

# Cisco WAN Automation Engine Software Release 6.2

PB735488

## Overview

This product bulletin describes some of the primary software features supported by Cisco® WAN Automation Engine (WAE) Software Release 6.2 (product number: WAE-62-SW-K9).

## Primary Features Delivered in Cisco WAE Software Release 6.2

Table1 highlights the primary new features for this release.

**Table 1.** Primary Features Provided by Cisco WAE Software Release 6.2

Feature Name	Description
<b>Application engineered routing enhancements</b>	<ul style="list-style-type: none"> <li>Active collection of segment routing and segment IDs (SIDs), including anycast node groups and their members</li> <li>Collection of all segment routing tunnels, path, and hop information, including Path Computation Element Protocol (PCEP) delegated and non-PCEP tunnels</li> <li>Segment routing traffic-engineering optimization tool that optimize routes of Label Switched Paths (LSPs) to reduce latency or enforce certain path policies</li> <li>PCEP segment routing LSPs that can be deployed, modified or deleted</li> <li>Anycast groups that can be used in segment lists</li> </ul>
<b>Border Gateway Protocol link state (BGP-LS)</b>	Active collecting and listening to Interior Gateway Protocol (IGP) topology and traffic engineering state changes to provide a near real-time view of the topology
<b>WAE application program interfaces (APIs)</b>	<ul style="list-style-type: none"> <li>Exposing Cisco WAE Design APIs through Representational State Transfer (REST), which supports development of applications using simulation and optimization APIs</li> <li>Integration of Cisco Network Services Orchestrator (NSO) enabled by Tail-f®, which allows Resource Reservation Protocol - Traffic Engineering (RSVP-TE) LSPs to be deployed to the network</li> <li>PCEP segment routing LSPs that can be deployed, modified, or deleted</li> <li>Enhancements to PCEP deployment through Open SDN Controller (OSC)</li> <li>API calendaring enhancements</li> </ul>
<b>WAE applications</b>	Coordinated maintenance: Simplifies, automates, and improves change management in the WAN Bandwidth on Demand with Calendaring: Provides the ability for Service Providers to enable a customer Self-Service portal, with Bandwidth-On-Demand and calendaring capabilities.
<b>Inventory collection</b>	Collection of network hardware information using Simple Network Management Protocol (SNMP) that can be used by the Cisco WAE Live application (Note: NETCONF is used to collect Juniper Router SFP transceiver information.)
<b>WAE system enhancements</b>	WAE system services: <ul style="list-style-type: none"> <li>New statistics user interface: Efficiently monitors all services and servers in a Cisco WAE deployment</li> <li>Process status: Shows the status of WAE processes</li> <li>Event logs: Shows detailed log information for each service</li> <li>Platform diagnostics: Shows diagnostic trends for all components (hosts)</li> <li>Installation enhancements and improvements</li> </ul>

## Cisco WAE and Segment Routing

When using centralized computation, Cisco WAE acts as a multivendor segment routing controller to provide fault-tolerant, centralized calculations of optimal segment routing paths meeting the specific application or use case requirements.

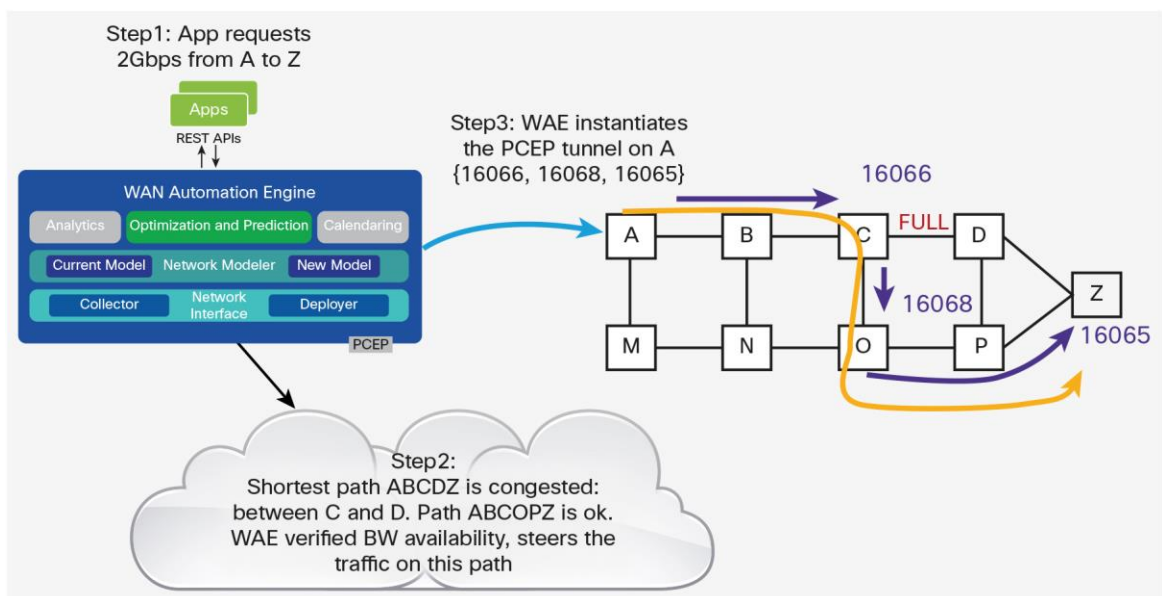
Using Cisco WAE to provide centralized segment routing path computation provides multiple advantages, including:

- Network wide view of topology and traffic information
- Multilayer (optical and IP/MPLS) topology views
- The ability to steer some demands away from their best BGP path, based on technical and business policies
- Historical traffic trends
- Calendaring capabilities over time, supporting future bandwidth requests
- Northbound APIs that allow external applications and traffic sources to request specific network requirements

In large, multidomain networks, path computation is complex and requires special computational components and cooperation between the elements in different domains. In IP/MPLS networks, this functionality is referred to as a Path Computation Element (PCE), as defined by RFC 4655. WAE acts as an external PCE server, providing a centralized traffic-engineering database (TED). Nodes, endpoints, and applications that need network paths that differ from the standard Interior IGP shortest path can make REST API queries to WAE, which in turn calculates a network path matching the specific requirement. WAE then programs the network path to the network. In networks using segment routing, PCEP is the protocol commonly used between WAE and the multivendor nodes.

Figure 2 illustrates a scenario where WAE is acting as an external PCE server for centralized segment routing path calculations. An application requests 2 Gigabits per second of end-to-end bandwidth. However, the IGP shortest path isn't capable of providing it. WAE calculates the next-shortest path that fulfills the requirements and then uses PCEP to signal a list of segments to the head-end router only. No other router in the network needs to be programmed by WAE, and network state is only kept on Router A (the head-end router).

**Figure 1.** Step-by-Step Depiction of PCEP Tunnel Creation



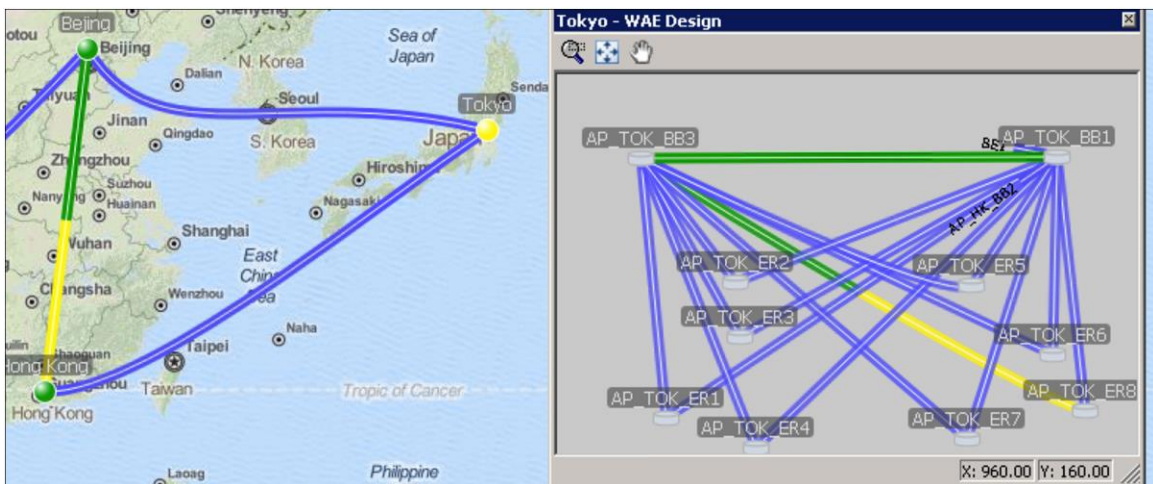
## Cisco WAE and Coordinated Maintenance

The WAE Coordinated Maintenance application provides the necessary data and the analytics to allow networking teams make informed decisions before scheduling outages. The application simplifies, automates, and improves the way customers can approach change management in the WAN. The main goals of Coordinated Maintenance in Cisco WAE Release 6.2 include:

- Reduce or eliminate uncertainty about the impact of network changes
- Intelligently guide the operator to perform multiple maintenances at optimal times
- Allow geographically and functionally disparate teams to collaborate and communicate more effectively about network changes
- Automate and streamline aspects of network maintenance which are very sensitive to operator error
- Take advantage of Cisco WAE optimization and prediction to make network outages as transparent as possible

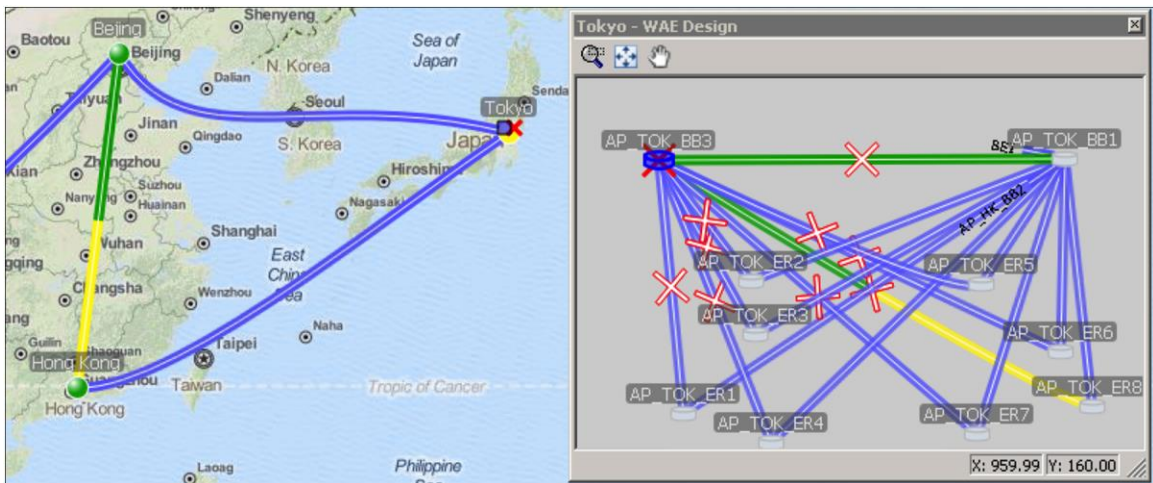
Figure 2 provides an illustration of how the application works. The sample network is operating under normal conditions, and the network team has decided to upgrade software on one of the backbone routers within the Tokyo site (AP\_TOK\_BB3).

**Figure 2.** Normalized Network



The WAE Coordinated Maintenance application provides centralized schedule management and evaluates the effects of the scheduled outage. Figure 3 shows the impact on physical links to the backbone router, but this only tells you part of the story. What happens, for example, to the traffic across the global network? Will traffic be dropped? Will services become inoperable?

**Figure 3.** Network During Outage



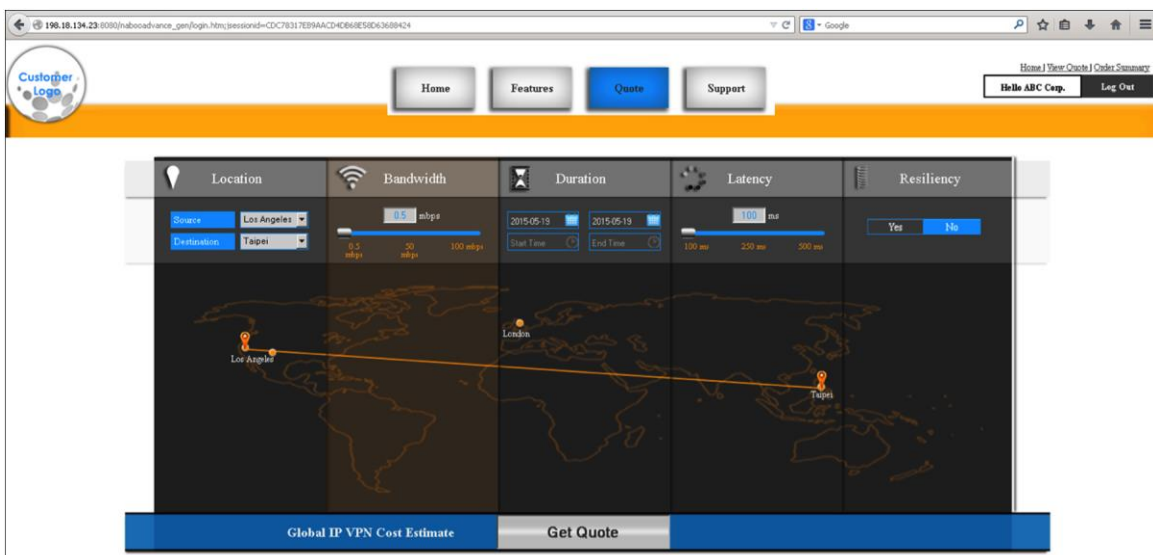
Cisco WAE knows the projected traffic on the network for the scheduled maintenance time. So the WAE Coordinated Maintenance application uses this analysis and “what-if” APIs to calculate where network traffic will be redirected, how much traffic will be on each link, and whether traffic utilization will reach unmanageable levels. This analysis can also be used to schedule alternative time slots where the effect on end users can be further reduced or transparently completed.

The local impact analysis also takes into account all other previously scheduled outages by the networking teams during the proposed time slots. A final report details the cumulative results of all events scheduled for this time.

### Cisco WAE and Bandwidth on Demand with Calendaring (BODC)

The Applications Platform Group (APG) within Cisco developed the BODC application for Service Providers to enable a customer Self-Service portal. End customers can now order bandwidth on an “as needed” basis. The customer signs in to the portal, Figure 4, and uses the graphical interface to specify the parameters of the request, From/To/Date/Duration/Latency/Resiliency

**Figure 4.** Screenshot from the BODC Application



The application sends a REST API query to Cisco WAE, which will confirm the request can be accommodated.

Cisco WAE will complete reservation and deployment of the Label Switched Path on confirmation from the application that the customer has placed the order.

## Cisco WAE and Network Services Orchestrator

Cisco WAE uses multiple standardized protocols to communicate southbound to the network. As of Cisco WAE Release 6.2, Cisco NSO enabled by Tail-f is integrated into the software. When northbound applications request the creation, deletion, modification, or optimization of an MPLS-TE tunnel on the network, WAE, using NETCONF, sends the deployment instructions to Cisco NSO, which in turn programs the changes to the network.

The revisions of software and network element drivers (NSO package identifiers) are listed in Table 2 have been tested and qualified for Cisco WAE and NSO.

**Table 2.** Qualified and Tested Software

Software/Driver	Version
Cisco WAN Automation Engine (WAE)	6.2
Cisco Network Services Orchestrator	3.4
Cisco IOS® XR NED	ncs-3.4-cisco-iosxr-3.9.0.7_ee8d73f
JunOS NED	ncs-3.4-juniper-junos-3.0.16

## Support

Support for Cisco WAE Software Release 6.2 (product number: WAE-62-SW-K9) follows the standard [Cisco support policy](#)

## Ordering Information

Table 3 provides product numbers and ordering information for Cisco WAE Software Release 6.2 and feature licenses. The following Table 3 shows the top-level assemble-to-order product identification numbers (ATO PIDs) for the WAE solution.

**Please note:** As of WAE Release 6.2, all Cisco MATE portfolio products are subsumed under the Cisco WAE suite of products. This consolidation creates easy-to-order solutions, including Cisco WAN Automation Engine (WAE), Cisco WAE Planning, and Cisco WAE Automation.

**Table 3.** Cisco WAE Software Release 6.2 Ordering Information

Product Names	Product Identifier (Top-Level ATO Subscription PID)	Description
Cisco WAE (Perpetual)	WAN-AUTOMATION-E	Cisco WAE Planning, Automation, and SDN
Cisco WAE (Subscription)	WAN-AUTOMATION-T	Cisco WAE Planning, Automation, and SDN

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## For Additional Information

For more information about Cisco WAE, please visit the product homepage at <http://www.cisco.com/go/wae>, or contact your local account representative.



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