQL</b>	Simple, yet sophisticated multilayer query language to get inventory, topology, tunnels, and services. All based on multilayer correlation.

Assurance	Benefit
<b>Performance</b>	Lets user correlate key traffic metrics from different layers (Layer 2 to Layer 0) into the same graph to simplify identification of anomalies and trends by time
<b>Service Assurance</b>	Enables view of E-Line, L3VPN, and L2VPN service configuration and status, as well as service underlay topology, mapped to optical topology over a 3D map.
<b>Root Cause Analysis</b>	Finds the failed lower-layer links that are the root cause of a link or a service failure
<b>Link Assurance</b>	Enables analysis of multilayer topologies of IP links, over ZR/ZR+ pluggables or optical transport network (OTN) to wavelength division multiplexing (WDM) network, and viewing of link hop-by-hop path and performance graphs per selected port and link.

Analytics	Benefit
<b>Failure Impact</b>	Supports planning of a maintenance event by finding which connections will be impacted by taking resources down and if there is an alternative path. When found, compares existing and alternative path latency, cost, and hops.  Supported for OTN, ETH, and Resource Reservation Protocol – Traffic Engineering (RSVP-TE) tunnels.
<b>Shared Risk Analysis</b>	Finds out if there are commonly shared resources (node, site, link, and card) between a selected group of links in any layer. Group can be selected explicitly or as an SHQL rule.
<b>Network Vulnerability</b>	Checks for router segmentation in the event of any combination of Layer 1 through 3 device/link failures.

Provisioning	Benefit
<b>Service Manager</b>	Service create, read, update, and delete (CRUD), show and provision all these service types. L2-L3-VPNs, RSVP-TE, and SR policies. ETH/OTN connections, optical channels (OCH), and ZR links.

## Product specifications

Cisco Crosswork Hierarchical Controller can be deployed on both VMware ESXi and KVM virtualization platforms. See the hardware requirements and scale limits in the [Installation guide](#).

## Prominent features

Crosswork Hierarchical Controller is unique in providing full support of the lifecycle operations of IP and optical transport networks, with proven integration (pre-Software-Defined Networking [SDN] and SDN) to all lead vendors.

- Preintegrated with all vendors: Both pre-SDN and SDN APIs.
- Helps meet tight SLAs: Provisioning and assurance for both service overlay and underlay.
- Unique discovery solution for all network layers, all services, and cross-layer and cross-domain links.
- Sophisticated path computation, allowing optimization of paths for multilayer constraints using powerful path computation algorithms.
- Network analytics engine: Helps teams understand network anomalies and track changes and degradations over time using powerful query language.
- Scalability: Hierarchical control scales to over 10,000 elements in real time.
- Supports evolution from pre-SDN to SDN and from legacy networks to new ones.
- Provides demonstrable leadership for advanced use cases: Multilayer restoration, optimization, and predictive failure avoidance.

## SDN controllers and network management systems supported

Crosswork Hierarchical Controller has the industry's broadest IP and optical multivendor support across Nokia, Ciena, Huawei, Infinera, and others. See the [adapters documentation](#) for complete information.

# Product sustainability

Information about Cisco’s Environmental, Social, and Governance (ESG) initiatives and performance is provided in Cisco’s CSR and sustainability [reporting](#).

**Table 2.** Links to product sustainability topics

Sustainability topic		Reference
General	Information on product-material-content laws and regulations	<a href="#">Materials</a>
	Information on electronic waste laws and regulations, including our products, batteries, and packaging	<a href="#">WEEE Compliance</a>
	Information on product takeback and reuse program	<a href="#">Cisco Takeback and Reuse Program</a>
	Sustainability inquiries	Contact: <a href="mailto:csr_inquiries@cisco.com">csr_inquiries@cisco.com</a>
Material	Product packaging weight and materials	Contact: <a href="mailto:environment@cisco.com">environment@cisco.com</a>

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# Document history

New or revised topic	Described in	Date
Updated HW requirements	<a href="#">Product specifications</a>	July 25, 2024
Added Cisco EPNM Adapter under IP NMSs	<a href="#">SDN controllers and NMSs support</a>	July 25, 2024
Updated the list of network adapters supported. Added more details of the specific features per adapter	<a href="#">SDN controllers and NMSs support</a>	June 11, 2024
Removed deprecated applications from the list (Network Vulnerability and Path Optimization)	<a href="#">Features and benefits</a>	June 11, 2024

Americas Headquarters  
Cisco Systems, Inc.  
San Jose, CA

Asia Pacific Headquarters  
Cisco Systems (USA) Pte. Ltd.  
Singapore

Europe Headquarters  
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