

Cisco WAE 7.2.1 Release Notes

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Introduction

This document provides information regarding Cisco WAN Automation Engine (Cisco WAE) Release 7.2.1.

Cisco WAN Automation Engine (WAE) provides the tools to create and maintain a model of the current network through the continual monitoring and analysis of the network and the traffic demands that are placed on it. This network model contains all relevant information about a network at a given time, including topology, configuration, and traffic information. You can use this information as a basis for analyzing the impact on the network due to changes in traffic demands, paths, node and link failures, network optimizations, or other changes.

The Cisco WAE platform is an open, programmable framework that interconnects software modules, communicates with the network, and provides APIs to interface with external applications.

This document contains the following topics:

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What's New in Cisco WAE 7.2.1

The following features are new in Cisco WAE 7.2.1

Feature	Description
Smart Licensing	<p>Cisco WAE now supports both Cisco Smart Licensing and traditional licensing. Cisco Smart Licensing is a standardized licensing platform that enables you to automate time consuming manual licensing tasks, track the status of your license and software usage trends.</p> <p>Some of the benefits that Cisco Smart Licensing offers are:</p> <ul style="list-style-type: none"> • Visibility to devices and software purchased and deployed • Ability to monitor and manage devices, licenses, and usage in real time • Automatic license activation • Product simplicity with standard software offers, licensing platform, and policies • Decreased operational costs <p>WAE UI → Smart Licensing is added to enable you to configure and manage all details related to smart licenses.</p> <p>For more information, see "Cisco Smart Licensing" chapter in the <i>Cisco WAE 7.2.1 User Guide</i>.</p>
HA with automatic failover	<p>Cisco WAE now supports High Availability (HA) with automatic failover. If a primary node fails, the secondary node takes over as Master node.</p> <p>WAE UI → HA configuration page is updated to enable you to configure master and slave nodes.</p> <p>For more information, see "Administration" chapter ("Configure High Availability" topic) in the <i>Cisco WAE 7.2.1 User Guide</i>.</p>
Online Help	<p>Cisco WAE now comes with embedded online help. Use the Help button on WAE UI to access the related help topics.</p> <p>Note Documents are sometimes updated after original publication. Refer to the <i>Cisco WAE 7.2.1 User Guide</i> document on Cisco.com for latest updates.</p>
Changeover tool enhancements	<p>The Changeover tool is enhanced to allow you to group Interface Metric changes together into steps. You can:</p> <ul style="list-style-type: none"> • Group parallel interfaces metric changes together. • Group interface metric changes from the same source if there is no impact to maximum utilization. <p>For more information, see "Changeover" chapter ("Running the Changeover Tool" topic) in the <i>Cisco WAE Design 7.2.1 User Guide</i>.</p>

Feature	Description
Enhancement to SR policy modelling to support multiple candidate path	<p>SR policy is enhanced to support multiple candidate path along with preference.</p> <p>If an SR LSP contains multiple SR Candidate paths, the demand is routed on the LSP path with the highest preference option for which the demand can be routed from source to destination.</p> <p>For more information, see "Segment Routing Simulation" chapter ("SR LSP Routing" topic) in the <i>Cisco WAE Design 7.2.1 User Guide</i>.</p>
RSVP-TE Optimization Tool enhancements	<p>In Cisco WAE Design, the RSVP-TE Optimization Tool is enhanced to allow you to set avoidance constraints.</p> <p>Navigate to Tools → RSVP LSP Optimization → RSVP-TE Opt. Avoid Objects section in the Advanced tab lets you to select Nodes, Interfaces, L1 Links, L1 Nodes, SRLGs to be avoided when optimizing LSPs.</p> <p>For more information, see "RSVP-TE Optimization" chapter ("Optimization Input" topic) in the <i>Cisco WAE Design 7.2.1 User Guide</i>.</p>
WAE Live Database management	<p>Cisco WAE Live database management now provides you with the following options:</p> <ul style="list-style-type: none"> • Manage database space by the age of the record. • Manage database space by the % of the disk capacity. <p>The dependency on Oracle Java is also removed.</p> <p>For more information, see "Performing Administrative Tasks" chapter ("Database Management" topic) in the <i>Cisco WAE Live 7.2.1 User Guide</i>.</p>
Inventory data collection timestamp	<p>On WAE Live → Inventory page, the Table view is updated to include Last Collected field at the bottom of the page which displays the date and time of last collected data.</p> <p>For more information, see "Viewing Inventory" chapter ("Viewing the Inventory Table" topic) in the <i>Cisco WAE Live 7.2.1 User Guide</i>.</p>
Digital Signing	<p>Cisco WAE software (including WAE Design and WAE Live) now come with digital signatures. The verifiable digital signatures ensure that the Cisco WAE software running on your systems is secure and has not been tampered with, and that the software originated from a trusted source.</p> <p>For more information, see <i>Cisco WAE 7.2.1 Installation Guide</i> and <i>Cisco WAE Design 7.2.1 GUI Installation Guide</i>.</p>
Enhancement to SR policy modelling to support multiple SID type	<p>Cisco WAE is now updated to support additional SID types - Interfaces, Nodes, Node Groups, LSPs.</p>
Cisco WAE scaling	<p>WAE is now enhanced to support 3000 nodes for modeling, simulation and optimization.</p>
EPNM 3.0 support for optical collection	<p>WAE now supports EPNM 3.0 with NCS2K (11.0/11.1).</p>
WAE performance improvements	<p>NIMOs are now enhanced to support native format.</p>
Inter AS BGP enhancement	<p>AS-merge is enhanced to handle dropped demands.</p>

Feature	Description
WMD - Increase in robustness	Performance of WMD interacting with SAGE is improved.

Upgrade to Cisco WAE 7.2.1

Follow the below workflow to install or upgrade to Cisco WAE 7.2.1:

- [Install and Configure Supervisor, on page 4](#)
- [Verify WAE Image, on page 5](#)
- [Install Cisco WAE, on page 5](#)

Install and Configure Supervisor

Install and configure supervisor before installing WAE.



Note The following configuration steps work only when supervisor is installed using yum. If supervisor is installed using any other method, it has to be configured to run **supervisorctl** as a non root user.

Procedure

Step 1 Install supervisor and verify.

```
sudo yum install -y epel-release
sudo yum install -y supervisor
supervisord -version
3.1.4
```

Step 2 Create directories with write permissions for the OS user running WAE.

```
sudo mkdir -p /opt/supervisor/run
sudo mkdir -p /opt/supervisor/log
sudo chown -R [USER-NAME]:[GROUP-NAME] /opt/supervisor
```

Step 3 Update supervisor configuration to not run as a root user.

Point the pid file to `/opt/supervisor/run/supervisor.pid` and user as the OS user running WAE.

Open `/etc/supervisord.conf` as root and edit.

- In the `[unix_http_server]` section:

- Change `;file=/var/run/supervisor/supervisor.sock` to `file=/opt/supervisor/run/supervisor.sock`

- Change `;chown=nobody:nogroup` to `chown=[USER-NAME]:[GROUP-NAME]`

- In the `[supervisord]` section:

- Change `;logfile=/var/log/supervisor/supervisord.log` to `logfile=/opt/supervisor/log/supervisord.log`.

- Change `;pidfile=/var/run/supervisord.pid` to `pidfile=/opt/supervisor/run/supervisord.pid`

- Change `;minfds=1024` to `minfds=1000000`
- Change `;minprocs=200` to `minprocs=257805`

Note Do not set the user under the `[supervisord]` section.

- In the `[supervisorctl]` section:

- Change `;serverurl=unix:///var/run/supervisor/supervisor.sock` to `serverurl=unix:///opt/supervisor/run/supervisor.sock`

Step 4 Start Supervisor.

```
sudo systemctl start supervisord
sudo supervisorctl status all
```

Step 5 Enable supervisor to start during system startup.

```
sudo systemctl enable supervisord
sudo systemctl status supervisord
```

Verify WAE Image

Procedure

Step 1 Download the Cisco WAE 7.2.1 software package from [Cisco Download Software](#) site.

Step 2 The certificate and digital signature are both embedded in the downloaded file `-wae-linux-v7.2.1.signed.bin`.

Step 3 Run the self-extracting signed binary. This extracts the Release Binary and validates using the signature file.

Verification of signed image

```
[admin@wae-vm-21 workspace.signed]$ ./wae-linux-v7.2.1.signed.bin
Unpacking...
Verifying signature...
Downloading CA certificate from http://www.cisco.com/security/pki/certs/crcam2.cer ...
Successfully downloaded and verified crcam2.cer.
Downloading SubCA certificate from http://www.cisco.com/security/pki/certs/innerspace.cer
...
Successfully downloaded and verified innerspace.cer.
Successfully verified root, subca and end-entity certificate chain.
Successfully fetched a public key from WAE-CCO_RELEASE.cer.
Successfully verified the signature of wae-linux-v7.2.1.bin using WAE-CCO_RELEASE.cer
```

Step 4 The generated `wae-linux-v7.2.1.bin` is the Linux installer for WAE.

Install Cisco WAE

Before you begin

- If one does not yet exist, create a UNIX user (assigned to a group). You must be this UNIX user to run installation.
- Make sure supervisor is installed and configured. See [Install and Configure Supervisor, on page 4](#).

- Download and verify the digitally signed Cisco WAE 7.2.1 image. See [Verify WAE Image, on page 5](#).
- Make sure Java-8 is installed on the system and `JAVA_HOME` environment variable is pointing to `jdk-1.8`.
- Make sure that `requests.auth` python package is installed for the BW-OPT application to function in WAE.
- For migrating the existing 7.1.x configurations to 7.2.1 please go through the README file provided with “*Cisco WAE upgrade script for migrating configurations from WAE 7.1.x to WAE 7.2.1*” package from CCO.

Procedure

Step 1 Stop WAE if running.

Step 2 Change permission of the install file using the command:

```
chmod +x wae-linux-v7.2.1.bin
```

Step 3 Run the installer specifying the target directory.

```
./wae-linux-v7.2.1.bin <wae-dir>
```

Step 4 Setup environment and create a runtime directory specifying the path.

```
cd <wae-dir>
source waerc
wae-setup --dest <target-runtime-dir>
```

Step 5 You are prompted to set the Cisco WAE admin password.

```
WAE admin password:
Confirm password:
```

Step 6 After installing and setting up wae (i.e. after running `wae-setup`), create a soft link to the `wae.ini` file from inside `/etc/supervisord.d/` and add WAE config to supervisor.

```
sudo ln -sf <target-runtime-dir>/wae.ini /etc/supervisord.d/
```

Note Execute this step only after supervisor is installed and configured.

Step 7 Update supervisor configuration.

```
supervisorctl update
```

Step 8 Start WAE process

```
supervisorctl start wae:*
wae:zookeeper: started
wae:waectl: started
wae:kafka: started
wae:wae-monitor: started
```

- Note**
- `wae:waectl` is the WAE program.
 - `wae:kafka` and `wae:zookeeper` are required for traffic collection.
 - `wae:wae-monitor` is the monitoring service.
 - `wae:logrotate` is for log rotation.

Step 9 Check status of WAE process

```

supervisorctl status
wae:kafka RUNNING pid 1540, uptime 28 days, 14:03:40
wae:logrotate RUNNING pid 1178, uptime 28 days, 15:10:11
wae:wae-monitor RUNNING pid 11520, uptime 0:00:12
wae:waectl RUNNING pid 1177, uptime 28 days, 15:10:11
wae:zookeeper RUNNING pid 1736, uptime 28 days, 14:03:39

```

Note To stop all WAE process, use the command:

```
supervisorctl stop wae:*
```

Supported Node Versions

The following table lists the supported node versions for Cisco WAE 7.2.1

Table 1: Supported Node Versions for Cisco WAE 7.2.1

Feature	Product	Tested with version	Notes
SRTM	IOS-XR	6.6.2 + SMU, 6.5.3 + SMU	
Netconf LSP	IOS-XR	6.5.1	NED Version: ncs-4.7.4-cisco-iosxr-7.11.1
	IOS-XR	15.3	NED Version: ncs-4.7.4-cisco-ios-6.22.1
	Juniper Junos Mx960	18.1R1.9	NED Version: ncs-4.7.1-juniper-junos-4.1
RT Apps, Multi XTC, Reactive polling.	IOS-XR	6.6.2 + SMU, 6.5.3 + SMU	
Multilayer	NCS2K	10.9, 11.0	
	EPNM	3.0.3	

Documentation

To find descriptions of all related Cisco WAE documentation, see [Documentation Roadmap](#).



Note We sometimes update the documentation after original publication. Therefore, you should always review the documentation on Cisco.com for any updates.

Bugs

Resolved Bugs

The following are descriptions of the resolved bugs in Cisco WAE Release 7.2.1:

Table 2: Resolved Bugs

Bug ID	Description
CSCvn17584	Running <code>topo-vpn-nimo</code> to discover L3 and L2 VPNs in a network results in error.
CSCvp60520	Unable to keep active connection with XTC.
CSCvp62803	WMD does not get traffic from <code>traffic-poll-nimo</code> .
CSCvq34672	<code>rpc-error</code> occurs on downloading <code>.pln</code> file from WMD using WAE-Design.
CSCvq36413	'Traffic fitting failed error' message displayed during Demand Deduction.
CSCvq54725	Interfaces with Util Sim higher than 100% due to demands coming from netflow.
CSCvq59755	'Bad file descriptor' error message is displayed when <code>external-executable-nimo</code> is executed.
CSCvq70190	<code>zookeeperctl.out</code> file is filled up with a lot of messages.
CSCvq74682	WAE High Availability does not work as expected.
CSCvq79488	Java Exception in <code>topo-igp</code> - Out Of Memory.
CSCvq86258	WAE XTC agent keeps multiple connections with XTC and is not consuming the information sent by XTC, increasing XTC memory usage.
CSCvq87842	<code>topo-bgp-nimo</code> collection is unable to complete the upload to CDB due to "Invalid Value" error for peer-id.
CSCvr09357	<code>traffic-demands-nimo</code> is not executed at regular intervals and at times it is not executed correctly.
CSCvr12252	The final network model does not have the layout coming from <code>layout-nimo</code> . It gets corrupted.
CSCvr85317	The DARE aggregation fails after few hours.
CSCvr86225	<code>wae.log</code> captures many CRIT errors showing instabilities in the processes and results in WAE restarting. <code>/tmp</code> folder get filled upto 100% when <code>topo-vpn-nimo</code> is executed.
CSCvm34065	DARE does not process changes, displays 'Queue full' error message.
CSCvm57253	Packages reload when simultaneous collections are scheduled.
CSCvn49160	Following error is seen while loading plan file with L1 and L3 information: <pre>wae@wae# wae components load-plan run plan-file /home/wae/bonn-agg_v30.pln network-name bonn-archive Error: Python cb_action error. external error (19): Error on line 588: unknown element: dispaly-name</pre>

Bug ID	Description
CSCvo78480	DARE rebuild creates another DARE network when one network gets sourced to multiple DARE network.
CSCvq01121	The traffic balance of external endpoint member is rounded off when a plan file is imported.
CSCvq26753	WAE DARE does not consolidate NIMOs when node-filter configuration is changed
CSCvq38200	<code>inter-as-nimo</code> deletes ASes previously merged from newly merged plan files that are not related to the other merges.
CSCvq39102	<code>login_test</code> and <code>snmp_test</code> tools are not packaged with WAE collector.
CSCvq53205	<code>supervisorctl</code> file limits need to be increased at Install time.
CSCvq54298	WAE is unable to discover Huawei CX600 boxes and hardware inventory
CSCvq56906	Intermittent Failures while writing plan files to Archives.
CSCvr51385	Maximum opened files option in netflow agent or flow collector tools is always set to 4096 when WAE is started using <code>supervisorctl</code> .
CSCvr84760	Kafka issue impacting multiple components.
CSCvp44310	WAE Design application is slow to recompute simulated traffic numbers when the Multicast tables are included.
CSCvq57634	On WAE Design, Save to -> Template option must be enhanced to allow the operator to update <code>layout-nimo</code> template file directly to WAE Server.
CSCvq84759	Introduce <code>NetIntHistory</code> details in the output plan file.
CSCvr24303	On WAE Design, introduce Save option to WAE server to improve performance.
CSCvr38394	When trying to execute <code>run-config-parse</code> , WAE fails with illegal reference error for <code>p2mp-lsp-name</code> .

Using the Cisco Bug Search Tool

You can use the Cisco Bug Search Tool to search for a specific bug or to search for all bugs in a release.

Procedure

-
- Step 1** Go to the <http://tools.cisco.com/bugsearch>.
- Step 2** Enter your registered Cisco.com username and password, and click **Log In**.
The Bug Search page opens.
- Note** If you do not have a Cisco.com username and password, you can <http://tools.cisco.com/RPF/register/register.do>.
- Step 3** Use any of these options to search for bugs, and then press Enter (Return) to initiate the search:
- To search for a specific bug, enter the bug ID in the Search For field.
 - To search for bugs based on specific criteria, enter search criteria, such as a problem description, a feature, or a product name, in the Search For field.

- To search for bugs based on products, enter or select a product from the Product list. For example, if you enter “WAE,” you get several options from which to choose.
- To search for bugs based on releases, in the Releases list select whether to search for bugs affecting a specific release, bugs that were fixed in a specific release, or both. Then enter one or more release numbers in the Releases field.

Step 4 When the search results are displayed, use the filter tools to narrow the results. You can filter the bugs by status, severity, and so on.

To export the results to a spreadsheet, click **Export Results to Excel**.

Known Limitations

This section describes known limitations and restrictions for Cisco WAE:

WAE System

License Check Failures on Newer Linux Distributions

Some newer Linux distributions use a new way (using biosdevname) of naming hardware devices, including network interfaces. This causes some software that depends on the traditional naming (for example, eth0 , eth1) to fail on license checks.

The workaround is to append biosdevname=0 to the kernel line of the grub configuration file and reboot. (Syntax varies among distributions.)

After reboot, you should be able to use ifconfig to verify that the NICs are named eth0 (or eth1 , ...) instead of the biosdevname names (such as p34p1).

NIMO Consolidation

The aggregator uses DARE to consolidate NIMOs into one network model. If you update the topo-igp-nimo node-filter configuration, or if a node goes down after running the initial DARE configuration, you must do the following:

1. Update the topo-igp-nimo exclusion or inclusion list.
2. Run collection on the topo-igp-nimo.
3. Run the WAE CLI tool to resync DARE with the updated NIMO node information:

```
wae@wae# wae components aggregators aggregator <aggregator_network_name> resync aggregator
net
```

WAE Collection

- LDP data collection can only be performed by executing CLI tools using the external-executable-nimo.
- NetFlow collection is not supported on Alcatel-Lucent devices.
- Due to vendor MIB limitations, WAE cannot represent QoS traffic on interfaces that have more than one VLAN configured. If a network contains such interfaces, their queue traffic statistics are omitted from the collection. The total traffic on these interfaces is still measured. As a result, demands for every class

of service estimated through Demand Deduction are less accurate. Estimates of traffic totals over all classes of services, however, are not affected.

- Collection of interface egress shaping rate for Alcatel-Lucent devices does not support LAG interfaces.
- Juniper MIBs do not support P2MP LSPs.
- WAE cannot associate a GRE tunnel with the physical interface it uses to reach the tunnel destination because the IP-Tunnel MIB lacks this information.
- For Juniper routers, the signaled standby LSP option is not available from the standard MPLS-TE MIB. Only the active path option name is collected.
- For Cisco IOS XR routers:
 - IGP topology collected through topo-igp-nimo module:
 - IS-IS link-state database with TE extensions contains incorrect interface “admin-weights” (TE metric) on Intel-based routers.
 - IPv6 IS-IS link-state database does not contain IPv6 interface addresses or parallel interfaces. This information is only available when Cisco IOS XR supports IS-IS IPv6 TE extensions.
 - MAC accounting is not supported (although you can collect MAC traffic through an external NIMO).
 - The lsp-snmp-nimo module does not set the Standby value in the <LSPPaths> table for signaled backup paths or collect named affinities configured with affinity-maps.
- BGP peers:
 - The topo-bgp-nimo module does not build BGP pseudo-nodes among internal ASNs.
 - The topo-bgp-nimo module does not collect BGP peers under PE-CE VRFs.
- TE Extended Admin Groups (EAGs), also known as extended affinities, are only supported from Juniper and parse_configs.
- There is no support for building port circuits for LAG members that are not within the same IGP (inter-AS circuits).
- It is not possible to distinguish between physically connected and unconnected LAG ports that are down for LAG port matching.
- With segment routing, concurrent RSVP-TE and SR-TE paths are not supported on the same LSP.

High Availability

Cisco WAE does not support netflow workflow and layout-nimo under HA.

WAE Multilayer Collection

- The optical plug-in is supported on Oracle JRE 1.8 but not on OpenJDK JRE. Oracle JRE 1.8 is not packaged with Cisco WAE. You can download Oracle JRE 1.8 from Oracle’s website.

If you are using a JRE other than Oracle JRE 1.8 for other Java programs and you want to use the optical plug-in, you must download Oracle JRE 1.8 and add the following lines to the beginning of the <WAE_installation_directory> /packages/optical-ctc-plugin/run.sh file:

```
#!/bin/bash
export JAVA_HOME=<path_to_JRE_installation_directory>
export PATH=$JAVA_HOME/bin:$PATH
```

- Multilayer collection for Cisco devices is supported only on the following platforms:
 - Cisco Network Convergence System (NCS) 2000 platforms running version 10.61, 10.7, and 10.8 for L1 devices when using the CTC optical agent. NCS 2000 platforms running version 10.9 is supported when using the Cisco Evolved Programmable Network Manager optical agent (EPN-M optical agent).
 - Cisco Aggregation Services Routers (ASR) 9000, Cisco Carrier Routing System (CRS), and Cisco NCS 5500 platforms running IOS-XR for L3 devices.
- Multilayer collection is limited to the collection of unprotected circuits.
- Collection of WSON and SSON circuits are supported.
- Collection of non-WSON circuits is only supported when using the EPN-M optical agent. It is not supported when using the CTC optical agent.
- L3-L1 mapping by LMP is supported only if the controller interface name is the same as the actual L3 interface name or of the form "dwdmx/x/x/x" where the "x/x/x/x" subscript matches that of the corresponding L3 interface.
- Central Frequency ID mapping is currently supported only for circuit paths but not for path hops.

FlexLM License Server

You cannot run the floating license server on a setup (Linux VM or actual host) that uses bonded virtual interfaces (that is, a setup with multiple interfaces that have the same MAC address but different IP addresses within a VM). If the WAE Design client tries to check out a license from a setup that uses bonded virtual interfaces, the license checkout fails with the error "No license found."

As a workaround, run the floating license server in a standard Linux VM or host.

Filing a Cisco WAE Bug

While filing CDETS for Cisco WAE, make sure the following information is captured:

- WAE configuration: supervisor configuration, aggregator configuration and the nimo configuration of concerned network and its source-network, if any.
- <run-dir>/logs/ directory
- Plan file(s) for the network(s) of concern
- <run-dir>/data/stats/ for system stability and resource usage related issues
- <run-dir>/work/dare/ for aggregation related issues.
- <run-dir>/data/networks/*.db for issues related to networks configured as 'native' and the corresponding aggregator (final-network).
- CDB dump of the networks of concern for networks of 'yang' format ('yang' is the default storage-format).
- Configuration corresponding to the component of concern. Eg: WMD, archive etc.

- For collection issues, record file(s) if the nimo supports record-playback.
- ~/.cariden/logs/ for designapid related issues.

Accessibility Features

For a list of accessibility features in Cisco WAE, visit <https://www.cisco.com/c/en/us/about/accessibility/voluntary-product-accessibility-templates.html> (VPAT) website, or contact accessibility@cisco.com.

All product documents except for images, graphics, and some charts are accessible. If you would like to receive the product documentation in audio format, braille, or large print, contact accessibility@cisco.com.

