

# Cisco WAN Automation Engine

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Cisco WAN Automation Engine (WAE) provides the tools for capacity planning, failure analysis, and traffic engineering, as well as analyzing network health and traffic trends.

## Product overview

Cisco® WAE is an integrated system for the designing, engineering, and planning of IP networks. It enables IT teams to explore the impact of failures and design changes on traffic flows, network performance, and reliability.

IP networks deliver a wide range of services, including cloud-based services, infrastructure as a service, unified communications and video collaboration services, and mobile services. With so many services dependent on this infrastructure, IT teams must focus on optimization of the network through capacity planning, traffic engineering, and improved network designs (greenfield or brownfield).

Cisco WAE meets these ongoing requirements through network planning and design tools that enable you to improve traffic distribution, identify vulnerabilities, and mitigate risk. Used worldwide by network planners and engineers, WAE's streamlined workflow and highly interactive interface enables providers to accurately model the network and quickly accomplish planning tasks to improve network efficiency and operational costs (OpEx) under different network stress conditions.

## Features and benefits

**Table 1.** Top WAE features

Feature	Benefit
<b>Collection</b>	Automated discovery of multivendor, multiprotocol network environments, including devices, topology, and traffic statistics. WAE continuously takes “snapshots” of the operating network and automatically adapts to changes without the need for user intervention to keep information current.
<b>Simulation and modeling</b>	Visualization of IGP , MPLS LDP, MPLS Segment routing, RSVP-TE LSPs, Segment Routing LSPs, QoS, BGP, VPN, Multicast, and Layer 1 networks
<b>Failure analysis</b>	Extensive reliability and resiliency analysis, including worst-case utilizations and latencies over a range of Layer 3 and Layer 1 failure states.
<b>Demand deduction</b>	Cisco-patented Demand Deduction derives highly accurate end-to-end traffic flows from any available source, including traffic polling and NetFlow data.
<b>Optimization</b>	Provide recommendations on LSPs and IGP metrics to balance traffic flow and optimize capacity
<b>Capacity planning</b>	Provides recommendations on all three facets of Capacity Management - Network Engineering, Capacity Planning and Traffic Engineering

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## WAE Collector

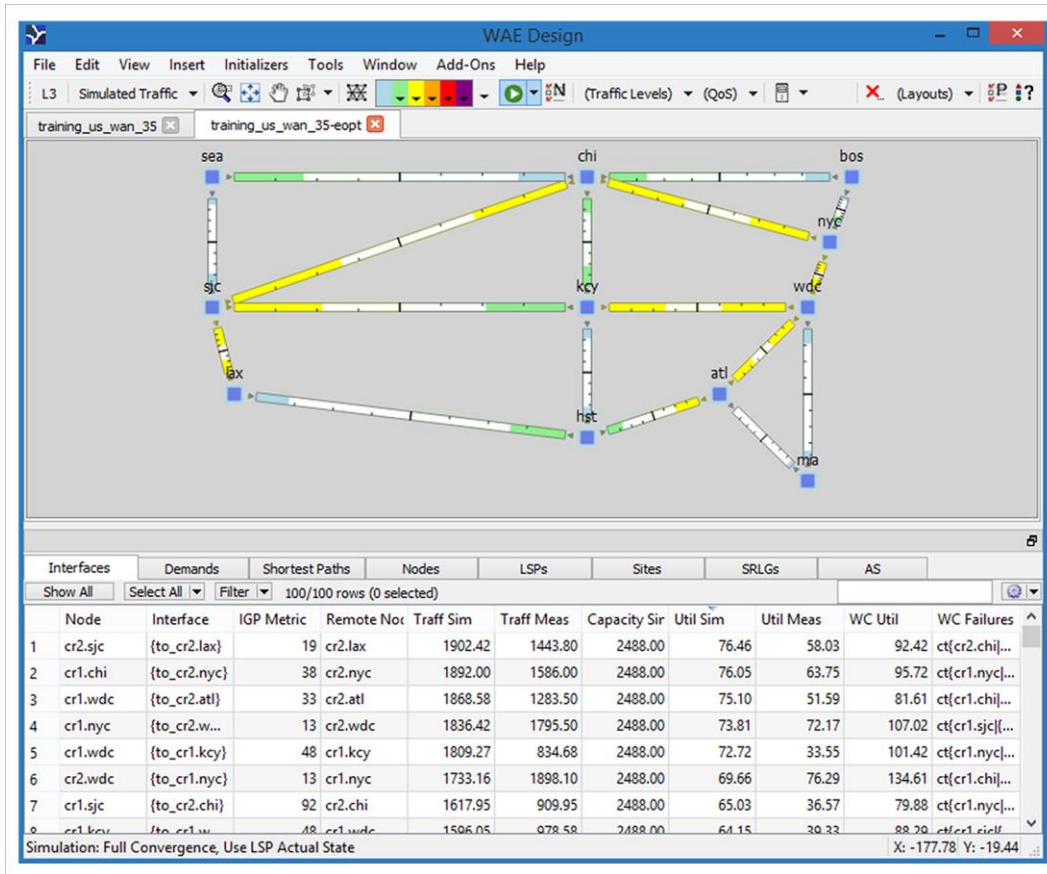
WAE Collector provides a continuous process of taking operating network snapshots to capture changes without the need for user intervention and keeping backup information current. The network discovery and data collection process generates files used by both WAE Design and WAE Live. These files can include network configuration, visual layout, LSP and multicast routes, operational state of network objects, infrastructure elements, topology, and traffic statistics for network planning and analytics.

- **Comprehensive:** Supports multiple vendors (including Cisco, Juniper, Alcatel-Lucent, Nokia, Huawei) and multiple data sources
- **Versatile:** Supports major IP/MPLS network protocols including OSPF (v2, v3), IS-IS, BGP, QoS, IP Multicast, RSVP-TE, Layer 2 and Layer 3 VPNs, and LDP
- **High performance:** Discovers network objects and collects data from large IP/MPLS networks in minutes
- **Automated:** Captures the network topology, state and measurement changes using a scheduled collection process, ensuring no disconnect between the real network and the visualized, analyzed, or planned network.

## WAE Design network modeling

Create and edit plans, including using Layer 1 topology, to build cost-effective Layer 3 networks. You can evaluate requirements for fastest routes and resilient Layer 1 circuit routes with routing and disjointness constraints.

- Know traffic utilization along any path, visually indicating the severity of traffic demands at any point in the network
- Comprehensive network representation of network elements and their properties for realistic simulations
- Use the network map (see Figure 1) to automatically receive detailed information in a table below it or select information in the table and see it represented graphically in the map
- Simple object creation and manipulation, including assignment of properties, for realistic network simulations
- Multiple backgrounds, such as schematic and geographic, offering multiple views of the same network, from high-level representations to street details
- Customizable layouts that can be shared, minimizing the amount of time it takes to upgrade plans
- Tools for automating visualization tasks, such as assigning site locations based on longitude and latitude, aligning sites, and segregating edge devices



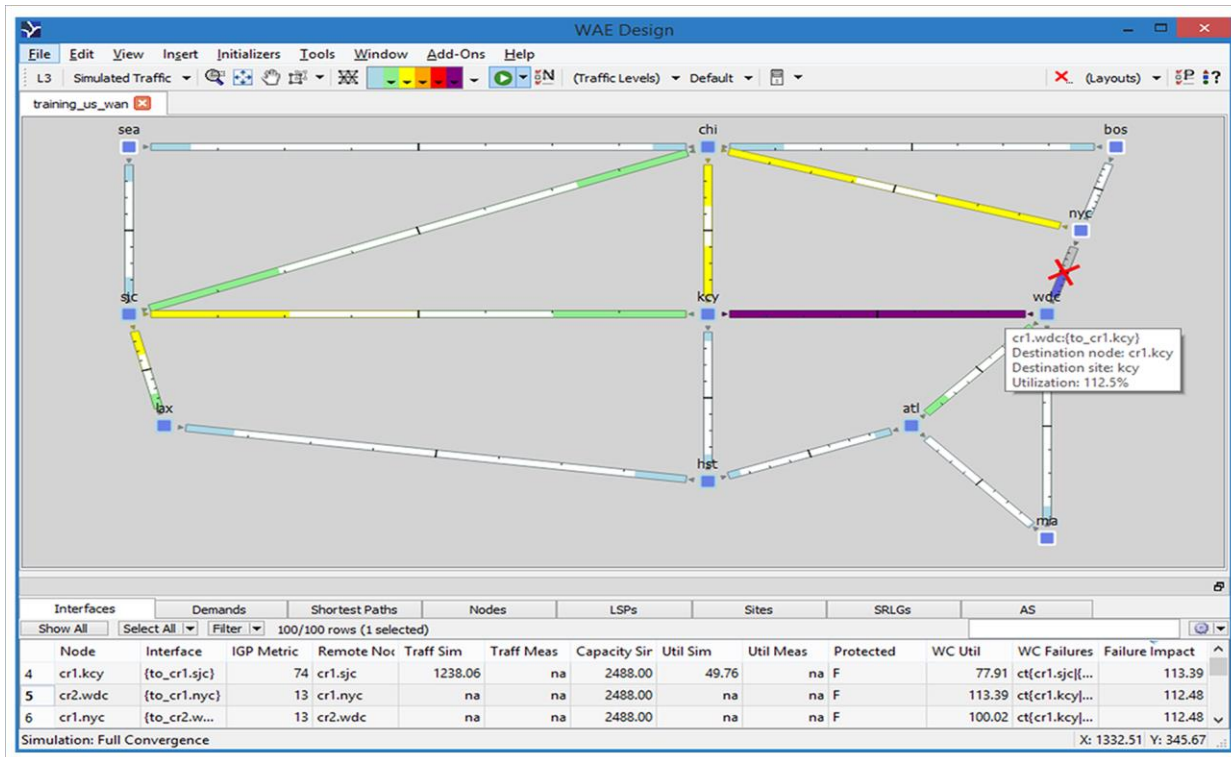
**Figure 1.**  
Sample network diagram and table from WAE Design

## WAE Design capacity management

Network capacity planning shortens project cycles while enabling capital and operational cost savings. WAE Design helps you accurately build out your network to remove bandwidth bottlenecks and better assess current and future traffic plans to ensure network resiliency.

WAE Design tools simplify capacity planning by enabling you to quickly and precisely perform the following tasks.

- Identify how failures (see Figure 2) affect the network and where bottlenecks would occur
- Determine inbound and outbound traffic demands within a site and from site to site, minimum/maximum latency, and path metrics
- Create growth plans based on traffic trends
- Use Simulation Analysis with user-specified failure scenarios to isolate worst-case impact on traffic utilization and latency
- Drill down into a site to see exactly what traffic types (for example, video versus data) cause congestion on a specific link



**Figure 2.** Impact of failed link between WDC and NYC causes congestion on link to KCY

## WAE Design traffic engineering

Optimize the infrastructure through traffic load balancing while detecting and solving shortcomings in resiliency.

- Balance traffic loads across the least expensive links
- Provides a step-by-step sequence of routing configuration changes to move a network safely from an initial configuration to a prespecified final configuration congruent with optimization goals
- Explore the impact of moving traffic from one circuit to another
- Automatically identify how to optimize IGP metrics, L1 link metrics, and LSP paths
- Identify the shortest paths based on lowest total IGP values and change IGP metrics to observe impact on routed traffic and any issue the change might cause
- Change BGP routing between multiple ASs to maintain network integrity and service levels

## Platform support

**Table 2.** Standard protocol support: Key protocols

Protocol	Title
<a href="#">RFC 5440</a>	Path Computation Element (PCE) Communication Protocol (PCEP)
<a href="#">RFC 8231</a>	Path Computation Element Communication Protocol (PCEP) Extensions for Stateful PCE
<a href="#">RFC 8281</a>	Path Computation Element Communication Protocol (PCEP) Extensions for PCE-Initiated LSP Setup in a Stateful PCE Model Through Cisco SR-PCE
<a href="#">RFC 3209</a>	RSVP-TE: Extensions to RSVP for LSP Tunnels
<a href="#">RFC 3630</a>	Traffic Engineering Extensions to OSPF Version 2
<a href="#">RFC 3784</a>	(IS-IS) Extensions for Traffic Engineering (TE)
<a href="#">RFC 7752</a>	North-Bound Distribution of Link-State and Traffic Engineering (TE)
<a href="#">RFC 8402</a>	Segment Routing Architecture
<a href="#">RFC 8660</a>	Segment Routing and MPLS Data Plane
<a href="#">RFC 8667</a>	IS-IS Extensions for Segment Routing
<a href="#">RFC 8570</a>	IS-IS Traffic Engineering (TE) Metric Extensions
<a href="#">RFC 8665</a>	OSPF Extensions for Segment Routing
<a href="#">RFC 7471</a>	OSPF Traffic Engineering (TE) Metric Extensions
<a href="#">RFC 4657</a>	Path Computation Element (PCE) Communication Protocol Generic Requirements
<a href="#">RFC 4655</a>	A Path Computation Element (PCE)-Based Architecture
<a href="#">RFC 5440</a>	Path Computation Element (PCE) Communication Protocol (PCEP)
<a href="#">RFC 3414</a>	User-Based Security Model (USM) for Version 3 of the Simple Network Management Protocol (SNMPv3)
<a href="#">RFC 3416</a>	Version 2 of the Protocol Operations of the Simple Network Management Protocol (SNMP)
<a href="#">RFC 3954</a>	Cisco Systems NetFlow Services Export Version 9

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## Licensing

WAE Design software licenses are based on user, application, technology, and device type. WAE has a Smart-enabled software subscription license. For more information, contact your Cisco account representative.

## Cisco and partner services

Cisco offers a wide range of services to help accelerate your success with Cisco WAE. The innovative Cisco Services offerings are delivered through a unique combination of people, processes, tools, and partners and are focused on helping you increase operational efficiency and improve your network control. Cisco Advanced Services use an architecture-led approach to help you align your network infrastructure with your business goals and achieve long-term value. Cisco WAE can be combined with Cisco SMARTnet<sup>®</sup> Service to help you resolve mission-critical problems with direct access at any time to Cisco network experts and award-winning resources. Spanning the entire network lifecycle, Cisco Services offerings help increase investment protection, optimize network operations, support migration operations, and strengthen your IT expertise. For more information, please visit <https://www.cisco.com/go/services>.

## Cisco Capital

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Cisco Capital makes it easier to get the right technology to achieve your objectives, enable business transformation and help you stay competitive. We can help you reduce the total cost of ownership, conserve capital, and accelerate growth. In more than 100 countries, our flexible payment solutions can help you acquire hardware, software, services and complementary third-party equipment in easy, predictable payments.

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## Learn more

- To discover more about Cisco WAE, please sign up on our DevNet site: <https://developer.cisco.com/docs/wan-automation-engine/#overview>.
- Also available are detailed tutorials within Cisco WAE documentation: [www.cisco.com/c/en/us/td/docs/net\\_mgmt/wae/7-0-1/design/tutorials/b\\_Cisco\\_WAE\\_Design\\_Tutorials\\_701.html](http://www.cisco.com/c/en/us/td/docs/net_mgmt/wae/7-0-1/design/tutorials/b_Cisco_WAE_Design_Tutorials_701.html).
- To experience a Cisco WAE solution in the dCloud, please register at: [https://dcloud-cms.cisco.com/help/get\\_started\\_steps](https://dcloud-cms.cisco.com/help/get_started_steps).



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## Document history

New or revised topic	Described in	Date
Added WAE Collector section and revised Benefits section wording	Features and benefits	Sep 20, 2021

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