



# ExtremeCloud™ IQ Site Engine Release Notes

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## 24.02.12 Release Notes

ExtremeCloud IQ Site Engine includes all the features and functionality of Extreme Management Center as well as issues that have been resolved and configuration changes for this release.

If you are an existing Extreme Management Center customer, contact your representative to have your Extreme Management Center license migrated to an ExtremeCloud IQ Site Engine license. The ExtremeCloud IQ Site Engine license also includes licensing for ExtremeAnalytics.

### IMPORTANT:

- For upgrade and installation requirements, as well as configuration considerations, see [ExtremeCloud IQ Site Engine Configuration and Requirements](#).
- ExtremeCloud IQ Site Engine version 24.02.12 consumes licenses from ExtremeCloud IQ in a connected deployment mode or from a license file in air gap deployment mode. ExtremeCloud IQ Site Engine is a subscription-based -only licensing model. Existing NMS licenses do not provide access to ExtremeCloud IQ Site Engine. You can view the status of your license by accessing [Administration > Licenses](#) after the installation is complete.
- ExtremeCloud IQ Site Engine is not compatible with an ExtremeCloud IQ Connect level account. You must use a commercial or trial subscription.
- ExtremeCloud IQ Site Engine is not compatible with ExtremeCloud IQ HIQ. You must use a standard VIQ or MSP account.
- For the information shared between ExtremeCloud IQ Site Engine and ExtremeCloud IQ , see [ExtremeCloud IQ Connection](#).

For information regarding the features supported by specific devices, see the [Firmware Support Matrix](#). Version 24.02.12 of ExtremeCloud IQ Site Engine supports the devices listed in the matrix.

Devices that do not have serial numbers or MAC addresses in Extreme Management Center must be rediscovered after you upgrade to ExtremeCloud IQ Site Engine before they can be onboarded to ExtremeCloud IQ.

**Connected mode only** - If your number of devices exceeds your licenses available, ExtremeCloud IQ Site Engine transitions to a license violation state and your access to ExtremeCloud IQ Site Engine is locked. To resolve the license shortage you need to access the Extreme Networks portal or ExtremeCloud IQ to evaluate the quantities of available Pilot and Navigator licenses versus the number of licenses required by ExtremeCloud IQ Site Engine.

## Licensing Changes

Starting in ExtremeCloud IQ Site Engine version 23.2.10 each stack member consumes a license in connected mode. In connected mode, ExtremeCloud IQ Site Engine now reports stack members to ExtremeCloud IQ. If you use stacks in connected mode, ensure that enough

ExtremeCloud IQ Pilot licenses are in the license pool before upgrading to ExtremeCloud IQ Site Engine 23.2.10 or later.

Beginning with ExtremeCloud IQ Site Engine version 21.04.10, your ExtremeAnalytics license is included as part of your ExtremeCloud IQ Pilot license. Separate licenses are no longer required.

For users upgrading from Extreme Management Center to ExtremeCloud IQ Site Engine, note that the XIQ-NAC subscription must be used instead of IA-ES- license. For new users that complete an initial install of ExtremeCloud IQ Site Engine, ExtremeControl licensing does not include end-system capabilities.

## End of Software Maintenance

In ExtremeCloud IQ Site Engine version 23.7.13 and after, the following components and features are at end-of-software maintenance:

- Guest and IoT Manager - last version is 23.7.11.6
- Fabric Manager - last version is 22.9.13.5
- Posture Assessment (both the agent-based and agent-less)

## Onboarding ExtremeCloud IQ Site Engine to ExtremeCloud IQ in Connected Deployment Mode

After installing or upgrading to ExtremeCloud IQ Site Engine, you need to [onboard](#) ExtremeCloud IQ Site Engine to ExtremeCloud IQ. When the onboarding is complete, you can then access ExtremeCloud IQ Site Engine.

Entering your ExtremeCloud IQ name and password are required during the first-time login to ExtremeCloud IQ Site Engine.

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**NOTE:**

If Extreme Management Center is onboarded to ExtremeCloud IQ, when you upgrade to ExtremeCloud IQ Site Engine, you need to remove Extreme Management Center from ExtremeCloud IQ before onboarding ExtremeCloud IQ Site Engine.

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## Enhancements

The following enhancements were made to ExtremeCloud IQ Site Engine in this release. For additional information about each of the enhancements listed in the release notes, see [ExtremeCloud IQ Site Engine Documentation](#).

## ExtremeCloud IQ Site Engine

### ExtremeCloud IQ Site Engine Enhancements

Changed the location and URL for Analytics Fingerprint update. Verify your firewall rules to allow communication from ExtremeCloud IQ Site Engine to <http://xiqse.extremenetworks.com>. Authentication is not mandatory, predefined credentials are cleared on upgrade.

## Customer Found Defects and Known Issues

### Customer Found Defects Addressed 24.02.12

ExtremeCloud IQ Site Engine CFDs Addressed	ID
	02779533
	02820493
Disk expansion on medium and large hyper-v installations will now work regardless of disk ordering.	02823796
	02921583
Local mirror appliance upgrades from ubuntu 18.04 to ubuntu 20.04 will disable all proxy settings before running the upgrade, and restore them when the upgrade has finished.	02818322

ExtremeManagement CFDs Addressed	ID
When moving a device from one site to another site, now the site archives are also updated.	02829219
Map drawings and labels should no longer be removed when a map is edited.	02856784
EXOS/Switch Engine will no longer report failed when a save config operation takes longer than expected.	02931367

### Customer Found Defects Addressed 24.02.11

ExtremeControl CFDs Addressed	ID
Addressed an issue with Entra IDs not included in a NAC database backup. Now added the Entra ID database to the NAC database backup.	02915773
Addressed an issue when Access Control Engine timed out while connecting to ExtremeCloud IQ Site Engine over connections with higher latency. Now increased the JMS connection timeout to 60 seconds.	02924621

### Customer Found Defects Addressed 24.02.10

ExtremeCloud IQ Site Engine CFDs Addressed	ID
Addressed an issue with the Securities Best Practices documentation to fix technical errors. Now the Rev AB from February 2024 is the corrected updated version.	02761167

<b>ExtremeControl CFDs Addressed</b>	<b>ID</b>
Addressed an issue with importing MACs to End-System Groups not working for users who logged in with @ sign in username.	02776741
Address an issue with certain EAP-TLS clients unable to authenticate because the EAP start packet contained the length field. Now the length is not configured by default for EAP-TLS unfragmented packets.	02829369 02852238 02862459
Addressed an issue by adding a new option in Administration> Options> Access Control> Data Persistence> End-Systems Search Criteria to include/exclude the MAC OUI Vendor from searching in the end-systems table.	02832682
Addressed an issue with being unable to update AAA Trusted Authorities if CA Certificate contained a private key. Now a CA cert with a private key can be added to the trusted store.	02856204
Addressed an issue when there was multiple LDAP(S) URLs configured, the first URL was always used for SSL connection configuration which was incorrect. Now can use the correct URL for LDAP configuration.	02894783

<b>ExtremeManagement CFDs Addressed</b>	<b>ID</b>
Addressed an issue with an Extreme Connect Module Sync Delay sleep timer calculation on the number of End-Systems when there are more than 1000 End-Systems. You can now override the sleep timer if there are more than 1000 End-Systems.	02808576
Addressed an issue when restoring a template config to a VOSS switch can cause config.cfg to become unreadable.	02857609
Addressed an issue with an enforce failed error with trunking. The VLAN trunking feature was taking all the VLANS available (including Onboarding VLAN) on the device and applying them to the port. Now the Onboarding VLAN is excluded.	02864717
Addressed an issue where the Context Menu > More Views > User Sessions, and Fabric L2VSNs options were not greyed out or hidden when not applicable.	02869173
Addressed an issue where packet loss or a bad TCP connection could prevent a cloud connected system startup.	02876953

## Known Issues Addressed in 24.02.12

### ExtremeCloud IQ Site Engine Issues Addressed

Addressed an issue with Administration > Server > Server Utilities > FlexView Editor / MIB Tools unable to launch due to unsigned Jar files in 24.02.11.

### ExtremeControl Issues Addressed

Addressed security vulnerabilities by updating the samba version to the latest available in Ubuntu 20.04.

## Known Issues Addressed in 24.02.11

**ExtremeControl Issues Addressed**

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Addressed a HTTP 404 issue with exporting end-system data when the username contains special characters.

---

Addressed a missing Intune Compliance Module in diagnostics. Intune Compliance Module debugging is now available in official diagnostics.

---

## Known Issues Addressed in 24.02.10

**ExtremeControl Issues Addressed**

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Addressed an issue where the SSH configuration> SSH Port field could save an invalid port range causing the SSH daemon to fail on next startup. The SSH Port field is now restricted to values 1 - 65535.

---

Addressed an issue with Phone Number verification in the ExtremeControl Captive Portal for various languages.

---

Addressed an issue with the "updateServiceDefinition" GraphQL (NBI) API call when no VRF ID is provided then the default VRF ID (-1) is used.

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Addressed an issue with the "deletePolicyMappingEntry" GraphQL (NBI) API call failing as in use.

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**ExtremeManagement Issues Addressed**

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Addressed an issue where ExtremeCloud IQ connected ping only devices did not have a valid uptime shown in ExtremeCloud IQ Site Engine.

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Addressed an issue where if you selected multiple VOSS/Fabric Engine devices and select the Configure button, if the devices had different SPBM Nicknames or DvR settings then the configuration did not save properly in the GUI.

---

Addressed an issue where if you configured Fabric Connect values for multiple devices simultaneously with the right-click configure, followed by multiple selections, that could cause the data to be copied from one device to another.

---

Addressed an issue where the SSH configuration> SSH Port field could save an invalid port range causing the SSH daemon to fail on next startup. The SSH Port field is now restricted to values 1 - 65535.

---

Addressed an issue of an unmanaged device allowing FlexView. FlexViews are supported on managed devices only.

---

Addressed an issue with ZTP+ Onboarding using pre-registered device the Fabric Connect services were not shown.

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Addressed an issue when the wrong hostname of the neighbor could be reported in the port tree and reported to ExtremeCloud IQ.

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**ExtremeAnalytics Issues Addressed**

---

Addressed an issue where the SSH configuration> SSH Port field could save an invalid port range causing the SSH daemon to fail on next startup. The SSH Port field is now restricted to values 1 - 65535.

---

## Addressed Vulnerabilities

This section presents the vulnerabilities reported by vulnerability scanners in previous versions. The following components received updates in 24.02 regardless of whether the vulnerability could have been exploited or not. If you need more information on vulnerability testing, see [Security and Vulnerability Testing](#).

### **24.02.12 ExtremeAnalytics and Application Analytics Traffic Sensor images:**

CVE-2022-48624, CVE-2024-24806, CVE-2023-50868, CVE-2023-5517, CVE-2023-6516, CVE-2023-4408, CVE-2023-50387, CVE-2024-26130, CVE-2023-50782, CVE-2021-3995, CVE-2021-3996, CVE-2024-22667, CVE-2023-22995, CVE-2023-51780, CVE-2021-44879, CVE-2023-51782, CVE-2024-0340, CVE-2023-6121, CVE-2023-4244, CVE-2023-51779, CVE-2021-30535, CVE-2023-23004, CVE-2024-24855, CVE-2023-23000, CVE-2024-1086, CVE-2023-4641, CVE-2021-33560, CVE-2021-40528

### **24.02.12 ExtremeControl images:**

CVE-2022-48624, CVE-2024-24806, CVE-2023-50868, CVE-2023-5517, CVE-2023-6516, CVE-2023-4408, CVE-2023-50387, CVE-2024-26130, CVE-2023-50782, CVE-2021-3995, CVE-2021-3996, CVE-2024-22667, CVE-2023-22995, CVE-2023-51780, CVE-2021-44879, CVE-2023-51782, CVE-2024-0340, CVE-2023-6121, CVE-2023-4244, CVE-2023-51779, CVE-2021-30535, CVE-2023-23004, CVE-2024-24855, CVE-2023-23000, CVE-2024-1086, CVE-2023-4641, CVE-2021-33560, CVE-2021-40528, CVE-2023-3823, CVE-2023-3824, CVE-2024-0985, CVE-2017-1000211, CVE-2016-9179, CVE-2021-38165

### **24.02.12 ExtremeCloud IQ Site Engine images:**

CVE-2022-48624, CVE-2024-24806, CVE-2023-50868, CVE-2023-5517, CVE-2023-6516, CVE-2023-4408, CVE-2023-50387, CVE-2024-26130, CVE-2023-50782, CVE-2021-3995, CVE-2021-3996, CVE-2024-22667, CVE-2023-22995, CVE-2023-51780, CVE-2021-44879, CVE-2023-51782, CVE-2024-0340, CVE-2023-6121, CVE-2023-4244, CVE-2023-51779, CVE-2021-30535, CVE-2023-23004, CVE-2024-24855, CVE-2023-23000, CVE-2024-1086, CVE-2023-4641, CVE-2021-33560, CVE-2021-40528, CVE-2020-26572, CVE-2020-26571, CVE-2020-26570, CVE-2019-15946, CVE-2019-15945

### **24.02.11 ExtremeCloud IQ Site Engine, ExtremeAnalytics, ExtremeControl, and Application Analytics Traffic Sensor images:**

CVE-2024-25062, CVE-2024-0727, CVE-2023-6932, CVE-2023-6931, CVE-2023-6606, CVE-2023-6516, CVE-2023-6277, CVE-2023-6237, CVE-2023-6228, CVE-2023-6129, CVE-2023-6040, CVE-2023-5678, CVE-2023-5517, CVE-2023-52356, CVE-2023-51764, CVE-2023-50868, CVE-2023-50387, CVE-2023-46343, CVE-2023-45863, CVE-2023-4408, CVE-2023-43040, CVE-2023-3817, CVE-2023-35827, CVE-2023-3446, CVE-2023-34324, CVE-2023-32681, CVE-2023-2953, CVE-2023-28450, CVE-2022-48065, CVE-2022-48063, CVE-2022-47695, CVE-2022-40897, CVE-2022-2806, CVE-2022-24407, CVE-2021-4122



### 24.02.10 ExtremeCloud IQ Site Engine, ExtremeAnalytics, ExtremeControl, and Application Analytics Traffic Sensor images:

CVE-2017-6363, CVE-2020-13645, CVE-2020-14367, CVE-2020-15704, CVE-2020-15709, CVE-2020-16121, CVE-2020-16122, CVE-2020-25219, CVE-2020-26154, CVE-2020-27350, CVE-2020-27351, CVE-2020-28241, CVE-2020-3810, CVE-2020-8252, CVE-2020-8927, CVE-2021-22918, CVE-2021-24031, CVE-2021-24032, CVE-2021-38115, CVE-2021-40145, CVE-2021-40153, CVE-2021-41072, CVE-2021-41617, CVE-2022-39348, CVE-2022-44840, CVE-2022-45703, CVE-2022-46908, CVE-2022-47007, CVE-2022-47008, CVE-2022-47010, CVE-2022-47011, CVE-2023-46137, CVE-2023-50164, CVE-2023-51384, CVE-2023-51385, CVE-2023-51764, CVE-2023-6004, CVE-2023-6918, CVE-2023-7104, CVE-2024-0553, CVE-2024-0567, CVE-2024-20918, CVE-2024-20919, CVE-2024-20921, CVE-2024-20922, CVE-2024-20923, CVE-2024-20925, CVE-2024-20926, CVE-2024-20945, CVE-2024-20952, CVE-2024-22365

## Installation, Upgrade, and Configuration Changes

### Installation Information

There are three tiers of licenses for ExtremeCloud IQ Site Engine and devices:

- Pilot
- Navigator
- No License

As you begin to onboard ExtremeCloud IQ Site Engine and your devices, ExtremeCloud IQ will determine if you meet or exceed the license limits for each license type.

For complete installation instructions, see [ExtremeCloud IQ Site Engine Suite Installation](#).

---

**IMPORTANT:**

The **Compliance** tab is available and supported by Extreme on an engine running the Linux operating system supplied by Extreme. Other Linux operating systems can support ExtremeCompliance functionality, but python version 2.7 or higher must be installed. Additionally ExtremeCompliance functionality requires the git, python2, python mysql module, python setuptools module, and python "pygtail" module packages be installed and related dependencies managed by the customer for their server's unique operating system and version.

---

### Upgrading Without an Internet Connection

If your Linux system requires an operating system upgrade, you are prompted to upgrade using either an internet connection or locally (without an internet connection) if no additional Ubuntu packages need to be installed.

!!! ATTENTION !!!

We can attempt to upgrade the OS without using the internet if there were no

extra Ubuntu packages installed. If there were extraneous packages installed, the upgrade will fail with this method.

Do you want to attempt a local in-place upgrade of the OS and reboot when complete? (Y/n)

## Custom FlexViews

When reinstalling ExtremeCloud IQ Site Engine Console, the installation program saves copies of any FlexViews you created or modified in the `<install_directory>\.installer\backup\current\appdata\System\FlexViews` folder.

If you are deploying FlexViews via the ExtremeCloud IQ Site Engine server, save them in the `appdata\VendorProfiles\Stage\MyVendorProfile\FlexViews\My FlexViews` folder.

## Custom MIBs and Images

If you are deploying MIBs via the ExtremeCloud IQ Site Engine server, they are saved in the `appdata\VendorProfiles\Stage\MyVendorProfile\MIBs\` folder.

If you are deploying device images (pictures) via the ExtremeCloud IQ Site Engine server, they are saved in the `appdata\VendorProfiles\Stage\MyVendorProfile\Images\` folder.

## Important Upgrade Information

ExtremeCloud IQ Site Engine version 24.02.12 supports upgrades from Extreme Management Center 8.5.7 or ExtremeCloud IQ Site Engine 23.4.12 only. The following table details the upgrade path supported for each NetSight, Extreme Management Center or ExtremeCloud IQ Site Engine version.

ExtremeCloud IQ Site Engine Version 24.02.12 contains an OS upgrade. Internet connectivity is required to download custom packages.

**NOTE:**

The installer prompts "Do you want to use the Internet to perform the OS upgrade?". The offline upgrade path is supported when no custom packages are installed (answer N). The online upgrade is required when custom packages are manually installed (answer Y). An online upgrade is recommended when an online upgrade was used previously, however there is a risk of session timeout due to 15 minutes of screen inactivity.

To upgrade Access Control Engines and Application Analytics Engines you can use the directive `--keepalive` to decrease the chance of a session expiry timeout from 15 minutes of no screen activity.

From Version (currently running)	To Version (next step in upgrade path)
ExtremeCloud IQ Site Engine <b>23.4.12, 23.7.x, 23.11.x</b>	ExtremeCloud IQ Site Engine <b>24.02</b>
ExtremeCloud IQ Site Engine <b>21.x, 22.x, 23.2.x 23.4.10, 23.4.11</b>	ExtremeCloud IQ Site Engine <b>23.4.12</b>
Extreme Management Center version <b>8.5.7</b>	ExtremeCloud IQ Site Engine <b>24.02</b>

From Version (currently running)	To Version (next step in upgrade path)
Extreme Management Center version <b>8.2.x to 8.5.6</b>	Extreme Management Center <b>8.5.7</b>
Extreme Management Center version <b>8.0.x to 8.1.x</b>	Extreme Management Center <b>8.3.3.11</b>
NetSight version <b>7.1.4.1</b>	Extreme Management Center <b>8.3.3.11</b>
NetSight version <b>7.x</b>	NetSight <b>7.1.4.1</b>
NetSight version <b>6.3.0.186</b>	NetSight <b>7.1.4.1</b>
NetSight version <b>6.x</b>	NetSight <b>6.3.0.186</b>

**IMPORTANT:**

A backup (**Administration > [Backup/Restore](#)**) of the database must be performed prior to the upgrade and saved to a safe location.

If you use LDAPS with a Fully Qualified Domain Name (FQDN) in the URL to authorize a user to the OneView, then ExtremeCloud IQ Site Engine presents the Server Certificate (located in **Administration > Certificates > Server Certificate Information**) to the LDAPS server. If the LDAPS server presents a certificate that does not match the LDAPS URL, then the certificate is rejected with the error "Certificate Unknown".

The best practice is to use a trusted certificate if the LDAPS URL is defined with FQDN, otherwise the LDAPS server might not accept the LDAPS connection. The alternative option is to use an IP address in the LDAPS URL instead of FQDN.

## Important Upgrade Considerations

- If your network is using ExtremeAnalytics or ExtremeControl engines, or another add-on feature, you must first perform the ExtremeCloud IQ Site Engine upgrade to version 24.02.12 and then upgrade the feature.
- To upgrade Traffic Sensor from version 21.x, a fresh installation is recommended. If the fresh installation cannot be used, then please check [Knowledge Base](#) for a special procedure.
- If the online upgrade fails due to an Internet connectivity issue, fix the connectivity issue and rerun the upgrade.

**IMPORTANT:**

When performing an upgrade, be sure to back up the database prior to performing the upgrade, and save it to a safe location. Use the **Administration > [Backup/Restore](#)** tab to perform the backup.

- When upgrading the ExtremeCloud IQ Site Engine server, ExtremeAnalyticsengine, or ExtremeControlengine to version 24.02.12, ensure the DNS server IP address is correctly configured.
- When upgrading to ExtremeCloud IQ Site Engine version 24.02.12, if you adjusted the ExtremeCloud IQ Site Engine memory settings and want them to be saved on upgrade, a flag (`-DcustomMemory`) needs to be added to the `/usr/local/Extreme_Networks/NetSight/services/nserver.cfg` file.

For example:

```
-Xms12g -Xmx24g -XX:HeapDumpPath=../../nsdump.hprof -  
XX:+HeapDumpOnOutOfMemoryError -XX:MetaspaceSize=128m -DcustomMemory
```

## License Renewal

Upgrading to ExtremeCloud IQ Site Engine version 24.02.12 requires you to transition from perpetual to subscription-based license model. Existing NMS licenses do not provide access to ExtremeCloud IQ Site Engine. If your perpetual licenses were not transitioned to subscription-based licenses, contact your Extreme Networks Representative for assistance.

## Free Space Consideration

When upgrading to ExtremeCloud IQ Site Engine version 24.02.12, a minimum of 15 GB of free disk space is required on the ExtremeCloud IQ Site Engine server

To increase the amount of free disk space on the ExtremeCloud IQ Site Engine server, perform the following:

- Decrease the number of ExtremeCloud IQ Site Engine backups (by default, saved in the `/usr/local/Extreme_Networks/NetSight/backup` directory).
- Decrease the Data Persistence settings (**Administration** > **Options** > **Access Control** > **Data Persistence**).
- Remove unnecessary archives (**Network** > **Archives**).
- Delete the files in the `<installation directory>/NetSight/.installer` directory.

## Site Discover Consideration

Discovering devices via the **Site** tab using a **Range**, **Subnet**, or **Seed** discover might not successfully add all expected devices. To correct the issue, increase the **Length of SNMP Timeout** value on the **Administration** > **Options** > **Site** tab in the Discover First SNMP Request section.

## ExtremeAnalytics Upgrade Information

Enabling or disabling the disk flow export feature might cause enforce operations to time out. Enforcing again resolves the issue.

When you delete an ExtremeXOS/Switch Engine device that is configured as a flow source via the Flow Sources table of the **Analytics** > **Configuration** > **Engines** > **Configuration** tab from the Devices list on the **Network** > **Devices** tab, an error message is generated in the `server.log`. The message does not warn you that the device is in use as a flow source. Adding the device back in the Devices list on the **Network** > **Devices** tab or removing the device from the Flow Source table fixes the issue.

The Flow Sources table on the **Analytics** > **Configuration** > *engine* > **Configuration** tab may take a few minutes to load.

## ExtremeControl Version 8.0 and later

Beginning in version 8.0, ExtremeControl may fail to join Active Directory when accessing as a **Standard Domain User with Descendant Computer Objects ("Reset password" permissions only)** group member.

To allow this functionality, add the following permissions:

- Reset Password
- Validated write to DNS host name
- Validated write to service principal
- Read and write account restrictions
- Read and write DNS host name attributes
- Write servicePrincipalName

## Other Upgrade Information

Immediately after you install version 24.02.12 on the ExtremeControlengine, the date and time does not properly synchronize and the following error message displays:

```
WARNING: Unable to synchronize to a NTP server. The time might not be
correctly set on this device.
```

Ignore the error message and the date and time automatically synchronize after a short delay.

Additionally, the following message might display during the ExtremeControl upgrade to version 24.02.12:

### No domain specified

```
To stop domain-specific winbindd process, run /etc/init.d/winbindd stop {example-
domain.com}
```

## Upgrading ExtremeControl Engine to Version 24.02.12

### General Upgrade Information

The EAP-TLS Certificates with SHA1 are considered weak and are not accepted anymore. The radius server fails to start with the SHA1 certificate. You can use a more secure certificate, such as SHA256.

You are not required to upgrade your ExtremeControl engine version to 24.02.12 when upgrading to ExtremeCloud IQ Site Engine version 24.02.12. However, both ExtremeCloud IQ Site Engine and ExtremeControl engine must be at version 24.02.12 in order to take advantage of the new ExtremeControl version 24.02.12 features. ExtremeCloud IQ Site Engine version 24.02.12 supports managing ExtremeControl engine versions 8.5.7, 21.x, 22.x, 23.x and up to 24.02.12.

In addition, if your ExtremeControl solution utilizes a Nessus assessment server, you should also upgrade your assessment agent adapter to version 24.02.12 if you upgrade to ExtremeControl version 24.02.12.

You can download the latest ExtremeControl engine version at the [Extreme Portal](#).

## Agent Version for NAC Agent-Based Assessment - Legacy

If you are using onboard agent-based assessment, be aware that the agent version is upgraded during the ExtremeControl engine software upgrade. If you would like end-systems to update their agent to the new version, you must configure your assessment test set to test for the new agent version. Refer to the [Important Upgrade Information](#) section in the [ExtremeCloud IQ Site Engine Release Notes](#) or the agent version included in the ExtremeControl engine software.

## LDAPS servers with FQDN

If the LDAPS server URL uses a Fully Qualified Domain Name (FQDN), then the LDAPS client of Access Control Engine presents the internal Communication Certificate to the LDAPS server. If the LDAPS server URL uses a FQDN then the LDAPS client of ExtremeCloud IQ Site Engine presents the Server Certificate (located in Administration > Certificates > Server Certificate Information) to the LDAPS server. If the LDAPS server presents a certificate that does not match the LDAPS URL, then the certificate is rejected with the error "Certificate Unknown"

The best practice is to use trusted certificates if the LDAPS URL is defined with FQDN, otherwise the LDAPS server might not accept the LDAPS connection. If the LDAPS server URL uses an IP address then the LDAPS client (of both Access Control Engine and ExtremeCloud IQ Site Engine) does not present the Certificate to the LDAPS server.

## Upgrading to Policy Manager 24.02.12

- Policy Manager 24.02.12 only supports ExtremeWireless Controller version 10.51. If you upgrade to ExtremeCloud IQ Site Engine 24.02.12 prior to upgrading your controllers, then Policy Manager does not allow you to open a domain where the controllers already exist or add them to a domain. A dialog is displayed indicating your controllers do not meet minimum version requirements and that they must be upgraded before they can be in a domain.
- Following an upgrade to Wireless Controller version 8.31 and higher, a Policy Manager enforce fails if it includes changes to the default access control or any rules that are set to contain. To allow Policy Manager to modify the default access control or set rules to contain, you must disable the **"Allow" action in policy rules contains to the VLAN assigned by the role** checkbox accessed from the Wireless Controller's web interface on the Roles > **Policy Rules** tab. This will allow the enforce operation to succeed.

## Fabric Configuration Information

### Certificate

Fabric Manager might be unavailable via ExtremeCloud IQ Site Engine after upgrading if the certificate is missing in ExtremeCloud IQ Site Engine Trust store.

To ensure Fabric Manager is available, enter the Fabric Manager certificate in the ExtremeCloud IQ Site Engine Trust store using **Generate Certificate** option. See [Add Fabric Manager Certificate](#) for the certificate procedure.

### Authentication Key

When you provision authentication keys for Fabric Attach, the key cannot be read back for security reasons. When the key is read from the device, it always shows "\*\*\*\*\*". For this reason, it might seem that there is a configuration mismatch when one does not exist.

### Service Configuration Change

If you change a configured service via the **Configure Device** window that references one of the following, and then enforce those changes to the device, the configuration on the device might change unexpectedly:

- MLT
- SMLT
- Port-specific settings to a port belonging to an MLT or SMLT

To prevent this merge, change rows in the **Enforce Preview** window where MLT or SMLT are in use from **Current** to **Desired**.

To correct the issue after enforcement, modify the service on the device via the CLI.

### CLIP Addresses

Using the CLIP Addresses table in the Configure Device window, you can enter addresses in both IPv4 and IPv6 formats. However, ExtremeCloud IQ Site Engine version 24.02.12 only supports applying a single address (either IPv4 or IPv6) to a Loopback Interface.

### Gateway Address Configuration Change

In versions of ExtremeCloud IQ Site Engine prior to 24.02.12, the Default Gateway IP Address is configured as part of the VLAN. In 24.02.12, the Default Gateway IP Address is configured as part of the VRF.

When enforcing VRFs to a device after upgrading to version 24.02.12, merge any **Default Gateway IP Addresses** from the device into the configuration of ExtremeCloud IQ Site Engine to prevent incorrect configuration of the device.

## Upgrading VSP-8600

When upgrading from Extreme Management Center version 8.2 to version 8.3, manually reload previously discovered VSP-8600 devices to gain access to Fabric Connect features.

## Removing Fabric Connect Configuration

Removing a device's Fabric Connect configuration by setting the **Topology Definition** to **<None>** may fail if the device has Logical Interfaces assigned to ISIS.

## Password Configuration

Fabric Manager fails to onboard in ExtremeCloud IQ Site Engine if the root password includes an ampersand (&) character. Additionally, if the Administration > Inventory Manager > SCP tab contains a password that includes an ampersand (&) in ExtremeCloud IQ Site Engine, the Fabric Manager firmware does not download successfully.

Ensure you use a password without an ampersand (&) character.

## VRF Configuration

VOSS/Fabric Engine SNMP performance is adversely affected as the number of VRF configurations increases. This issue can be resolved by upgrading to VOSS/Fabric Engine release 8.1.1 or later or VSP-8600 series version 6.3.3 or later.

# Device Configuration Information

## VDX Device Configuration

To properly discover interfaces and links for VDX devices in ExtremeCloud IQ Site Engine, enable `three-tuple-if` on the device.

---

To enable `three-tuple-if` on the device in ExtremeCloud IQ Site Engine:

**NOTE:**

1. Access the **Network > Devices** tab.
2. Right-click on the device in the Devices table.
3. Select **Tasks > Config > VDX Config Basic Support**.

---

Additionally, for ExtremeCloud IQ Site Engine to display VCS fabric, the NOS version must be 7.2.0a or later.

Rediscover VDX devices after upgrading to ExtremeCloud IQ Site Engine.

## VOSS/Fabric Engine Device Configuration

Topology links from VOSS/Fabric Engine devices to other VOSS/Fabric Engine or ERS devices might not display in a topology map (or might display inconsistently). To ensure topology map



links display correctly, verify that the VOSS/Fabric Engine device is configured to publish its management IP address in the autotopology (SONMP) data.

Ensure that the output of `show sys setting` command shows:

```
autotopology : on
ForceTopologyIpFlag : true
clipId-topology-ip : 0
```

If the output values displayed are different, configure the VOSS/Fabric Engine device to publish management IP address in SONMP data by executing the following CLI commands:

```
(config)# autotopology
(config)# sys force-topology-ip-flag enable
(config)# default sys clipId-topology-ip
```

The **Status** of LAG links in maps will start working after the next polling following an upgrade to ExtremeCloud IQ Site Engine. You can initiate the polling of a device by performing a refresh/rediscovery of the device.

## ERS Device Configuration

ERS devices might automatically change VLAN configurations you define in ExtremeCloud IQ Site Engine. To disable this, change the `vlan configcontrol` setting for ERS devices you add to ExtremeCloud IQ Site Engine by entering the following in the device command line:

```
CLI commands
enable
config term
vlan configcontrol flexible
```

Additionally, configure all VLANs on the port for an ERS device with the same tag status (tagged or untagged). If enforcing to an ERS device on which a port has at least one VLAN as tagged, ExtremeCloud IQ Site Engine adds all untagged VLANs to the tagged VLAN list and clears the untagged VLAN list.

Creating an archive for ERS devices using the **Network > Archives** tab does not complete successfully if Menu mode (cmd-interface menu) is used instead of CLI mode (cmd-interface cli). See [How To Set Default Management Interface To Either Menu or CLI Mode](#) to create the archive.

## SLX Device Configuration

When creating a ZTP+ Configuration for an SLX 9240 on which firmware version 18s.01.01 or 18s.01.02 is installed, the ZTP+ process fails if the **Administration Profile** value uses SSH or Telnet CLI credentials. ExtremeCloud IQ Site Engine indicates that the SSH or CLI profile is not supported by the device.

To create a ZTP+ configuration for an SLX 9240:

1. Create a new Device Profile with the **CLI Credential** set to **< No Access >**.

---

**NOTE:** The SLX ZTP+ Connector does NOT support configuring CLI credentials on the device.

---

2. Create the ZTP+ Configuration and select the new **Device Profile** you created in Step 1 as the **Administration Profile**.
3. After the ZTP+ process successfully completes and the device is added to ExtremeCloud IQ Site Engine, select a **Device Profile** that uses the correct CLI credentials for the SLX device in the **Administration Profile**.

## ExtremeXOS Device Configuration

ExtremeXOS/Switch Engine devices on which firmware version 30.3.1.6 is installed do not download and install new firmware versions successfully via the ZTP+ process. To correct the issue, access the **Network > Firmware** tab in ExtremeCloud IQ Site Engine, select the ExtremeXOS device you are updating via ZTP+, and change the **Version** field in the Details right-panel from **builds/xos\_30.3/30.3.1.6** to **30.3.1.6**.

## Firmware Upgrade Configuration Information

ExtremeCloud IQ Site Engine supports firmware downloads and uploads to devices using TFTP, FTP, SCP, and SFTP. However, before firmware images can be downloaded or uploaded from the server, ExtremeCloud IQ Site Engine needs the root path or directory for each of the protocols. The following default root paths for each protocol are configurable from the **Administration > Options > Inventory Manager** tab:

Protocol Root Path:

- TFTP: /tftpboot/firmware/images/
- FTP: /tftpboot/firmware/images/
- SCP: /root/firmware/images/
- SFTP: /root/firmware/images/

To upload firmware images that are 2 GB or less to the server, use the ExtremeCloud IQ Site Engine **Network > Firmware** tab. For files larger than 2 GB, use a third-party client (such as SCP, WinSCP, or FTP).

For example, to use SCP to upload a firmware image to the SCP root path on the server, enter the following:

- `scp <LOCAL_FIRMWARE_PATH> root@<ExtremeCloud IQ Site Engine_SERVER_IP>:/root/firmware/images`
- Where:
  - `<ExtremeCloud IQ Site Engine_SERVER_IP>`= IP Address to ExtremeCloud IQ Site Engine Server
  - `<LOCAL_FIRMWARE_PATH>`= fully qualified path to a firmware image on the client machine

## Wireless Manager Upgrade Information

A High Availability pair cannot be added as a flow source if the WLAN(s) selected are not in common with both wireless controllers.

## Server and Client System Requirements

### IMPORTANT:

Wireless event collection is disabled by default in version 24.02.12 due to the increase in disk space usage required. To enable event collection, select **Enable Event Collection** **Event Analyze**. Then select **Administration > Options > [Event Analyzer](#)**.

Internet Explorer is not supported in ExtremeCloud IQ Site Engine version 24.02.12.

### ExtremeCloud IQ Site Engine Server Requirements

Manufacturer	Operating System
Linux	Red Hat Enterprise Linux WS and ES v6 and v7 Ubuntu 20.04
VMware® (ExtremeCloud IQ Site Engine Virtual Engine)	VMware ESXi™ 6.0 server VMware ESXi™ 6.5 server VMware ESXi™ 6.7 server VMware ESXi™ 7.0 server vSphere (client only)™
Microsoft® Hyper-V (ExtremeCloud IQ Site Engine Virtual Engine)	Windows® Server 2012 R2 Windows® Server 2016

These are the operating system requirements for the ExtremeCloud IQ Site Engine server.

### ExtremeCloud IQ Site Engine Client Requirements

These are the operating system requirements for remote ExtremeCloud IQ Site Engine client machines.

Manufacturer	Operating System
Windows (qualified on the English version of the operating systems)	Windows® 10 and 11
Linux	Red Hat Enterprise Linux WS and ES v6 and v7 Ubuntu 20.04
Mac OS X®	Monterey

## ExtremeCloud IQ Site Engine Server and Client Hardware Requirements

These are the hardware requirements for the ExtremeCloud IQ Site Engine server and ExtremeCloud IQ Site Engine client machines.

**NOTES:** ExtremeControl and ExtremeAnalytics are not supported on Small ExtremeCloud IQ Site Engine servers.

### ExtremeCloud IQ Site Engine Server Requirements

	Small	Medium	Enterprise	Large Enterprise
Total CPUs	1	2	2	2
Total CPU Cores	8	16	24	24
Memory	16 GB	32 GB	64 GB	64 GB
Disk Size	240 GB	480 GB	960 GB	1.92 TB
IOPS	200	200	10,000	10,000
Recommended scale based on server configuration:				
Maximum APs	250	2,500	25,000	25,000
Maximum Wireless MUs	2,500	25,000	100,000	100,000
Maximum Managed Devices	100	1,000	10,000 air gap 8,000 connected	10,000 air gap 8,000 connected
ExtremeControl End-Systems	N/A	50,000	200,000	200,000
Statistics Retention (Days)	90	180	180	360
ExtremeAnalytics	No	Yes	Yes	Yes
MU Events	No	Yes	Yes	Yes

**IMPORTANT:** For optimal performance the CPU and Memory needs to reserved in the ESX Client and the virtual machine needs to be deployed using Thick Disk provisioning.

### ExtremeCloud IQ Site Engine Client Requirements

	Requirements
CPU Speed	3.0 GHz Dual Core Processor
Memory	8 GB (4 GB for 32-bit OS)
Disk Size	300 MB (User's home directory requires 50 MB for file storage)
Java Runtime Environment (JRE) (Oracle Java only)	Version 8
Browser <sup>1</sup> (Enable JavaScript and Cookies)	Microsoft Edge Mozilla Firefox Google Chrome

<sup>1</sup>Browsers set to a zoom ratio of less than 100% might not display ExtremeCloud IQ Site Engine properly (for example, missing borders around windows). Setting your browser to a zoom ratio of 100% corrects this issue.

## Virtual Engine Requirements

The ExtremeCloud IQ Site Engine, ExtremeControl, and ExtremeAnalytics virtual engines must be deployed on a VMWare or Hyper-V server with a disk format of VHDX.

- The VMWare ExtremeCloud IQ Site Engine virtual engines are packaged in the .OVA file format (defined by VMware).
- The Hyper-V ExtremeCloud IQ Site Engine virtual engines are packaged in the .ZIP file format.

### IMPORTANT:

For ESX and Hyper-V servers configured with AMD processors, the ExtremeAnalytics virtual engine requires AMD processors with at least Bulldozer based Opterons.

### ExtremeCloud IQ Site Engine Virtual Engine Requirements

Specifications	Small	Medium	Enterprise
Total CPU Cores	8	16	24
Memory	16 GB	32 GB	64 GB
Disk Size	240 GB	480 GB	960 GB
IOPS	200	200	10,000

Recommended scale based on server configuration:

Maximum APs	250	2,500	25,000
Maximum Wireless MUs	2,500	25,000	100,000
Maximum Managed Devices	100	1,000	10,000 air gap 8,000 connected
ExtremeControl End-Systems	N/A	50,000	200,000
Statistics Retention (Days)	90	180	180
ExtremeAnalytics	No	Yes	Yes
MU Events	No	Yes	Yes

### IMPORTANT:

For optimal performance the CPU and Memory needs to reserved in the ESX Client and the virtual machine needs to be deployed using Thick Disk provisioning.

### ExtremeControl Virtual Engine Requirements

Specifications	Small	Medium	Enterprise	Large Enterprise
Total CPU Cores	8	16	16	20
Memory	12 GB	16 GB	32 GB	48 GB
Disk Size	40 GB	120 GB	120 GB	120 GB
IOPS	200	200	200	200

Recommended scale based on server configuration:

Specifications	Small	Medium	Enterprise	Large Enterprise
ExtremeControl End-Systems	3,000	6,000	9,000/12,000 <sup>1</sup>	12,000/24,000 <sup>2</sup>
Authentication	Yes	Yes	Yes	Yes
Captive Portal	No	Yes	Yes/No <sup>1</sup>	Yes/No <sup>2</sup>
Assessment	No	Yes	No	No

<sup>1</sup> The Enterprise ExtremeControlengine configuration supports two different scale options:

- Up to 9,000 end-systems if your network uses Captive Portal functionality.
- Up to 12,000 end-systems if your network does not use Captive Portal functionality.

<sup>2</sup> The Large Enterprise ExtremeControlengine configuration supports two different scale options:

- Up to 12,000 end-systems if your network uses Captive Portal functionality.
- Up to 24,000 end-systems if your network does not use Captive Portal functionality.

### IMPORTANT:

For optimal performance the CPU and Memory needs to reserved in the ESX Client and the virtual machine needs to be deployed using Thick Disk provisioning.

## ExtremeAnalytics Virtual Engine Requirements

Specifications	Small	Medium	Enterprise
Total CPU Cores	8	16	16
Memory	12 GB	32 GB	64 GB
Disk Size	40 GB	480 GB	960 GB
IOPS	200	10,000	10,000
Recommended scale based on server configuration:			
Flows Per Minute	250,000	500,000	750,000
End-Systems	10,000	20,000	30,000

### IMPORTANT:

The ESXi free license supports a maximum of 8 CPU cores, and the medium and enterprise ExtremeAnalytics virtual engine installations require 16 CPU cores. Sixteen CPU cores are only available by purchasing a permanent license. To use the ExtremeAnalytics virtual engine with an ESXi free license, adjust the number of CPU cores to 8.

To reduce the possibility of impaired functionality, ensure at least 4 GB of swap space is available for flow storage on the ExtremeAnalytics virtual engine. To verify the amount of available RAM on your Linux system, use the `free` command

## Fabric Manager Requirements

Specifications	Requirements
Total CPU Cores	4
Memory	9 GB

Specifications	Requirements
<b>Memory allocated to Java:</b>	
-Xms	4 GB
-Xmx	6 GB
<b>Disk Size</b>	60 GB

## ExtremeControl Agent OS Requirements

The table below outlines the supported operating systems for end-systems connecting to the network through an ExtremeControl deployment that is implementing agent-based assessment. Additionally, the end-system must support the operating system disk space and memory requirements as provided by Microsoft® and Apple®.

Manufacturer	Operating System	Operating System Disk Space	Available/Real Memory
<b>Windows<sup>1</sup></b>	Windows Vista	80 MB	40 MB (80 MB with Service Agent)
	Windows XP		
	Windows 2008		
	Windows 2003		
	Windows 7		
	Windows 8		
	Windows 8.1		
	Windows 10		
<b>Mac OS X</b>	Catalina	10 MB	120 MB
	Tiger		
	Snow Leopard		
	Lion		
	Mountain Lion		
	Mavericks		
	Yosemite		
	El Capitan		
	Sierra		

<sup>1</sup>Certain assessment tests require the Windows Action Center (previously known as Windows Security Center), which is supported on Windows XP SP2+, Windows Vista, and Windows 7, Windows 8, and Windows 8.1 operating systems.

ExtremeControl Agent support for Antivirus or Firewall products includes, but is not limited to, the following families of products:

- McAfee
- Norton
- Kaspersky
- Trend Micro
- Sophos

ExtremeControl Agent operating system support for the above products includes the latest Windows or Mac OS X versions currently available at the time of product release. The ExtremeControl Agent running on MAC Operating Systems requires Java Runtime Environment

(JRE) support. Some features of various products might not be supported. For additional information on specific issues, see [Known Restrictions and Limitations](#).

## ExtremeControl Supported End-System Browsers

The following table outlines the supported desktop and mobile end-system browsers connecting to the network through the Mobile Captive Portal of Extreme NetworksExtremeControl.

Medium	Browser
Desktop	Microsoft Edge
	Microsoft Internet Explorer
	Mozilla Firefox
	Google Chrome
Mobile	Internet Explorer Mobile
	Microsoft Edge
	Microsoft Windows 10 Touch Screen Native (Surface Tablet)
	iOS Native
	Android Chrome
	Android Native
	Dolphin
	Opera

**NOTES:** A native browser indicates the default, system-installed browser. Although this might be Chrome (Android), this also includes the default, system-controlled browser used for a device's Captive Network Detection for a device. Typically, this is a non-configurable option for Wi-Fi Captive Network Detection, but default Android, Microsoft and iOS devices are tested for compatibility with the Mobile Captive Portal.

A mobile device can access the standard (non-mobile) version of the Captive Portal using any desktop-supported browsers available on a mobile device.

For other browsers, the Mobile Captive Portal requires the browser on the mobile device to be compatible with Webkit or Sencha Touch.

To confirm compatibility with Webkit or Sencha Touch, open `http://<ExtremeControlEngine IP>/mobile_screen_preview` using your mobile web browser.

- If the browser is compatible, the page displays properly.
- If the browser is not compatible with the Mobile Captive Portal, the following error displays:





## ExtremeControl Engine Version Requirements

For complete information on ExtremeControl engine version requirements, see [Important Upgrade Information](#).

## ExtremeControl VPN Integration Requirements

VPN concentrators are supported for use in ExtremeControl VPN deployment scenarios.

- Supported Functionality: Authentication and Authorization (policy enforcement)  
Cisco ASA  
Enterasys XSR
- Supported Functionality: Authentication  
Juniper SA (requires an S-Series Stand Alone (SSA) system in order to provide access control)

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**NOTE:** For all ExtremeControl VPN Deployment scenarios, an S-Series Stand Alone (SSA) system is required to change authorization levels beyond the initial authorization, such as when using assessment.

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## ExtremeControl SMS Gateway Requirements

The following SMS Gateways have been tested for interoperability with ExtremeControl:

- Clickatell
- Mobile Pronto

## ExtremeControl SMS Text Messaging Requirements

The following mobile service providers are supported by default for SMS text messaging in an ExtremeControl deployment. Additional service providers can be added:

AT&T	Sprint PCS
Alltel	SunCom
Bell Mobility (Canada)	T-Mobile
Cingular	US Cellular
Metro PCS	Verizon
Rogers (Canada)	Virgin Mobile (US and Canada)

## ExtremeAnalytics Requirements

To use an ExtremeSwitching X440-G2 switch as an Application Telemetry source for ExtremeAnalytics, install firmware version 22.4.1.4-patch2-5 or higher.

## Ekahau Maps Requirements

ExtremeCloud IQ Site Engine supports importing Ekahau version 8.x maps in .ZIP format.

## Guest and IoT Manager Requirements

### Guest and IoT Manager Server OS Requirements

These are the operating system requirements for Guest and IoT Manager server:

Manufacturer	Operating System
VMware® (ExtremeCloud IQ Site Engine Virtual Engine)	VMware ESXi™ 5.5 server VMware ESXi™ 6.0 server VMware ESXi™ 6.5 server vSphere (client only)™

### Guest and IoT Manager Outlook Add-in Client Requirements

These are the requirements for the Client Machines, which need to run Guest and IoT Manager Outlook Add-in.

Manufacturer	Operating System
Windows <sup>1</sup>	Windows 7 Windows 10
Mac OS X	Sierra High Sierra Mojave

<sup>1</sup>Microsoft® Outlook® 2016 is needed on Windows/Mac clients for the add-in to operate.

### Guest and IoT Manager Virtual Engine Requirements

The VMWare Guest and IoT Manager virtual engines are packaged in the .OVA file format (defined by VMware) and needs an x86, 64-bit capable environment

Specifications	Minimum	Recommended
Total CPU Cores	2	4
Memory	2 GB	4 GB
Disk Size	80 GB	80 GB
Interfaces	1 Physical NIC	3 Physical NICs

### Guest and IoT Manager Supported Browsers

The following table outlines the supported desktop and mobile browsers that can be used to launch Guest and IoT Manager Admin and Provisioner Web Application:

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Medium	Browser	Version
Desktop	Microsoft Internet Explorer	11 and later
	Mozilla Firefox	63 and later
	Google Chrome	65 and later
	Microsoft Edge	42 and later
	Safari	12 and later
Mobile <sup>1</sup>	iOS Native	9 and later
	Android Chrome	65 and later
	US Browser	11.5 and later
	Opera	40 and later
	Firefox	63 and later

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<sup>1</sup>Mobile Browsers are supported only for the Guest Self-Service Provisioning flow.

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**NOTES:**

- A mobile device can access the Guest and IoT Manager Application by using any desktop-supported browsers available on a mobile device. Before login, make sure to select the **Desktop site** option in the browser options.
  - Browsers set to a zoom ratio of less than 100% might not display Guest and IoT Manager Application properly (for example, missing borders around windows). Setting your browser to a zoom ratio of 100% corrects this issue.
  - Guest and IoT Manager Application is best viewed in 1920 x 1080 resolution or higher. Lower resolutions might result in improper layouts in some cases.
  - If you are using self-signed certificates, they must be added in the Trusted Root Certificate store on the client machine or you might observe issues in the “print” use cases. This is only applicable for Microsoft Edge and Microsoft Internet Explorer browsers.
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