Install the ExtraHop session key forwarder on a Windows server

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Perfect Forward Secrecy (PFS) is a property of secure communication protocols that enables short-term, completely private session key exchanges between clients and servers. ExtraHop offers session key forwarding software that can send session keys to the ExtraHop system for TLS decryption. Communication between the key forwarder and the sensor is encrypted with TLS 1.2 or TLS 1.3, and there is no limit to the number of session keys that the ExtraHop system can receive.

> **Note:** For more information about how the traffic feed or changes to the configuration might affect sensors, review the desync and capture drop rate metrics in the System Health dashboard ⤢.

You must configure the ExtraHop system for session key forwarding and then install the forwarder software on the Windows and Linux ⤢ servers that have the TLS traffic that you want to decrypt.

Before you begin

- Read about TLS decryption ⤢ and review the list of supported cipher suites.
- Make sure that the ExtraHop system is licensed for TLS Decryption and TLS Shared Secrets.
- Make sure that your server environment is supported by the ExtraHop session key forwarder software:
    - Microsoft Secure Channel (Schannel) security package
    - Java TLS (Java versions 8 through 17). Do not upgrade to this version of the session key forwarder if you are currently monitoring Java 6 or Java 7 environments. Version 7.9 of the session key forwarder supports Java 6 and Java 7, and is compatible with the latest ExtraHop firmware.
    - Dynamically linked OpenSSL (1.0.x and 1.1.x) libraries. OpenSSL is only supported on Linux systems with kernel versions 4.4 and later and RHEL 7.6 and later.
- Make sure the server where you install the session key forwarder trusts the TLS certificate of the ExtraHop sensor.
- Make sure your firewall rules allow connections to be initiated by the monitored server to TCP port 4873 on the sensor.

    > **Important:** The ExtraHop system cannot decrypt TLS-encrypted TDS traffic through session key forwarding. Instead, you can upload an RSA private key ⤢.

- Install the session key forwarder on one or more Windows 2016 or Windows 2019 servers that are running TLS-based services with the native Windows TLS framework. OpenSSL on Windows is not currently supported.

    > **Important:** After you install the session key forwarder software, applications that include TLS-enabled features, such as EDR agents and Windows Store applications, might fail to function correctly.
    >
    > Validate the compatibility of the session key forwarder in your Windows test environment before deploying in your production environment.

Windows application traffic decryption

The following Microsoft application traffic can be decrypted with the session key forwarder.

- Microsoft IIS
- Microsoft PowerShell
- Microsoft SQL Server

Install the software with the installation wizard

1. Log in to the Windows server.
2. Download ↗ the latest version of the session key forwarder software.
3. Double-click the `ExtraHopSessionKeyForwarder.exe` file and click **Next**.
4. If the system prompts you to authorize the installer to run with administrator privileges, click **OK**.
5. Select the box to accept the terms of the license agreement and then click **Next**.
6. Type the hostname or IP address of the sensor where you want to forward session keys.

    > **Note:** You can forward session keys to more than one sensor by entering comma-separated hostnames. For example:
    >
    > ```
    > packet-sensor.example.com,ids-sensor.example.com
    > ```

7. Optional: Select the **Advanced options** checkbox. Accept the default TCP listen port value of 598 (recommended), or type a custom port value.
8. Click **Install**.
9. When the installation completes, click **Finish**.

Command-line installation option

The following steps show you how to install the session key forwarder from a Windows command prompt or Windows PowerShell.

1. Log in to the Windows server.
2. Download ↗ the latest version of the session key forwarder software.
3. Run the following command:

    ```
    ExtraHopSessionKeyForwarderSetup.exe -q EDA_HOSTNAME="<hostname or IP
      address of sensor>"
    ```

    > **Note:** The `-q` option installs the forwarder in non-interactive mode, which does not prompt for confirmation. You can omit the `-q` option to install the forwarder in interactive mode.

    > **Note:** You can specify multiple sensors in a comma-separated list. For example, the following command specifies two sensors:
    >
    > ```
    > ExtraHopSessionKeyForwarderSetup.exe EDA_HOSTNAME="packet-
    > sensor.example.com,ids-sensor.example.com"
    > ```

    For more information about installation options, see Installation parameters.

Enable the TLS session key receiver service

You must enable the session key receiver service on the ExtraHop system before the system can receive and decrypt session keys from the session key forwarder. By default, this service is disabled.

1. Log in to the Administration settings on the ExtraHop system through `https://<extrahop-hostname-or-IP-address>/admin`.
2. In the Appliance Settings section, click **Services**.
3. Select the **SSL Session Key Receiver** checkbox.
4. Click **Save**.

Add a global port to protocol mapping

Add each protocol for the traffic that you want to decrypt with your session key forwarders.

1. Log in to the Administration settings on the ExtraHop system through `https://<extrahop-hostname-or-IP-address>/admin`.
2. In the System Configuration section, click **Capture**.
3. Click **SSL Decryption**.
4. In the Private Key Decryption section, clear the Require Private Keys checkbox.
5. In the Global Protocol to Port Mapping section, click **Add Global Protocol**.
6. From the **Protocol** drop-down menu, select the protocol for the traffic that you want to decrypt.
7. In the Port field, type the number of the port.
   Type `0` to add all ports.
8. Click **Add**.

View connected session key forwarders

You can view recently connected session key forwarders after you install the session key forwarder on your server and enable the TLS session key receiver service on the ExtraHop system. Note that this page only displays session key forwarders that have connected over the last few minutes, not all session key forwarders that are currently connected.

1. Log in to the Administration settings on the ExtraHop system through `https://<extrahop-hostname-or-IP-address>/admin`.
2. In the System Configuration section, click **Capture**.
3. Click **SSL Shared Secrets**.

Validate session key forwarding

Perform these steps to make sure that the installation was successful and the session key forwarder is forwarding the keys to the ExtraHop system.

1. Log in to the Windows server.
2. Open the Services MMC snap-in. Ensure the "ExtraHop Session Key Forwarder" service shows the status as "Running."
3. If either service is not running, troubleshoot the issue by completing the following steps.
   a) Open the Event Viewer MMC snap-in and navigate to Windows Logs > Application.
   b) Locate the most recent entries for the ExtraHopAgent source. Common reasons for failure and their associated error messages are listed in the Troubleshoot common error messages section below.
4. If the Services and Event Viewer snap-in do not indicate any issues, apply a workload to the monitored services and go to the ExtraHop system to verify that secret-based decryption is working.

When the ExtraHop system receives session keys and applies them to decrypted sessions, the Shared Secret metric counter (in Applications > All Activity > SSL Sessions Decrypted) is incremented. Create a dashboard chart with this metric to see if the sensor is successfully receiving session keys from the monitored servers.

Verify the configuration from the command line

In cases where you might have problems with the configuration, the session key forwarder binary includes a test mode you can access from the command line to test your configuration.

1. Log in to your Windows server.
2. Open the Windows PowerShell application.
3. Perform a verification test by running the following command:

```
& 'C:\Program Files\ExtraHop\extrahop-agent.exe' -t -server <eda
  hostname>
```

Where `<eda hostname>` is the fully qualified domain name of the sensor you are forwarding secrets to.

The following output should appear:

```
<timestamp> Performing connectivity test
<timestamp> No connectivity issues detected
```

If there is a configuration issue, troubleshooting tips appear in the output to help you correct the issue. Follow the suggestions to resolve the issue and then run the test again.

4. You can optionally test the certificate path and server name override by adding the following options to the command above.

    -   Specify this option to test the certificate without adding it to the certificate store.

    ```
    -cert <file path to certificate>
    ```

    -   Specify this option to test the connection if there is a mismatch between the ExtraHop system hostname that the forwarder knows (SERVER) and the common name (CN) that is presented in the TLS certificate of the ExtraHop system.

    ```
    -server-name-override <common name>
    ```

Key receiver system health metrics

The ExtraHop system provides key receiver metrics that you can add to a dashboard chart to monitor key receiver health and functionality.

To view a list of available metrics, click the System Settings icon ⚙ and then click **Metric Catalog**. Type `key receiver` in the filter field to display all available key receiver metrics.

Metric Catalog

key receiver

System | **Key Receiver** System Health - Attempted Connections
The number of TCP connections that were initiated to the session key receiver po

System | **Key Receiver** System Health - Disconnections
The number of connections that clients ended intentionally. This number does n

System | **Key Receiver** System Health - Failed SSL Handshakes
The number of connections to the session key receiver port that did not proceed

System | **Key Receiver** System Health - Failed Certificate Authority
*The number of connections to the session key receiver port that did not proceed*

💡 **Tip:** To learn how to create a new dashboard chart, see Edit a chart with the Metric Explorer ↗.

Integrate the forwarder with the Java-based TLS application

The ExtraHop session key forwarder integrates with Java applications through the `-javaagent` option. Consult your application's specific instructions for modifying the Java runtime environment to include the `-javaagent` option.

As an example, Apache Tomcat supports customization of Java options in the Tomcat service manager properties. In the following example, adding the `-javaagent` option to the Java Options section causes the Java runtime to share TLS session secrets with the key forwarder process, which then relays the secrets to the ExtraHop system so that the secrets can be decrypted.

```
-javaagent:C:\Program Files\ExtraHop\exagent.jar
```
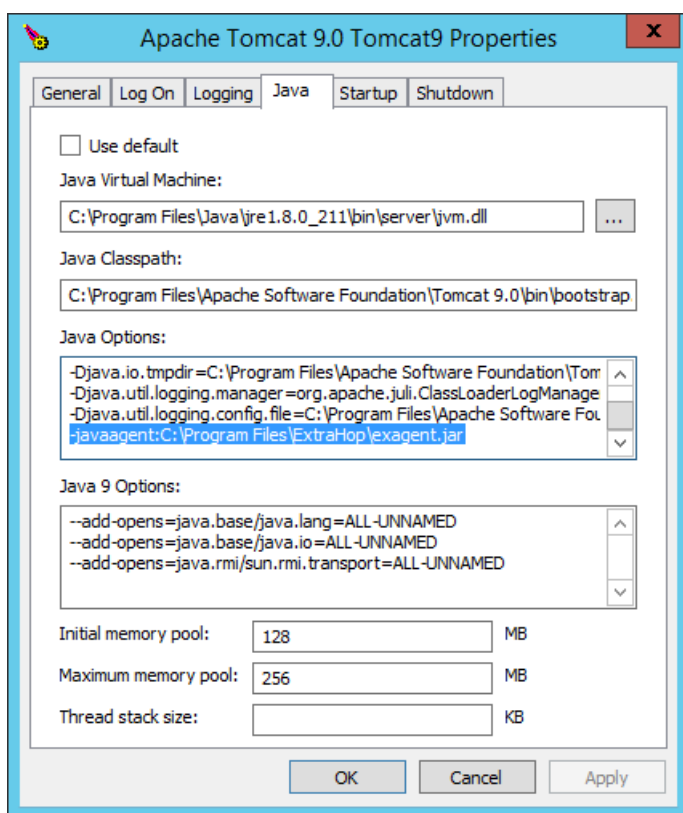
> **Note:** If your server is running Java 17 or later, you must also allow the sun.security.ssl module to access all unnamed modules with the `--add-opens` option, as shown in the following example:

```
--add-opens java.base/sun.security.ssl=ALL-UNNAMED
```

Appendix

Troubleshoot common error messages

Error messages are saved to log files in the following locations, where TMP is the value of your TMP environment variable:

- `TMP\ExtraHopSessionKeyForwarderSetup.log`
- `TMP\ExtraHopSessionKeyForwarderMsi.log`

The following table shows common error messages that you can troubleshoot. If you see a different error or the proposed solution does not resolve your issue, contact ExtraHop Support.

Message	Cause	Solution
`connect: dial tcp <IP address>:4873: connectex: A connection attempt failed because the connected party did not properly respond after a period of time, or established connection`	The monitored server cannot route any traffic to the sensor.	Ensure firewall rules allow connections to be initiated by the monitored server to TCP port 4873 on the sensor.

Message	Cause	Solution
`failed because connected host has failed to respond`		
`connect: dial tcp <IP address>:4873: connectex: No connection could be made because the target machine actively refused it`	The monitored server can route traffic to the sensor, but the receiving process is not listening.	Ensure that the sensor is licensed for both the TLS Decryption and TLS Shared Secrets features.
`connect: x509: certificate signed by unknown authority`	The monitored server is not able to chain up the sensor certificate to a trusted Certificate Authority (CA).	Ensure that the Windows certificate store for the computer account has trusted root certificate authorities that establish a chain of trust for the sensor.
`connect: x509: cannot validate certificate for <IP address> because it doesn't contain any IP SANs`	An IP address was supplied as the `EDA_HOSTNAME` parameter when installing the forwarder, but the TLS certificate presented by the sensor does not include an IP address as a Subject Alternate Name (SAN).	Select from the following three solutions. • If there is a hostname that the server can connect to the sensor with, and that hostname matches the subject name in the sensor certificate, uninstall and reinstall the forwarder, specifying that hostname as the value of `EDA_HOSTNAME`. • If the server is required to connect to the sensor by IP address, uninstall and reinstall the forwarder, specifying the subject name from the sensor certificate as the value of `SERVERNAMEOVERRIDE`. • Re-issue the sensor certificate to include an IP Subject Alternative Name (SAN) for the given IP address.

Uninstall the software

If you no longer want the ExtraHop session key forwarder software installed, or if any of the original installation parameters have changed (sensor hostname or certificate) and you need to reinstall the software with new parameters, do the following:

⚠ **Important:** You must restart the server for the configuration changes to take effect.

1. Log in to the Windows server.

2. Optional: If you integrated the session key forwarder with Apache Tomcat, remove the `-javaagent:C:\Program Files\ExtraHop\exagent.jar` entry from Tomcat to prevent the web service from stopping.

3. Choose one of the following options to remove the software:

   - Open the Control Panel and click **Uninstall a program**. Select **ExtraHop Session Key Forwarder** from the list and then click **Uninstall**.
   - Open a PowerShell command prompt and run the following commands to remove the software and associated registry entries:

     1.
     ```
     $app=Get-WMIObject -class win32_product | where-object {$_.name -eq "ExtraHop Session Key Forwarder"}
     ```

     2.
     ```
     $app.Uninstall()
     ```

4. Click **Yes** to confirm.

5. After the software is removed, click **Yes** to restart the system

Installation parameters

You can specify the following MSI parameters:

MSI Installation Parameter	`EDA_HOSTNAME`
Registry Entry	`HKEY_LOCAL_MACHINE\SOFTWARE\ExtraHop\EDAHost`
Description	The sensor hostname or IP address where TLS session keys will be sent.
	This parameter is required.

MSI Installation Parameter	`EDA_CERTIFICATEPATH`
Registry Entry	N/A
Description	The monitored server must trust the issuer of the sensor TLS certificate through the server's certificate store.
	In some environments, the sensor works with the self-signed certificate that the ExtraHop firmware generates upon installation. In this case, the certificate must be added to the certificate store. The `EDA_CERTIFICATEPATH` parameter enables a file-based PEM-encoded certificate to be imported into the Windows certificate store at installation.
	If the parameter is not specified at installation and a self-signed or other CA certificate must be placed into the certificate store manually, the administrator must import the certificate to Certificates (Computer Account) > Trusted Root Certification Authorities on the monitored system.
	This parameter is optional if the monitored server was previously configured to trust the TLS

certificate of the sensor through the Windows certificate store.

MSI Installation Parameter	SERVERNAMEOVERRIDE
Registry Entry	HKEY_LOCAL_MACHINE\SOFTWARE\ExtraHop \ServerNameOverride
Description	If there is a mismatch between the sensor hostname that the forwarder knows (EDA_HOSTNAME) and the common name (CN) that is presented in the TLS certificate of the sensor, then the forwarder must be configured with the correct CN. This parameter is optional. We recommend that you regenerate the TLS self-signed certificate based on the hostname from the TLS Certificate section of the Administration settings instead of specifying this parameter.

MSI Installation Parameter	TCPLISTENPORT
Registry Entry	HKEY_LOCAL_MACHINE\SOFTWARE\ExtraHop \TCPListenPort
Description	The key forwarder receives session keys locally from the Java environment through a TCP listener on localhost (127.0.0.1) and the port specified in the TCPListenPort entry. We recommended that this port remain set to the default of 598. This parameter is optional.

Supported TLS cipher suites

The ExtraHop system can decrypt TLS traffic that has been encrypted with PFS or RSA cipher suites. All supported cipher suites can be decrypted by installing the session key forwarder on a server and configuring the ExtraHop system.

Cipher suites for RSA can also decrypt the traffic with a certificate and private key—with or without session key forwarding.

Decryption methods

The table below provides a list of cipher suites that the ExtraHop system can decrypt ⧉ along with the supported decryption options.

- **PFS + GPP**: the ExtraHop system can decrypt these cipher suites with session key forwarding and global protocol to port mapping
- **PFS + Cert**: the ExtraHop system can decrypt these cipher suites with session key forwarding and the certificate and private key ⧉
- **RSA + Cert**: the ExtraHop system can decrypt these cipher suites without session key forwarding as long as you have uploaded the certificate and private key ⧉

Hex Value	Name (IANA)	Name (OpenSSL)	Supported Decryption
0x04	TLS_RSA_WITH_RC4_128_MD5	RC4-MD5	PFS + GPP PFS + Cert RSA + Cert
0x05	TLS_RSA_WITH_RC4_128_SHA	RC4-SHA	PFS + GPP PFS + Cert RSA + Cert
0x0A	TLS_RSA_WITH_3DES_EDE_CBC_SHA	DES-CBC3-SHA	PFS + GPP PFS + Cert RSA + Cert
0x16	TLS_DHE_RSA_WITH_3DES_EDE_CBC_SHA	EDH-RSA-DES-CBC3-SHA	PFS + GPP PFS + Cert
0x2F	TLS_RSA_WITH_AES_128_CBC_SHA	AES128-SHA	PFS + GPP PFS + Cert RSA + Cert
0x33	TLS_DHE_RSA_WITH_AES_128_CBC_SHA	DHE-RSA-AES128-SHA	PFS + GPP PFS + Cert
0x35	TLS_RSA_WITH_AES_256_CBC_SHA	AES256-SHA	PFS + GPP PFS + Cert RSA + Cert
0x39	TLS_DHE_RSA_WITH_AES_256_CBC_SHA	DHE-RSA-AES256-SHA	PFS + GPP PFS + Cert
0x3C	TLS_RSA_WITH_AES_128_CBC_SHA256	AES128-SHA256	PFS + GPP PFS + Cert RSA + Cert
0x3D	TLS_RSA_WITH_AES_256_CBC_SHA256	AES256-SHA256	PFS + GPP PFS + Cert RSA + Cert
0x67	TLS_DHE_RSA_WITH_AES_128_CBC_SHA256	DHE-RSA-AES128-SHA256	PFS + GPP PFS + Cert
0x6B	TLS_DHE_RSA_WITH_AES_256_CBC_SHA256	DHE-RSA-AES256-SHA256	PFS + GPP PFS + Cert
0x9C	TLS_RSA_WITH_AES_128_GCM_SHA256	AES128-GCM-SHA256	PFS + GPP PFS + Cert RSA + Cert
0x9D	TLS_RSA_WITH_AES_256_GCM_SHA384	AES256-GCM-SHA384	PFS + GPP PFS + Cert RSA + Cert
0x9E	TLS_DHE_RSA_WITH_AES_128_GCM_SHA256	DHE-RSA-AES128-GCM-SHA256	PFS + GPP PFS + Cert
0x9F	TLS_DHE_RSA_WITH_AES_256_GCM_SHA384	DHE-RSA-AES256-GCM-SHA384	PFS + GPP PFS + Cert
0x1301	TLS_AES_128_GCM_SHA256	TLS_AES_128_GCM_SHA256	PFS + GPP PFS + Cert

Hex Value	Name (IANA)	Name (OpenSSL)	Supported Decryption
0x1302	TLS_AES_256_GCM_SHA384	TLS_AES_256_GCM_SHA384	PFS + GPP PFS + Cert
0x1303	TLS_CHACHA20_POLY1305_SHA256	TLS_CHACHA20_POLY1305_SHA256	PFS + GPP PFS + Cert
0xC007	TLS_ECDHE_ECDSA_WITH_RC4_128_SHA	ECDHE-ECDSA-RC4-SHA	PFS + GPP
0xC008	TLS_ECDHE_ECDSA_WITH_3DES_EDE_CBC_SHA	ECDHE-ECDSA-DES-CBC3-SHA	PFS + GPP
0xC009	TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA	ECDHE-ECDSA-AES128-SHA	PFS + GPP
0xC00A	TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA	ECDHE-ECDSA-AES256-SHA	PFS + GPP
0xC011	TLS_ECDHE_RSA_WITH_RC4_128_SHA	ECDHE-RSA-RC4-SHA	PFS + GPP PFS + Cert
0xC012	TLS_ECDHE_RSA_WITH_3DES_EDE_CBC_SHA	ECDHE-RSA-DES-CBC3-SHA	PFS + GPP PFS + Cert
0xC013	TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA	ECDHE-RSA-AES128-SHA	PFS + GPP PFS + Cert
0xC014	TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA	ECDHE-RSA-AES256-SHA	PFS + GPP PFS + Cert
0xC023	TLS_ECDHE_ECDSA_WITH_AES_128_CBC_SHA256	ECDHE-ECDSA-AES128-SHA256	PFS + GPP
0xC024	TLS_ECDHE_ECDSA_WITH_AES_256_CBC_SHA384	ECDHE-ECDSA-AES256-SHA384	PFS + GPP
0xC027	TLS_ECDHE_RSA_WITH_AES_128_CBC_SHA256	ECDHE-RSA-AES128-SHA256	PFS + GPP PFS + Cert
0xC028	TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA384	ECDHE-RSA-AES256-SHA384	PFS + GPP PFS + Cert
0xC02B	TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256	ECDHE-ECDSA-AES128-GCM-SHA256	PFS + GPP
0xC02C	TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384	ECDHE-ECDSA-AES256-GCM-SHA384	PFS + GPP
0xC02F	TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256	ECDHE-RSA-AES128-GCM-SHA256	PFS + GPP PFS + Cert
0xC030	TLS_ECDHE_RSA_WITH_AES_256_GCM_SHA384	ECDHE-RSA-AES256-GCM-SHA384	PFS + GPP PFS + Cert

Hex Value	Name (IANA)	Name (OpenSSL)	Supported Decryption
0xCCA8	TLS_ECDHE_RSA_WITH_CHACHA20_POLY1305_SHA256	ECDHE-RSA-CHACHA20-POLY1305	PFS + GPP PFS + Cert
0xCCA9	TLS_ECDHE_ECDSA_WITH_CHACHA20_POLY1305_SHA256	ECDHE-ECDSA-CHACHA20-POLY1305	PFS + GPP
0xCCAA	TLS_DHE_RSA_WITH_CHACHA20_POLY1305_SHA256	DHE-RSA-CHACHA20-POLY1305	PFS + GPP PFS + Cert

Export the MSI file from the executable file

You can export the MSI file from the executable file to support a custom installation workflow.

Open a PowerShell command prompt and run the following command:

```
ExtraHopSessionKeyForwarderSetup.exe -e
```

> **Note:** You can append `<directory>` to the `-e` parameter to save the `.msi` file to a directory other than the current working directory. For example, the following command saves the file to the `install_dir` directory:
>
> ```
> ExtraHopSessionKeyForwarderSetup.exe -e install_dir
> ```