



**ADLINK**  
TECHNOLOGY INC.

# SEMA<sup>®</sup> 3.5

## Software Installation Guide

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## Revision History

Revision	Date	Changes
1.00	September 2016	Initial release
1.01	December 2016	Update based on SEMA® 3.5 R7 Added Chapter 2.1 Pre-Processing

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# 1 OS Support

Currently, the following operating systems are supported:

- Windows (win32/64)
  - Microsoft® Windows® 7
  - Microsoft® Windows® 8/8.1
  - Microsoft® Windows® 10
- Linux® (3.2.x or higher) 64/32

## 2 Installation

This chapter describes the installation of the SEMA<sup>®</sup> release package which includes:

- SEMA<sup>®</sup> Extended EAPI and driver software
- SEMA<sup>®</sup> Graphical User Interface (GUI) Application
- SEMA<sup>®</sup> Command Line Interface (CLI) Application

### 2.1 Pre-Processing

If you have installed SEMA already, e.g. an older version, then uninstall the SEMA software and disable the respective services, if used, before updating SEMA.

#### **Delete EAPI and/or MQTT Server services**

If you didn't set up services yet for remote SEMA calls (EAPI service) or for external data transfer (MQTT Server service), then you don't need to do the following steps.

In Windows, open a command prompt as an administrator and use *sc stop* and *sc delete* to disable SEMA\_EAPI\_Service and/or SEMA\_MQTT\_Service.

```

Administrator: Command Prompt

C:\Windows\system32>sc stop SEMA_EAPI_Service

SERVICE_NAME: SEMA_EAPI_Service
        TYPE               : 10  WIN32_OWN_PROCESS
        STATE                : 3  STOP_PENDING
                           (STOPPABLE, PAUSABLE, ACCEPTS_SHUTDOWN)
        WIN32_EXIT_CODE       : 0  (0x0)
        SERVICE_EXIT_CODE    : 10117016 (0x9a5f98)
        CHECKPOINT           : 0x1
        WAIT_HINT            : 0x1388

C:\Windows\system32>sc stop SEMA_MQTT_Service

SERVICE_NAME: SEMA_MQTT_Service
        TYPE               : 10  WIN32_OWN_PROCESS
        STATE                : 3  STOP_PENDING
                           (STOPPABLE, PAUSABLE, ACCEPTS_SHUTDOWN)
        WIN32_EXIT_CODE       : 0  (0x0)
        SERVICE_EXIT_CODE    : 22676248 (0x15a0318)
        CHECKPOINT           : 0x1
        WAIT_HINT            : 0x1388

C:\Windows\system32>sc delete SEMA EAPI Service
[SC] DeleteService SUCCESS

C:\Windows\system32>sc delete SEMA_MQTT_Service
[SC] DeleteService SUCCESS

```

In Linux, find the PID of *eapi\_serverd* and/or *sema\_mqttd* using the **top** program.

```

top - 10:27:37 up 21:46, 1 user, load average: 0.00, 0.00, 0.00
Tasks: 105 total, 1 running, 104 sleeping, 0 stopped, 0 zombie
Cpu(s): 0.1%us, 0.1%sy, 0.0%ni, 99.6%id, 0.2%wa, 0.0%hi, 0.0%si, 0.0%st
Mem: 4002912k total, 306824k used, 3696088k free, 21144k buffers
Swap: 4084732k total, 0k used, 4084732k free, 202456k cached

  PID USER      PR  NI  VIRT  RES  SHR  S  %CPU  %MEM    TIME+  COMMAND
 2030 root        20   0 12056 3788 3016 S   0.0   0.1   0:00.80 sshd
 2026 root        20   0 74720 3496 2632 S   0.0   0.1   0:00.72 eapi_serverd
 1129 root        20   0 13892 2944 2276 S   0.0   0.1   0:00.59 master
 1390 root        18  -2  3356 1848  596 S   0.0   0.0   0:00.08 udevd
 1391 root        18  -2  3356 1848  596 S   0.0   0.0   0:00.05 udevd
 2035 root        20   0  5120 1660 1424 S   0.0   0.0   0:00.10 bash
   998 root        20   0 36988 1496 1016 S   0.0   0.0   0:00.10 rsyslogd
    1 root        20   0  2896 1396 1200 S   0.0   0.0   0:01.86 init
 1139 root        20   0  6032 1312  732 S   0.0   0.0   0:02.98 crond
 2050 root        20   0  2680 1140  904 R   0.7   0.0   0:00.65 top
 1052 root        20   0  9004 1080  540 S   0.0   0.0   0:00.04 sshd
   420 root        16  -4  2700 1004  368 S   0.0   0.0   0:01.29 udevd
   978 root        16  -4 12884  776  572 S   0.0   0.0   0:00.06 auditd
 1350 root        20   0  2832  772  496 S   0.0   0.0   0:00.00 dhclient
 1392 root        20   0  2004  508  448 S   0.0   0.0   0:00.00 mingetty
 1380 root        20   0  2004  504  448 S   0.0   0.0   0:00.02 mingetty
 1382 root        20   0  2004  504  448 S   0.0   0.0   0:00.01 mingetty
 1386 root        20   0  2004  504  448 S   0.0   0.0   0:00.00 mingetty
 1394 root        20   0  2004  504  448 S   0.0   0.0   0:00.00 mingetty
 1384 root        20   0  2004  500  448 S   0.0   0.0   0:00.01 mingetty
    2 root        20   0    0    0    0 S   0.0   0.0   0:00.00 kthreadd
    3 root        RT    0    0    0    0 S   0.0   0.0   0:00.00 migration/0
    4 root        20   0    0    0    0 S   0.0   0.0   0:00.00 ksoftirqd/0
    5 root        RT    0    0    0    0 S   0.0   0.0   0:00.00 stopper/0

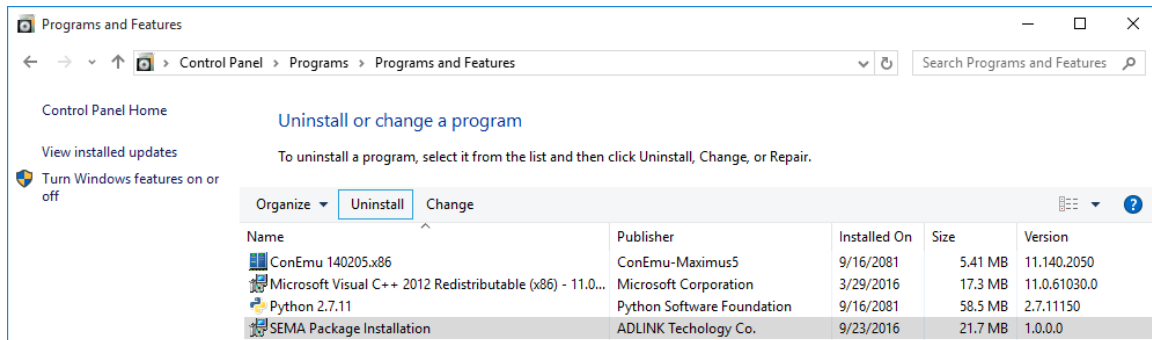
```

Use the **kill** command, for example:

```
$ kill -9 2026
```

## Uninstall SEMA Software

In Windows, uninstall “SEMA Package Installation”.



In Linux, remove program files and configuration file and keys for SSL connections.

```
$ sudo rm -rf /usr/local/SEMA
```

```
$ sudo rm -rf /etc/SEMA
```

## 2.2 Windows

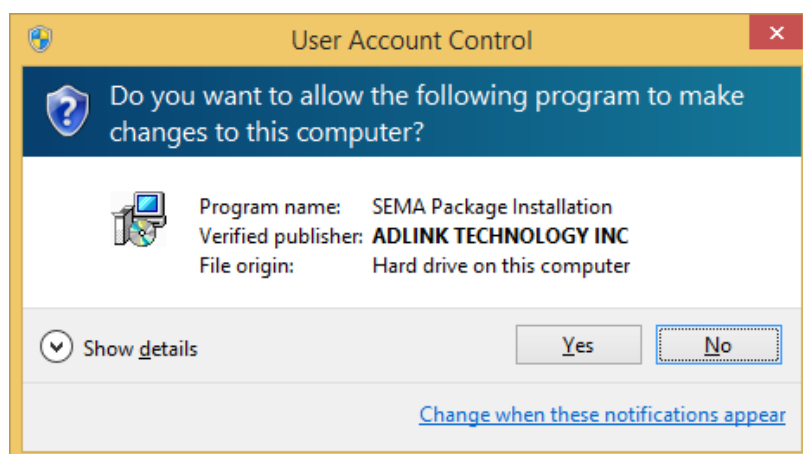
Unpack the release package and launch the install file in the release package corresponding to your operating system. For example, the install file for Window 32-bit can be found in the sub-folder: binaries\win32 and is named SEMA\_x86.exe.



1. Execute the install file, and click *Install*.

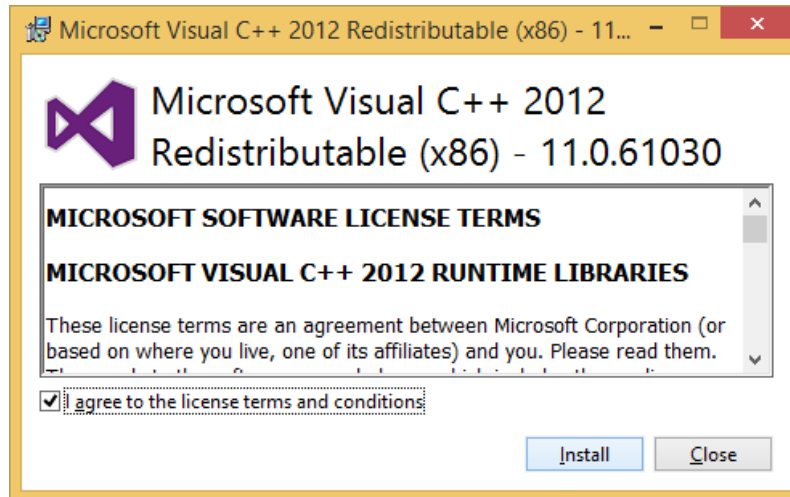


2. Select Yes to allow to install.

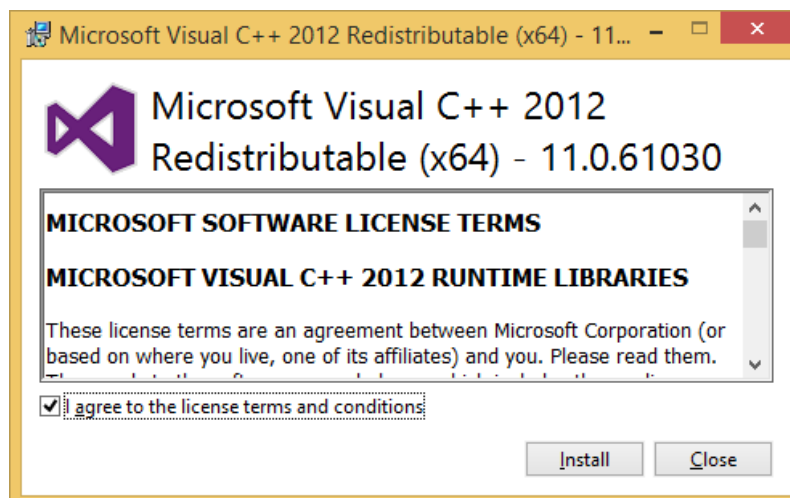


3. Select "I agree to the licenes terms and conditions" and click *Install* when prompted to install Microsoft Visual C++ 2012.

32-bit:



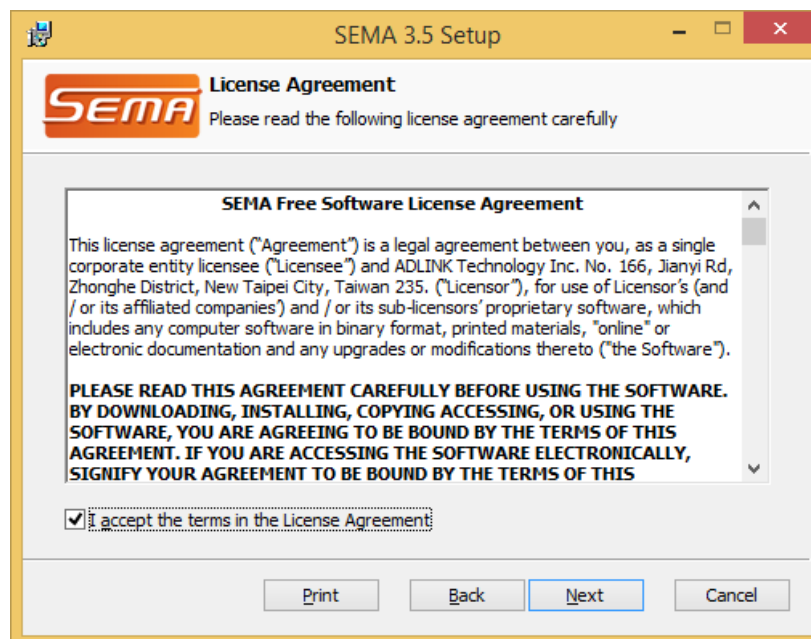
64-bit:



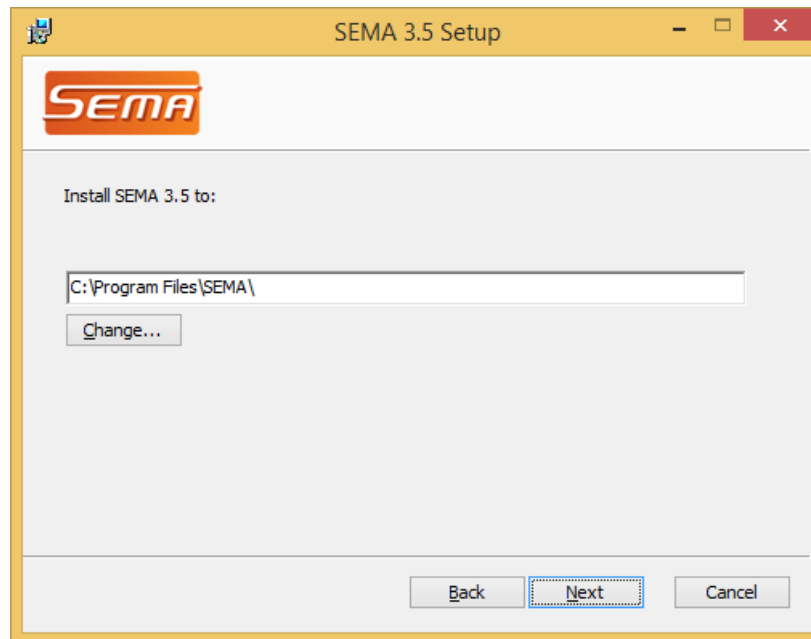
4. Click *Next* to proceed with SEMA installation.



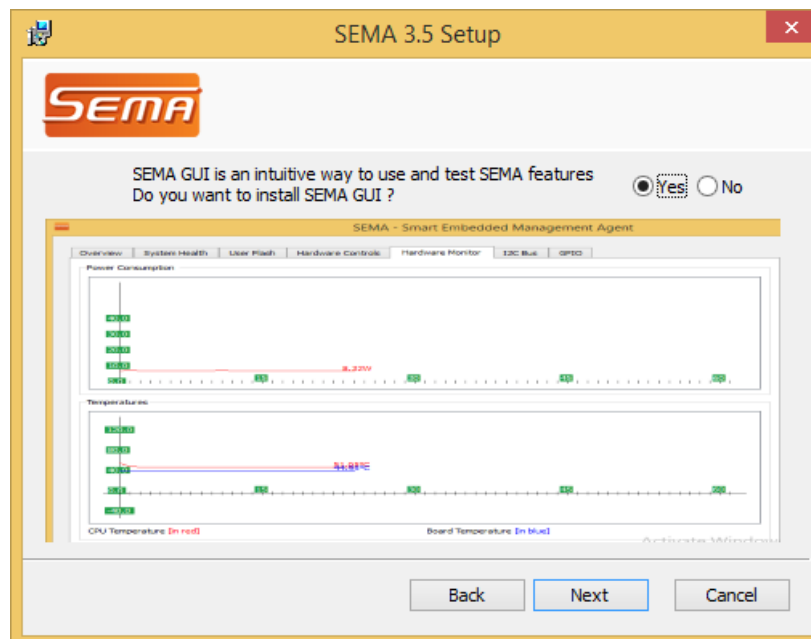
5. Select "I agree the terms in the License Agreement" and click *Next*.



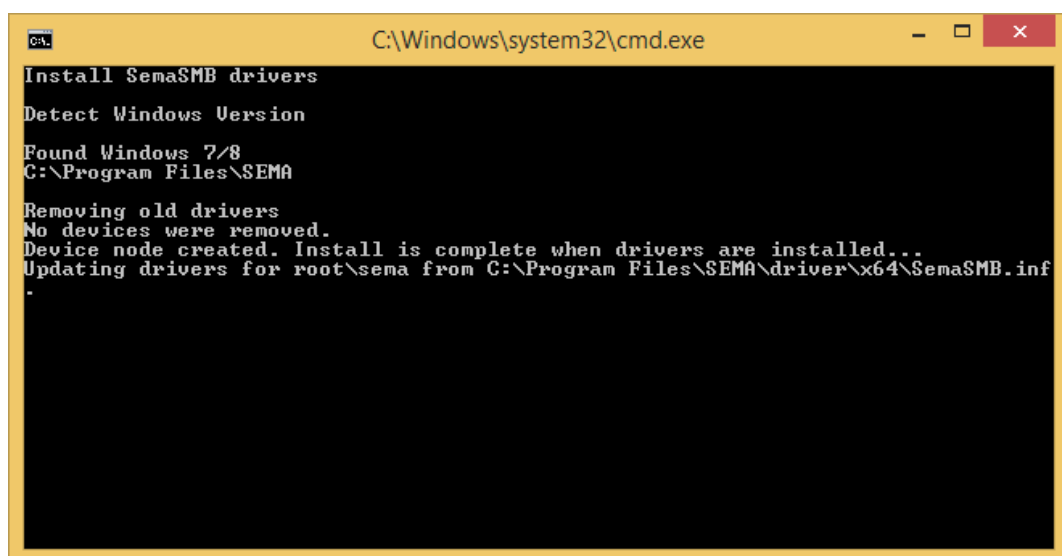
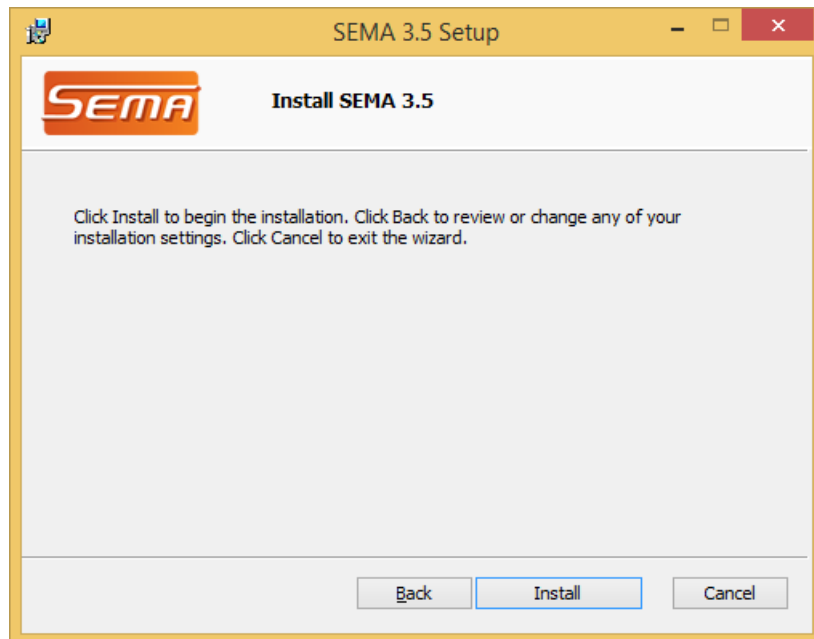
6. Click *Next* again if you don't wish to change the install path. The default path is *C:\Program Files\SEMA*.

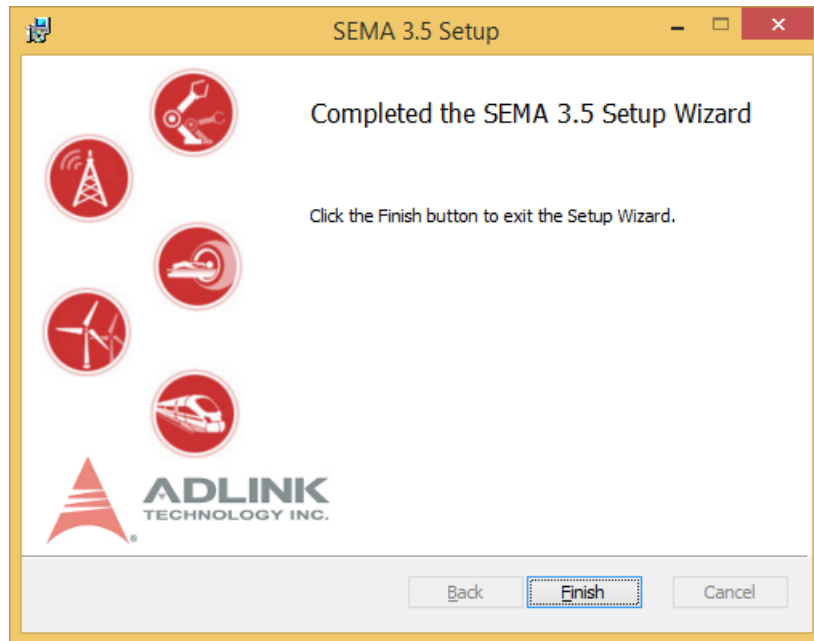


7. Select *Yes* to install SEMA GUI, or select *No* if you don't wish to install it. Click *Next*.



8. Click *Install* to begin the installation of SEMA. Then click *Finish* to close the Setup Wizard.





9. SEMA setup has successfully completed. Click *Close*.



In Windows, the program files will be located at *C:\Program Files\SEMA* by default. The configuration files and keys for SSL connections will be located at *C:\SEMA\*. The shortcut for SEMA GUI will be placed on the desktop if it was installed. The SEMA CLI is also available after installation of the SEMA release package.

## 2.3 Linux

Unpack the release package and launch the install file in the release package corresponding to your operating system. Example: the install file for Linux 64-bit can be found in the sub-folder: binaries\linux64 and is named SEMA\_x64.

**Step 1:** To view the file mode, use the **ls** command, or mark the file as executable with the **chmod** command.

```
root@sema-64-14:/home/sema/Downloads# ls -al SEMA_x64
-rwxr-xr-x 1 sema sema 33403624 May  6 10:54 SEMA_x64
root@sema-64-14:/home/sema/Downloads#
```

**Step 2:** Now you can execute the installer in the terminal.

```
root@sema-64-14:/home/sema/Downloads# ./SEMA_x64
Verifying archive integrity... All good.
Uncompressing install SEMA3.5(R7)_Installer 100%
Please read the SEMA Free Software License Agreement carefully!
Press Enter to continue ...
(After press Enter, please press Q or q to quit.)
```

Press "Enter" to show SEMA Free Software License Agreement.

After pressing "Enter", press "Q" or "q" to quit.

```
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The parties hereby agree as follows:

1. Grant of License
SEMA license.txt
```

Press “y” to agree to the SEMA Free Software License Agreement.

```
Do you agree to the SEMA Free Software License Agreement? (y/n) y
Do you want to install SEMA GUI (Graphical User Interface) (Y/n) y
Adding SEMA bin folder to PATH at startup ... DONE
Copying libraries files ... DONE
Setting up ldconfig ... DONE
Copying config files ... DONE
root@sema-64-14:/home/sema/Downloads#
```

When installing, you can choose whether or not to install SEMA GUI.

In Linux, the program files will be located at `/usr/local/SEMA`. The configuration file and keys for SSL connections will be located at `/etc/SEMA/`.

If you choose ‘yes’, the SEMA GUI files will be located at `/usr/local/SEMA/bin`. You can execute SEMA GUI by using `SEMA_GUI.sh`.

```
root@sema-32-15:/usr/local/SEMA/bin# ./SEMA_GUI.sh
```

The SEMA CLI is also available after installation of the SEMA release package.



## 3 Setting Up Services

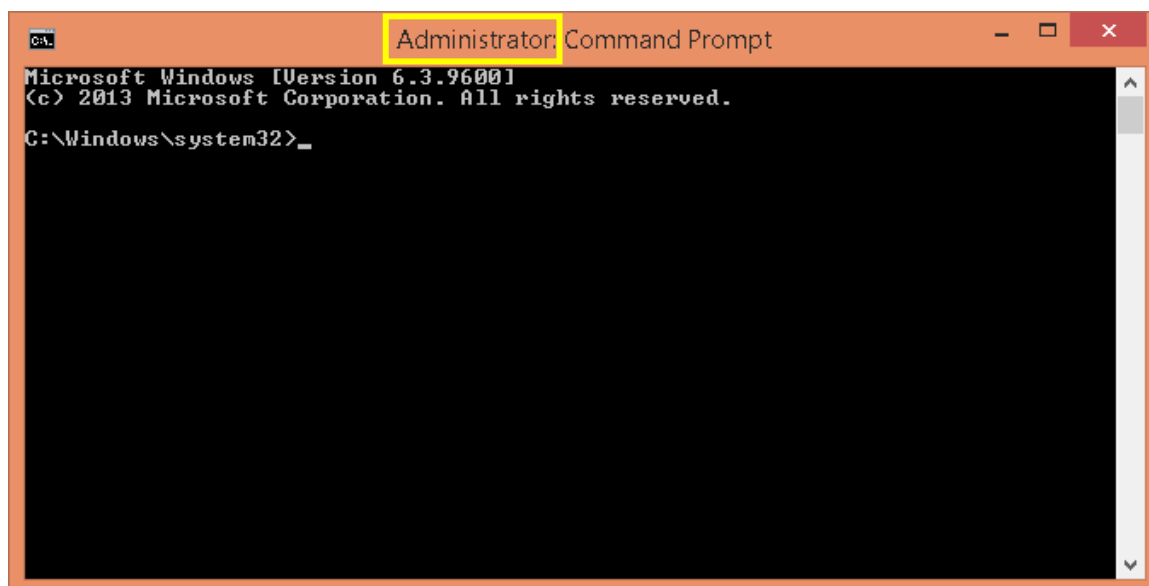
This section explains how to install SEMA services that can be automatically started when the computer boots. There are two services in SEMA installation package.

- **EAPI Server (eapi\_serverd)**: A service that responds to SEMA EAPI remote procedure calls to get SEMA information of the device. If users don't need to run SEMA EAPI remotely, installation of this service can be skipped.
- **MQTT Server (sema\_mqttd)**: A service that collects SEMA information and pushes the data to the SEMA Dashboard. If users don't need to run the SEMA Dashboard, installation of this service can be skipped.

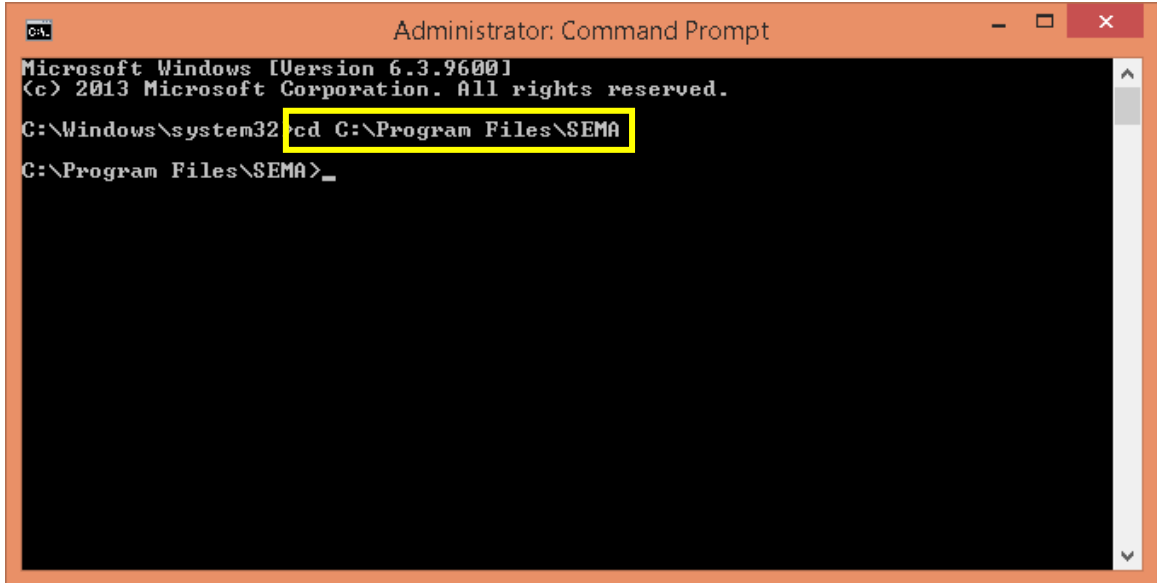
### 3.1 Windows

#### Setting up the EAPI Server

1. To open a command prompt as an administrator:
  - i. Click *Start > All Programs > Accessories*.
  - ii. Right-click *Command prompt*, and then click *Run as administrator*.



2. Access the directory where the SEMA executable file is located.

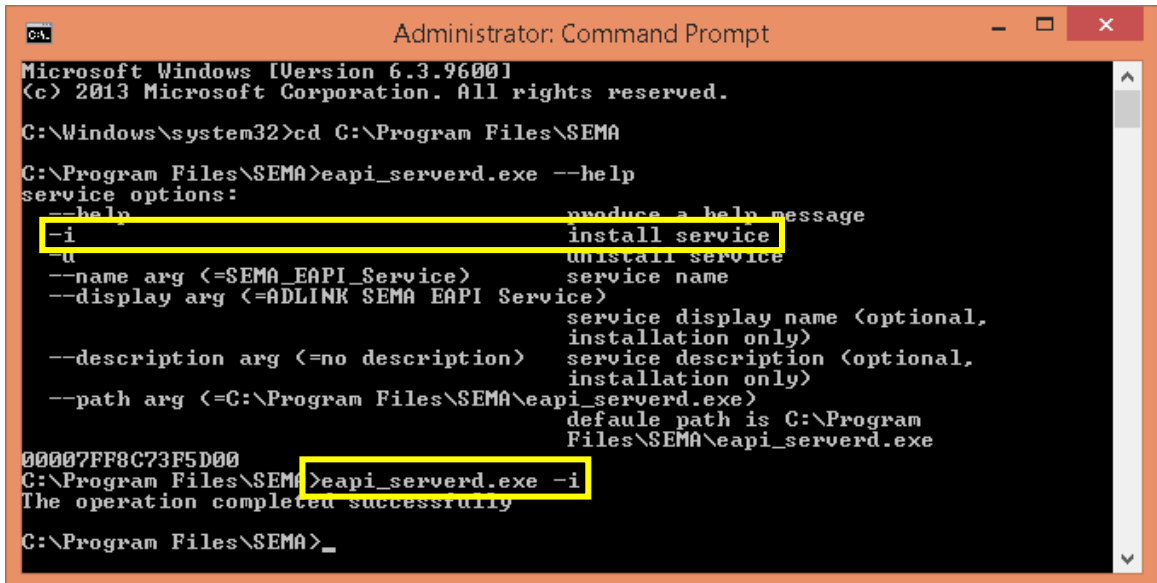


```

Administrator: Command Prompt
Microsoft Windows [Version 6.3.9600]
(c) 2013 Microsoft Corporation. All rights reserved.

C:\Windows\system32>cd C:\Program Files\SEMA
C:\Program Files\SEMA>_
  
```

3. Run *eapi\_serviced.exe* from the command prompt with *-i* as a parameter.



```

Administrator: Command Prompt
Microsoft Windows [Version 6.3.9600]
(c) 2013 Microsoft Corporation. All rights reserved.

C:\Windows\system32>cd C:\Program Files\SEMA
C:\Program Files\SEMA>eapi_serverd.exe --help
service options:
--help                produce a help message
-i                    install service
-u                    uninstall service
--name arg (<=SEMA_EAPI_Service)  service name
--display arg (<=ADLINK SEMA EAPI Service)  service display name (optional,
installation only)
--description arg (<=no description)  service description (optional,
installation only)
--path arg (<=C:\Program Files\SEMA\eapi_serverd.exe)  default path is C:\Program
Files\SEMA\eapi_serverd.exe
00007FF8C73F5D00
C:\Program Files\SEMA>eapi_serverd.exe -i
The operation completed successfully
C:\Program Files\SEMA>_
  
```

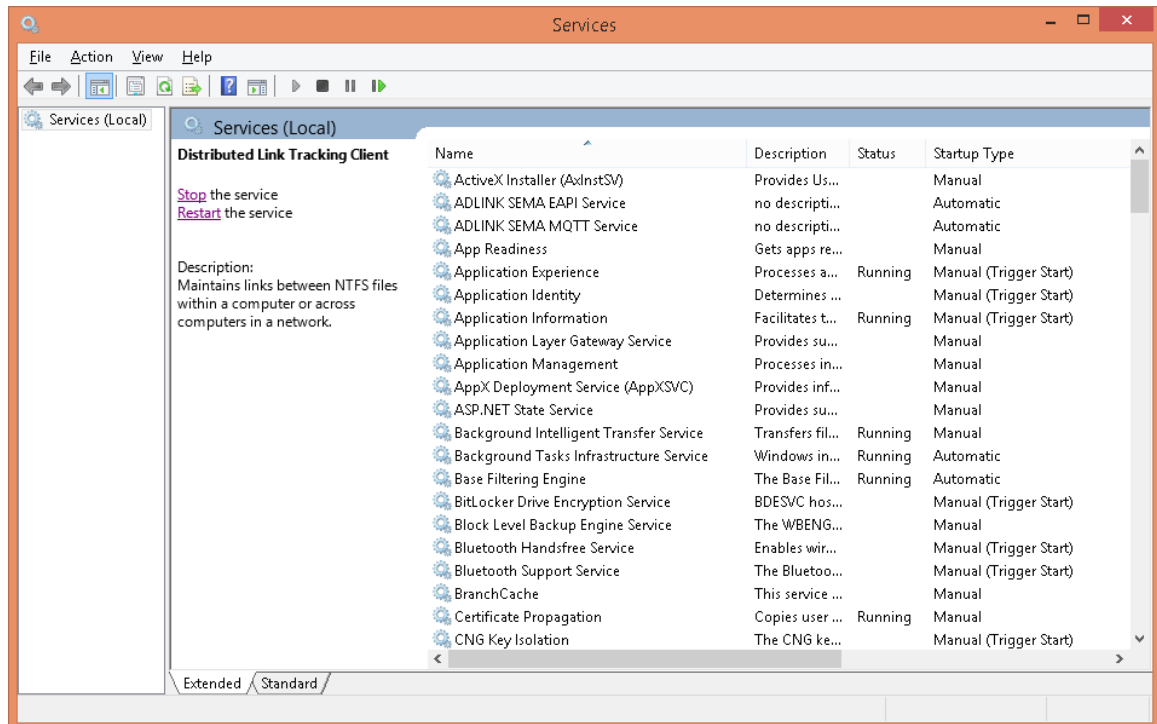
## Setting up the MQTT Server

Use the method above to set up **sema\_mqttd**.

## Start/Stop EAPI /MQTT Server services

To start or stop services in Windows:

1. Open the *Control Panel* (icons view), click on the Administrative Tools icon, and double click on the *Services* shortcut.
2. Right click the *ADLINK SEMA EAPI Service* or *ADLINK SEMA MQTT Service*, and click *Start/Stop*.



## 3.2 Linux

### Starting the EAPI Server and MQTT Server services manually

Using the `exec` command

```
$ exec /usr/local/SEMA/bin/eapi_serverd
```

```
$ exec /usr/local/SEMA/bin/sema_mqttd
```

### Starting the EAPI Server and MQTT Server services automatically on startup

1. Set up startup scripts in `/etc/rc.local` (e.g. `vim /etc/rc.local ..`)
2. Add command `/usr/local/SEMA/bin/eapi_serverd` to script
3. Add command `/usr/local/SEMA/bin/sema_mqttd` to script
4. Reboot

### Stopping the EAPI Server and MQTT Server services

Find the PID of `eapi_serverd` and `sema_mqttd` using the `top` program.

```
top - 10:27:37 up 21:46, 1 user, load average: 0.00, 0.00, 0.00
Tasks: 105 total, 1 running, 104 sleeping, 0 stopped, 0 zombie
Cpu(s): 0.1%us, 0.1%sy, 0.0%ni, 99.6%id, 0.2%wa, 0.0%hi, 0.0%si, 0.0%st
Mem: 4002912k total, 306824k used, 3696088k free, 21144k buffers
Swap: 4084732k total, 0k used, 4084732k free, 202456k cached
```

PID	USER	PR	NI	UIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
2030	root	20	0	12056	3788	3016	S	0.0	0.1	0:00.80	sshd
2026	root	20	0	74720	3496	2632	S	0.0	0.1	0:00.72	eapi_serverd
1129	root	20	0	13892	2944	2276	S	0.0	0.1	0:00.59	master
1390	root	18	-2	3356	1848	596	S	0.0	0.0	0:00.08	udev
1391	root	18	-2	3356	1848	596	S	0.0	0.0	0:00.05	udev
2035	root	20	0	5120	1660	1424	S	0.0	0.0	0:00.10	bash
998	root	20	0	36988	1496	1016	S	0.0	0.0	0:00.10	rsyslogd
1	root	20	0	2896	1396	1200	S	0.0	0.0	0:01.86	init
1139	root	20	0	6032	1312	732	S	0.0	0.0	0:02.98	crond
2050	root	20	0	2680	1140	904	R	0.7	0.0	0:00.65	top
1052	root	20	0	9004	1080	540	S	0.0	0.0	0:00.04	sshd
420	root	16	-4	2700	1004	368	S	0.0	0.0	0:01.29	udev
978	root	16	-4	12884	776	572	S	0.0	0.0	0:00.06	auditd
1350	root	20	0	2832	772	496	S	0.0	0.0	0:00.00	dhclient
1392	root	20	0	2004	508	448	S	0.0	0.0	0:00.00	mingetty
1380	root	20	0	2004	504	448	S	0.0	0.0	0:00.02	mingetty
1382	root	20	0	2004	504	448	S	0.0	0.0	0:00.01	mingetty
1386	root	20	0	2004	504	448	S	0.0	0.0	0:00.00	mingetty
1394	root	20	0	2004	504	448	S	0.0	0.0	0:00.00	mingetty
1384	root	20	0	2004	500	448	S	0.0	0.0	0:00.01	mingetty
2	root	20	0	0	0	0	S	0.0	0.0	0:00.00	kthreadd
3	root	RT	0	0	0	0	S	0.0	0.0	0:00.03	migration/0
4	root	20	0	0	0	0	S	0.0	0.0	0:00.00	ksoftirqd/0
5	root	RT	0	0	0	0	S	0.0	0.0	0:00.00	stopper/0

Use the `kill` command, for example:

```
$ kill -9 2026
```

### 3.3 Configuring the EAPI Service

File path in Windows

*C:\SEMA\config\conf.xml*

File path in Linux

*/etc/SEMA/config/conf.xml*

```
<?xml version="1.0"?>
- <Server>
  <id>ADLINK_SEMA3.0.0</id>
  - <api>
    <process_safe>false</process_safe>
  </api>
  - <security>
    <!-- true for SSL , false for non-SSL connection -->
    <SSL>true</SSL>
    <!-- the files must be located at the same folder as EAPI_Server -->
    <certificate>server.crt</certificate>
    <privatekey>server.key</privatekey>
    <dhfile>dh512.pem</dhfile>
    <passwd>202CB962AC59075B964B07152D234B70</passwd>
  </security>
  <ipversion>IPV4</ipversion>
  <port>9999</port>
  <maxconnection>10</maxconnection>
  <logsize>4096</logsize>
  <loglevel>warning</loglevel>
</Server>
```

Setting	Description
id	The id string to identify the target device for the SEMA Dashboard
Api\process_safe	true: enable multi-process false: disable multi-process
security\SSL	true: enable SSL socket false: disable SSL socket
security\certificate	The location of certification
security\privatekey	The location of private key
security\dhfile	The location of dhfile
security\passwd	The password to connect to EAPI server. MD5 encrypted
ipversion	IPV4: use <b>ipv4</b> IP address IPV6: use <b>ipv6</b> IP address
port	The port number to listen for the client connection.
maxconnection	The maximum number of connection at a time.
logsize	The maximum log size (in kB)
loglevel	The detail level of log information "nolog" "trace" "debug" "info" "warning" "error" "fatal"
watchdog\enable	Not support currently
watchdog\resettime	Not support currently

## 3.4 Configuring the MQTT Service

If users have installed the SEMA Dashboard Server, the target device must be configured using the file mqtt.xml.

File path in Windows

*C:\SEMA\config\mqtt.xml*

File path in Linux

*/etc/SEMA/config/mqtt.xml*

```
<?xml version="1.0"?>
- <mqtt>
  <sn>ADLINK_SEMA</sn>
  - <connection>
    <ip>172.16.6.180</ip>
    <port>1883</port>
    <timeout>10</timeout>
    <ping>10</ping>
    <cache>1000</cache>
  </connection>
  - <configure>
    - <Push_Interval>
      <timeout>60</timeout>
      <unit>second</unit>
    </Push_Interval>
    <Register>0</Register>
    - <log>
      <level>warning</level>
      <size>4096</size>
    </log>
  </configure>
  - <static_message>
    <ip/>
    <mac/>
    <disk>0</disk>
  </static_message>
</mqtt>
```

Open the file mqtt.xml in a text editor, set the IP address, port and cache.

Setting	Description
ip	The SEMA Dashboard Server's IP address
port	The SEMA Dashboard Server port. Default value is 1883
cache	The number of data items that can be stored temporarily offline. Default value is 1000

## 4 Firewall

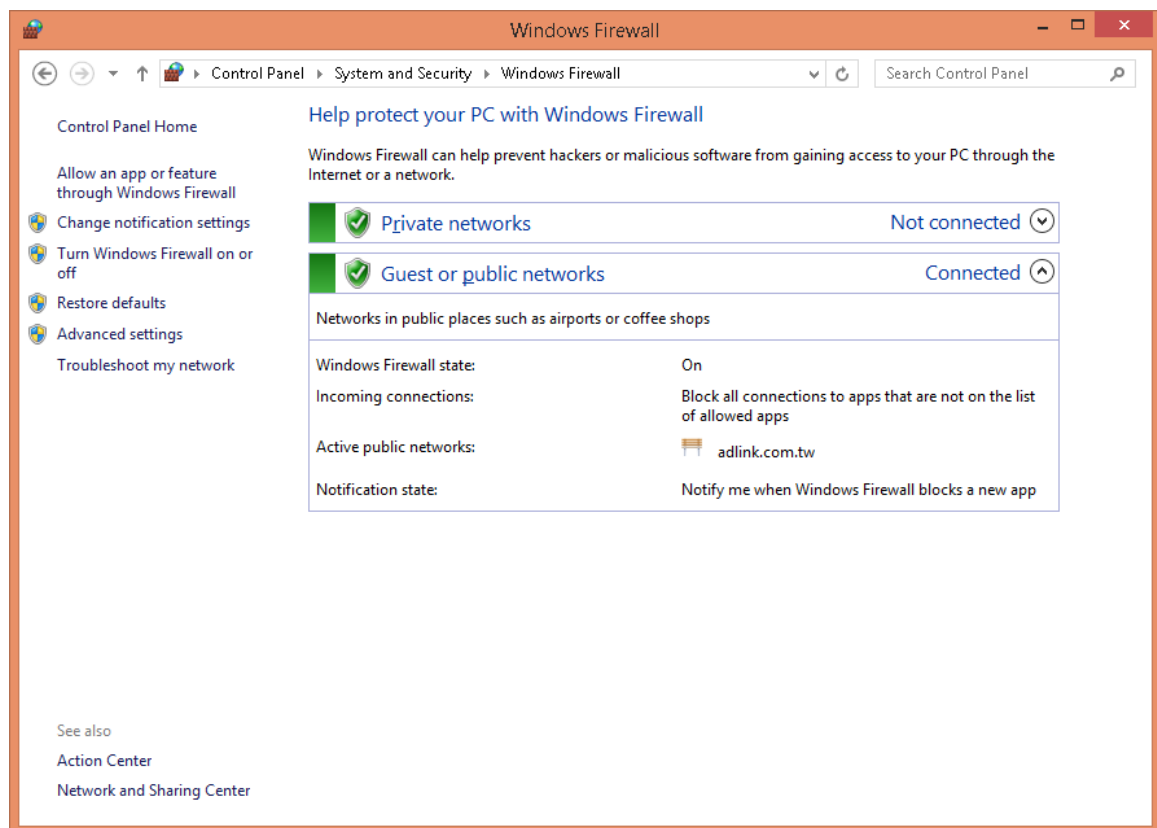
By default, most of programs/ports are blocked by the firewall to help keep your computer secure. To enable a SEMA remote API call, users must unblock the port number to allow SEMA communication through the firewall. SEMA uses ports 9999 and 1883 by default. Please ensure the firewall is setup correctly.

Note: Make sure that ports 9999 and 1883 are not banned by the IT infrastructure.

### 4.1 Windows

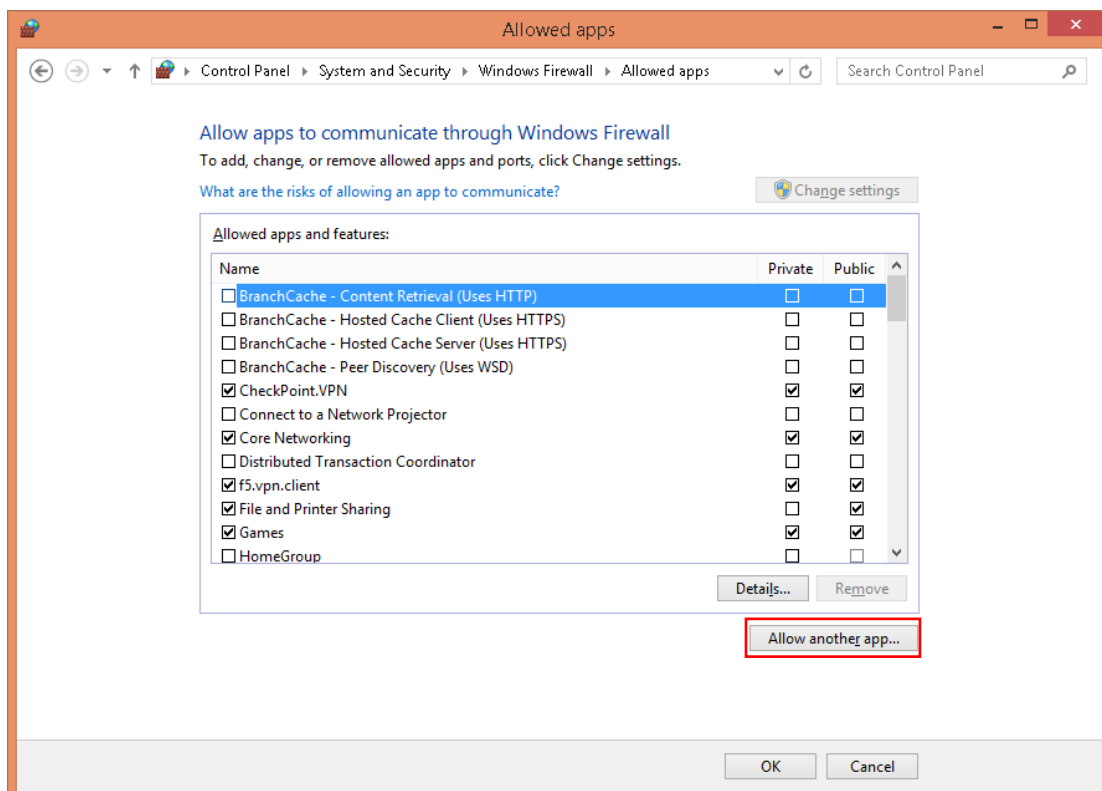
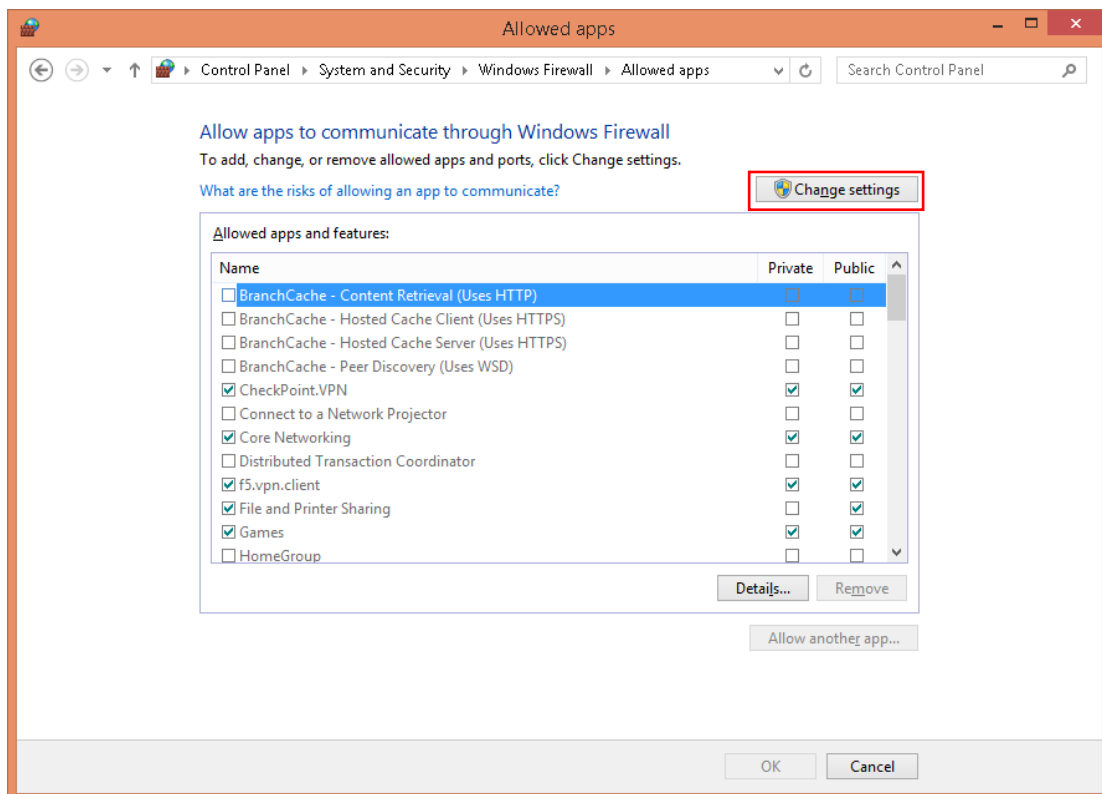
To add an app to the list of allowed apps, follow the procedure below.

1. Open Windows Firewall by clicking the *Start* button and then clicking *Control Panel*. In the search box, type *firewall*, and then click *Windows Firewall*.
2. In the left pane of Windows Firewall, click *Allow a program or feature*.

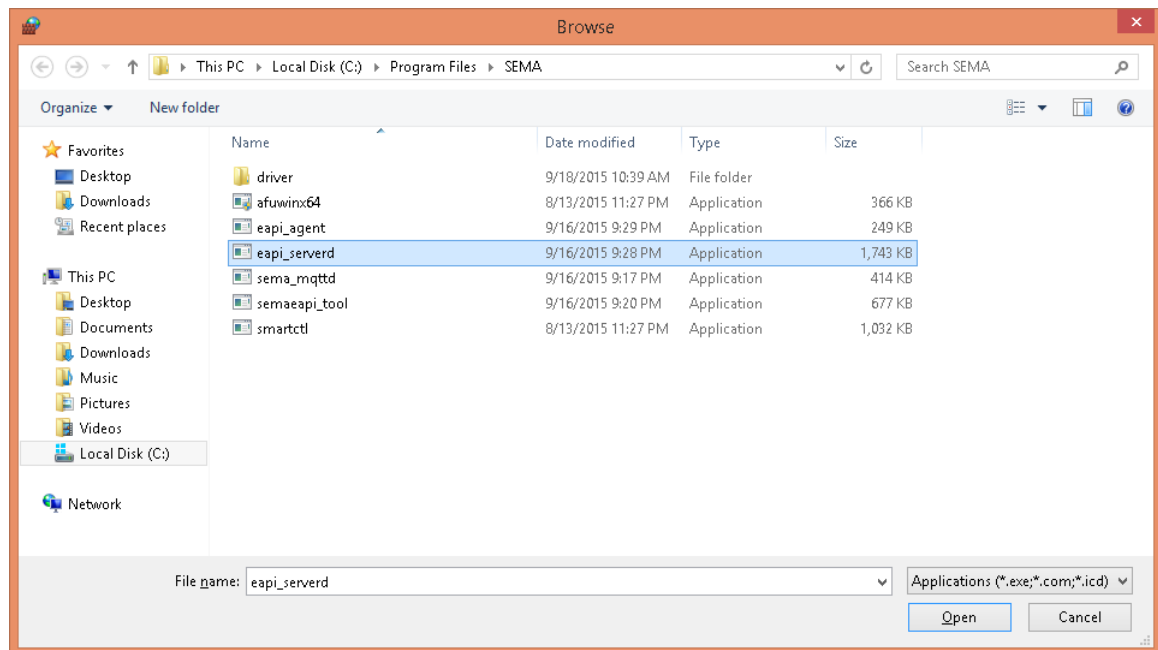
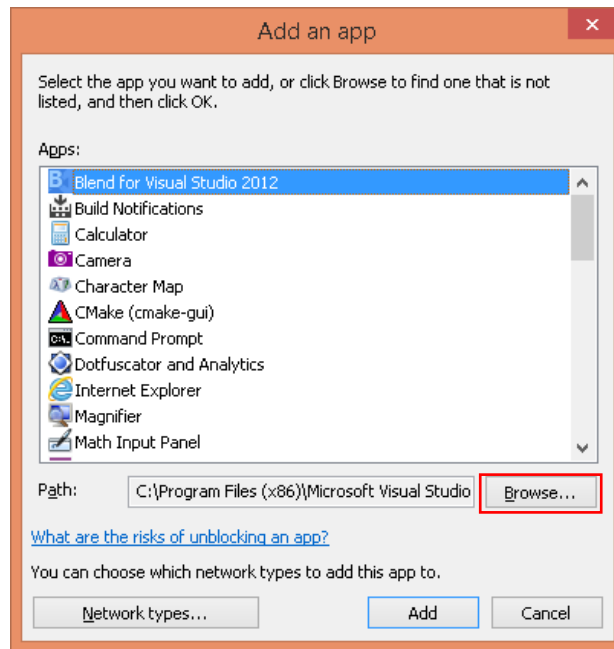




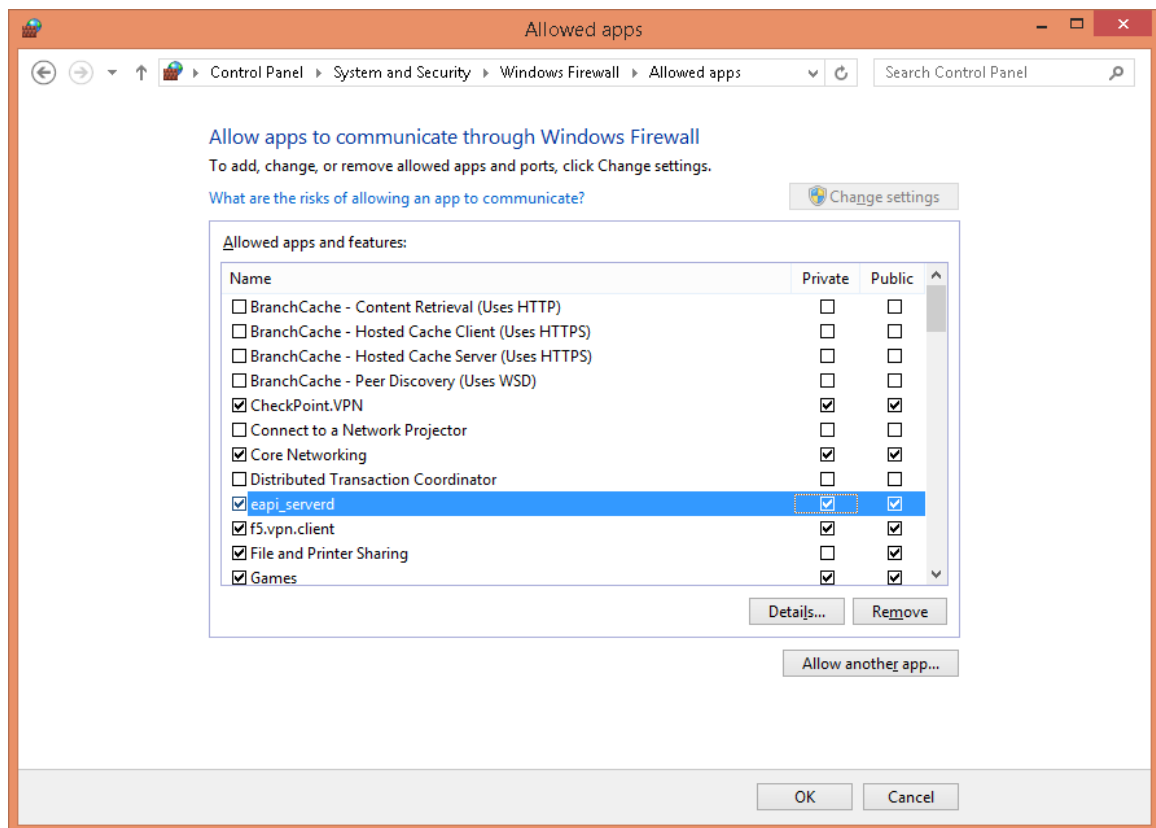
3. Click *Change settings*, and then click *Allow another app*.



4. Browse to the program *eapi\_serverd* and click *Open* to add it to the list of allowed apps.



5. Select the check box next to the program *eapi\_serverd* to allow it, then select the network locations you want to allow communication on, and then click **OK**.



6. Follow steps 3 to 5 above to allow *sema\_mqttd* (port 1883) to communicate through Windows Firewall.

## 4.2 Linux

### Allow ports through firewall

Find the setting files `/etc/SEMA/config/conf.xml` and `/etc/SEMA/config/mqtt.xml`, and allow the ports in these files through firewall.

```
<?xml version="1.0"?>
<Server>
  <id>ADLINK_SEMA3.0.0</id>
  <security>
    <!-- true for SSL , false for non-SSL connection -->
    <SSL>true</SSL>
    <!-- the files must be located at the same folder as EAPI_Server -->
    <certificate>server.crt</certificate>
    <privatekey>server.key</privatekey>
    <dhfile>dh512.pem</dhfile>
    <passwd>202CB962AC59075B964B07152D234B70</passwd>
  </security>
  <ipversion>IPv4</ipversion>
  <port>9999</port>
  <maxconnection>10</maxconnection>
  <logsize>4096</logsize>
  <loglevel>warning</loglevel>
</Server>
~
~
~
~
~
"/etc/SEMA/config/conf.xml" [noeol] 18L, 538C 1,1 All
```

```
<?xml version="1.0"?>
<mqtt>
  <sn>ADLINK_SEMA</sn>
  <connection>
    <ip>61.222.153.59</ip>
    <port>1883</port>
    <timeout>10</timeout>
    <ping>10</ping>
    <cache>1000</cache>
  </connection>
  <configure>
    <Push_Interval>
      <timeout>60</timeout>
      <unit>second</unit>
    </Push_Interval>
    <Register>1</Register>
    <log>
      <level>warning</level>
      <size>4096</size>
    </log>
  </configure>
  <static_message>
    <ip />
  </static_message>
</mqtt>
"/etc/SEMA/config/mqtt.xml" 27L, 471C 1,1 Top
```

## 5 Security Connection

If SSL encryption is enabled, the same set of SSL keys should be installed on all computers involved in remote communication via SEMA API. Keys can be generated on any Linux host using following commands:

**Generate a private key:**

```
# openssl genrsa -des3 -out server.key 1024
```

**Generate a certificate signing request:**

```
# openssl req -new -key server.key -out server.csr
```

**Sign the certificate with the private key:**

```
# openssl x509 -req -days 3650 -in server.csr -signkey server.key -out server.crt
```

**Remove password requirement:**

```
# cp server.key server.key.secure
```

```
# openssl rsa -in server.key.secure -out server.key
```

**Generate a dhparam file:**

```
# openssl dhparam -out dh512.pem 512
```

The resulting *dh512.pem*, *server.crt* and *server.key* must be put in the */etc/SEMA/cert/* or *c:\SEMA\cert\* directory on all computers involved in remote communication via SEMA API. If these files are not generated and installed manually, the predefined keys included with the install package will be used (see warning below).



**WARNING:** to make sure their connections are secure.

The install package comes with predefined keys for customer testing purposes. These keys are distributed to the public. Customers should create their own keys

## Getting Service

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