



Release Notes for Cisco WAE 7.2.2

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Introduction

This document provides information regarding Cisco WAN Automation Engine (Cisco WAE) Release 7.2.2.

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 7.2.2

The following features are new in Cisco WAE 7.2.2

Feature	Description
Upgrade to Python 3	Cisco WAE Server (Linux) and Cisco WAE Design (Linux) are upgraded to support Python 3. Python 3 is not supported for Cisco WAE Design on Mac and Windows OS.
WAE network scaling	WAE is now enhanced to support 3000 nodes for collection and modeling.

Feature	Description
Enhancements to Simulation Analysis tool	<p>Cisco WAE Design now lets you to simultaneously fail parallel L3 circuits. You can exclude the parallel circuits from being failed by marking them as <i>Protected</i> in the Simulation Analysis tool.</p> <p>For more information, see "Simulation Analysis" chapter ("Protecting Objects" topic) in the <i>Cisco WAE Design 7.2.2 User Guide</i>.</p>
WAE Infrastructure support	WAE Infrastructure is now upgraded to support 3rd party devices.
WAE Performance Improvement	XTC Agent now writes into a native file system and not the CDB.
Enhancements to <code>optical-nimo</code> agent and optical reactive model	The EPNM agent writes to a file system instead of CDB. The <code>optical-nimo</code> agent is modified to read from native EPNM agent and other multi vendor yang agents.
Modifications to Node Filtering workflow	<p>Cisco WAE UI now allows you to include or exclude nodes using the Node Filter option from WAE UI home page.</p> <p>For more information, see "Network Model Configuration—CiscoWAE UI" chapter ("Configure the Node Filter using Cisco WAE UI" topic) in the <i>Cisco WAE 7.2.2 User Guide</i>.</p>
SNMP Collection enhancements	<p>The SNMP collection nimo is enhanced to collect data using continuous poller and avoid full network scan to build network model. This improves the scalability of WAE collection.</p> <p>To use SNMP poller, you must configure SNMP agent and the nimo doing discovery using SNMP</p> <p>For more information, see "Network Model Configuration—Expert Mode" chapter ("Configuring SNMP Agents using the Expert Mode" topic) in the <i>Cisco WAE 7.2.2 User Guide</i>.</p>
Upgrade to Java 11	Cisco WAE Server and Cisco WAE Design are upgraded to support Java 11.
REST API deprecation	REST API support is deprecated in Cisco WAE release 7.2.2 and will be removed in future releases. Customers using REST API are recommended to migrate to RESTCONF/NETCONF.
System Robustness	Cisco WAE is now enhanced for better performance.
System Debug and Diagnostics	<p>A CLI based diagnostics tool is added to Cisco WAE.</p> <p>You can use this tool to generate reports with possible faults, misconfigurations, tuning, setup errors, and known issues. The tool also recommends corrective actions.</p> <p>For more information, see "Administration" chapter ("Run Diagnostic Tool using CLI" topic) in the <i>Cisco WAE 7.2.2 User Guide</i>.</p>
SR-TE Bandwidth Optimization tool enhancements	<p>The SR-TE Bandwidth Optimization tool is enhanced to allow splitting of Demands into multiple LSPs if necessary to mitigate congestion. The Maximum Demand Split option allows you to split demands into smaller demands.</p> <p>For more information, see "Segment Routing Optimization" chapter ("SR-TE Bandwidth Optimization" topic) in the <i>Cisco WAE Design 7.2.2 User Guide</i>.</p>

Upgrade to Cisco WAE 7.2.2



Note A license is required to use all the features in Cisco WAE. Cisco WAE supports both Cisco Smart Licensing and traditional licensing.

If you decide to move back from Smart License to traditional license, disable Smart License from Cisco WAE GUI and manually delete the file `MATE_Smart.lic` file present in `~/cariden/etc` folder.

For more information, see *Cisco WAE 7.2.2 User Guide*.

Follow the below workflow to install or upgrade to Cisco WAE 7.2.2:

- [Install and Configure Supervisor, on page 3](#)
- [Verify WAE Image, on page 4](#)
- [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
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 7.2.2 software package from [Cisco Download Software](#) site.

Step 2 The certificate and digital signature are both embedded in the downloaded file - wae-linux-v7.2.2.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-v7.2.2.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-v7.2.2.bin using WAE-CCO_RELEASE.cer
```

Step 4 The generated wae-linux-v7.2.2.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 Java 11 and Python 3 are installed on the system and `JAVA_HOME` environment variable is pointing to `jdk-11.0`.
- Make sure supervisor is installed and configured. See [Install and Configure Supervisor, on page 3](#).
- Download and verify the digitally signed Cisco WAE 7.2.2 image. See [Verify WAE Image, on page 4](#).
- Make sure that `requests.auth` python package is installed for the BW-OPT application to function in WAE.

Procedure

-
- Step 1** Stop WAE if running.
- Step 2** Change permission of the install file using the command:
- ```
chmod +x wae-linux-v7.2.2.bin
```
- Step 3** Run the installer specifying the target directory.
- ```
./wae-linux-v7.2.2.bin <wae-dir>
```
- Step 4** Navigate to installation directory to source `waerc`. 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.
- If you want to use an external-executable-nimo based network which needs `JAVA_HOME/JRE_HOME` to be set, edit the section `[program:waectl]` inside `target-runtime-dir/wae.ini` file to include `JAVA_HOME="valid_jdk_path"` inside environment.

For example, under `[program:waectl]` edit to add:

```
JAVA_HOME:environment=HOME="/home/wae", NCS_JAVA_VM_OPTIONS="-Xmx32G -Xms16G
-XX:+UseG1GC -XX:+HeapDumpOnOutOfMemoryError
-XX:HeapDumpPath=/home/wae/test/run/logs/
-Djava.io.tmpdir=/home/wae/test/run/work/", TMPDIR="/home/wae/test/run/work/",
JAVA_HOME="/usr/"
```

**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:*
```

**Step 10** To migrate configurations from a WAE 7.x.x release to WAE 7.2.2 release, use the Cisco WAE upgrade script from [Cisco Download Software](#) site.

- Note** If you plan to use Cisco WAE Design from windows, generate ssh-rsa keys by running the following command from the run directory after sourcing waerc:

```
$ generate-ssh_rsa-keys
```

---

## Supported Node Versions

The following table lists the supported node versions for Cisco WAE 7.2.2

**Table 1: Supported Node Versions for Cisco WAE 7.2.2**

| Feature | Product | Tested with version             | Notes |
|---------|---------|---------------------------------|-------|
| SRTM    | IOS-XR  | 6.6.2 + SMU, 6.5.3 + SMU, 6.6.3 |       |

| Feature                                  | Product                | Tested with version                | Notes                                         |
|------------------------------------------|------------------------|------------------------------------|-----------------------------------------------|
| Netconf LSP                              | IOS-XR                 | 6.6.3                              | NED Version:<br>ncs-5.3.1-cisco-iosxr-7.23    |
|                                          | IOS-XR                 | 15.3                               | NED Version:<br>ncs-5.3.1-cisco-ios-6.47      |
|                                          | Juniper Junos<br>Mx960 | 18.1R1.9                           | NED Version:<br>ncs-5.3.1-juniper-junos-4.523 |
| RT Apps, Multi XTC,<br>Reactive polling. | IOS-XR                 | 6.6.2 + SMU, 6.5.3 +<br>SMU, 6.6.3 |                                               |
| Multilayer                               | NCS2K                  | 10.7, 10.9, 11.0, 11.1             |                                               |
|                                          | EPNM                   | 4.0, 4.1                           |                                               |

## 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 7.2.2:

**Table 2: Resolved Bugs**

| Bug ID     | Description                                                                                                             |
|------------|-------------------------------------------------------------------------------------------------------------------------|
| CSCvo36676 | WAE server crashes leaving Java processes running.                                                                      |
| CSCvp60520 | The connection with XTC agent configured on WAE is established only for a few minutes.                                  |
| CSCvs18201 | Unable to collect inventory for Huawei VRP 5 and CPU/MEM for VRP 8.                                                     |
| CSCvs70239 | Aggregation of network demand freezes preventing any further aggregation from running.                                  |
| CSCvs70134 | Virtual nodes are displayed as physical nodes.                                                                          |
| CSCvs71913 | Interfaces collected using <code>topo-bgppls-xtc-nimo</code> are incorrectly labeled as TE-Enabled = T from WAE Design. |
| CSCvt19325 | After DARE aggregation, the IP address information in Interfaces Table is lost.                                         |
| CSCvt83677 | DARE Aggregation does not complete the resync process.                                                                  |

| Bug ID     | Description                                                                                                                                                                                         |
|------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CSCvt72194 | Issue with IP-manage in Nokia devices.                                                                                                                                                              |
| CSCvt93470 | Inventory collection displays the following error:<br><br>Failed form container portslot                                                                                                            |
| CSCvu07403 | During <code>topo-bgpls-xtc</code> collection run, the <code>wae-java-vm.log</code> returns an <code>IOException</code> while processing circuits.                                                  |
| CSCvu11477 | When <code>flow_collector_ias</code> tries to create the <code>ias_flows.txt</code> file, it runs out of memory in Java VM. This prevents the <code>ias_flows.txt</code> file from getting created. |
| CSCvu22521 | WAE Live unable to collect any plan files from WAE Collector.                                                                                                                                       |
| CSCvu40057 | XTC Agent adding wrong <code>nodeName</code> and <code>Ipv4teRouterId</code> in <code>NetIntXtcTopoNodes</code> DB file.                                                                            |
| CSCvu43786 | WAE Design does not display the correct circuit information and uses <code>ipv4</code> and <code>ipv6</code> inconsistently.                                                                        |
| CSCvu56228 | Inventory tool is unable to collect Model for Huawei devices.                                                                                                                                       |

## 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, layout-nimo, and RT apps under HA.

## WAE Multilayer Collection

- Multilayer collection for Cisco devices is supported only on the following platforms:
  - Cisco Network Convergence System (NCS) 2000 platforms running versions 10.9, and 11.0 are 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.

- 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.

## EPNM Notification

The configured constraints are not modelled during notification. Run collection must be used to collect/delete the configured constraints.

## EPNM Multi Agent Notification

Cisco WAE does not support simultaneous notification events in case of dual agents. It is recommended to schedule full collection in case of dual agents.

## Python API

When using WAE OPM python API and WAE Design API for python, the following warning might be seen:

```
warning: unknown property: `Ice.Default.Timeout`
```

This warning does not have any impact on the functionality and can be ignored.

## Filing a Cisco WAE Bug

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

- WAE configuration: supervisord 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.

- Log files from Cisco WAE Diagnostics Tool. For more information, see *Cisco WAE 7.2.2 User Guide*.

## 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](mailto: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](mailto:accessibility@cisco.com).

