SIEMENS

Digital Grid Automation Products

Trusting Self-Signed Certificates in Browsers

V01.20

Supplementary Note

E50417-X0040-C154-A2

NOTE

For your own safety, observe the warnings and safety instructions contained in this document, if available.

Document version: E50417-X0040-C154-A2.02

Edition: 06.2019

Version of the product described: V01.20

Preface

Purpose of the Manual

This manual contains information about:

- The way of securely trusting self-signed certificates in general
- Adding self-signed certificates to the certificate trust store of Internet Explorer, Chrome, and Firefox.

Target Audience

This manual is mainly intended for security system engineers and persons entrusted with the setting, testing, and maintenance of automation, selective protection, and control equipment, as well as for operational crews in electrical installations and power plants.

Scope

This manual applies to all **Digital Grid Automation Products** having a secure web-based engineering interface via HTTPS.

Additional Support

For questions about the system, please contact your Siemens sales partner.

Support

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1 Motivation

Besides using an engineering tool like DIGSI 5 or SICAM TOOLBOX II for configuration and maintenance, several products offer a Web front-end to be used with a regular browser. Formerly, most of these front-ends had, if at all, a flawed security concept caused by the lack of methods to enforce integrity and confidentiality of the communication between browser and device. Adding TLS to the communication stack and switch from HTTP:// to HTTPS:// circumvents the most obvious attacks (for example, replay, password sniffing, MITM).

Due to the authentication scheme used by browsers, Siemens cannot provide certificates to be used for HTTPS with browsers (for example, during assembly).

This is because either the DNS name or the IP address of the device has to be part of the signed certificate, both of which are ultimately determined after installation at the customer's site. Therefore, the products generate a self-signed certificate after the IP address has been set. This self-signed certificate has to be trusted in a secure way on all clients used to access this device.

2 Trusting Self-Signed Certificates in Browsers

2.1 Secure Way of Trusting Self-Signed Certificates

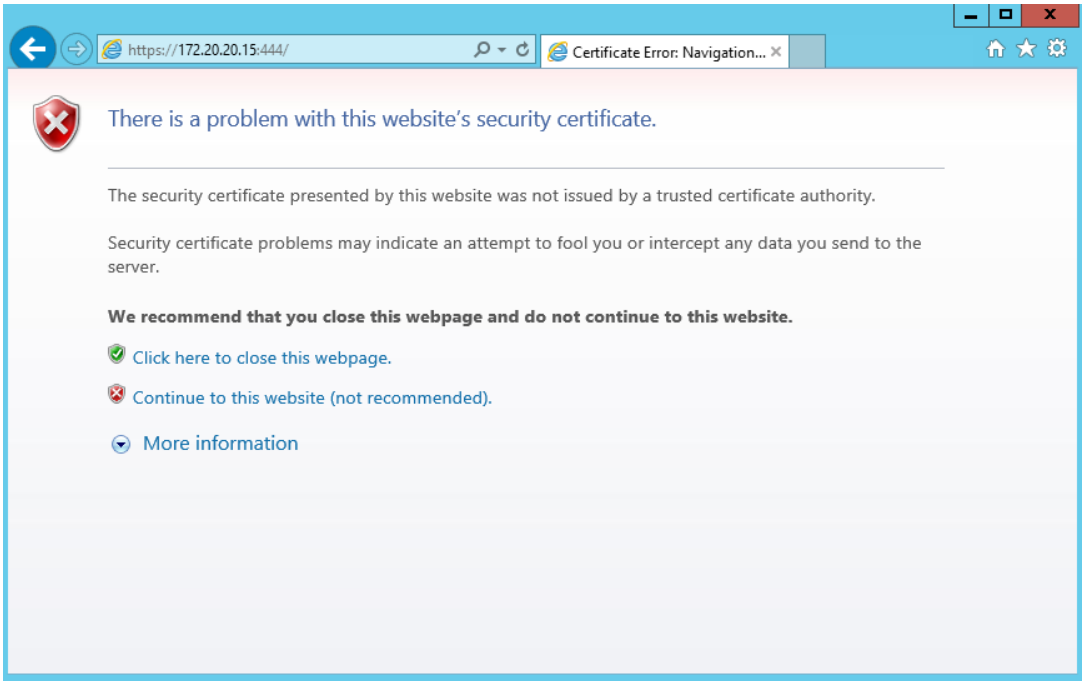
As with the usage of self-signed certificates there is no hierarchy of trust (certificate authority) which can be imported in the browser's trust store, the way of trusting self-signed certificates must be done in a secure way to circumvent potential man-in-the-middle attacks.

Downloading the certificate via browser over an insecure network includes the risk of downloading the certificate from the attacker. This would in fact lead to insecure communication. To prevent this attack, the certificate of a device has to be downloaded by physically connecting directly to the devices LAN interface. After collecting the certificates of all devices, these certificates have to be deployed in a secure manner to the client systems (for example, by using Active Directory Domain Services and a Group Policy object).

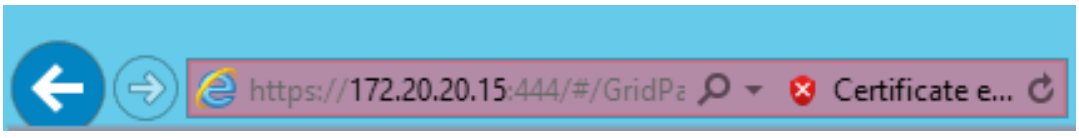
2.2 Downloading Self-Signed Certificates via Browser

2.2.1 Microsoft Internet Explorer

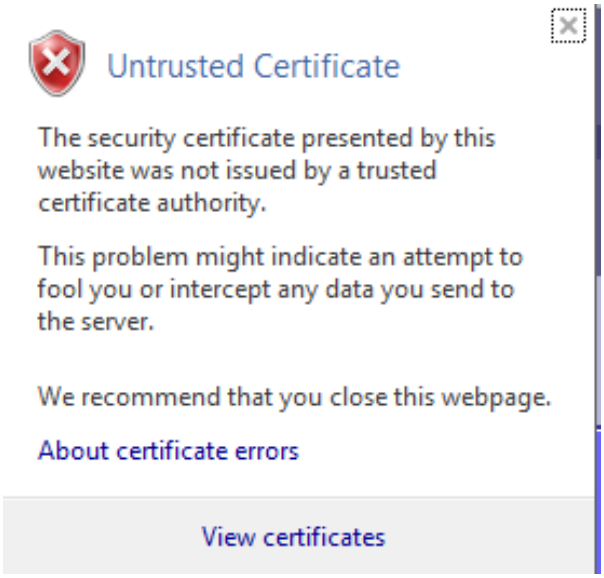
✧ Navigate to the website of your device by entering the target IP address in the address bar of the browser. A certificate error site is shown.



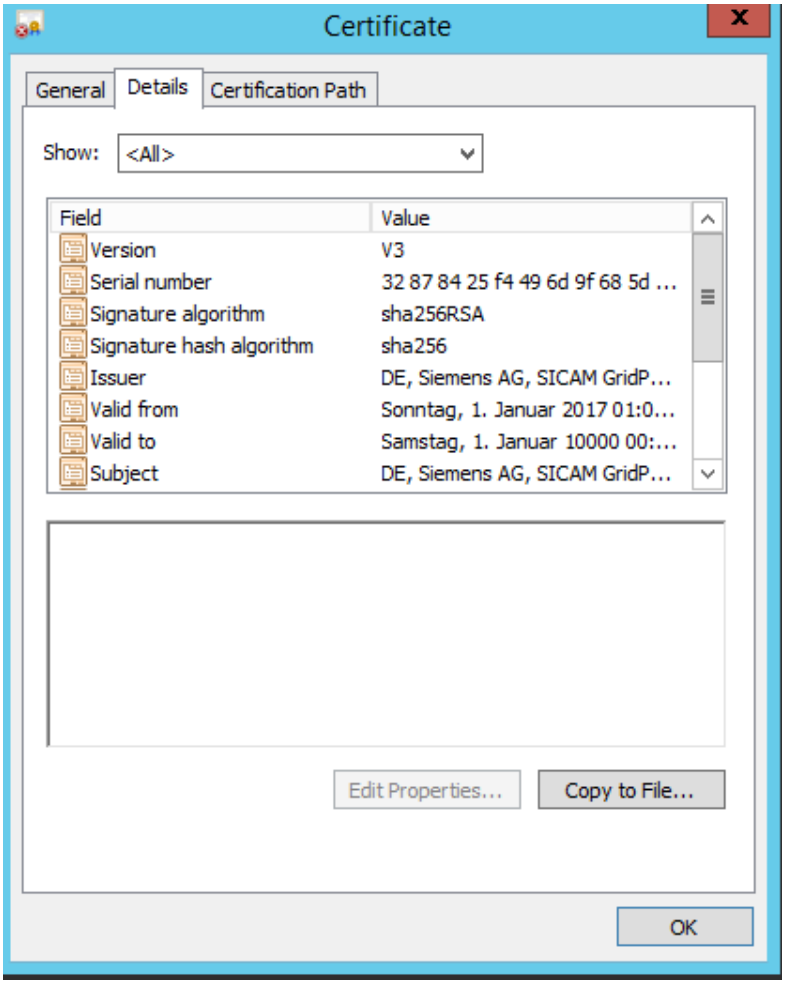
✧ Click **Continue to this website (not recommended)**. The website is opened and the address bar of the browser shows a **Certificate error**.



✧ Click **Certificate error** to open the details.

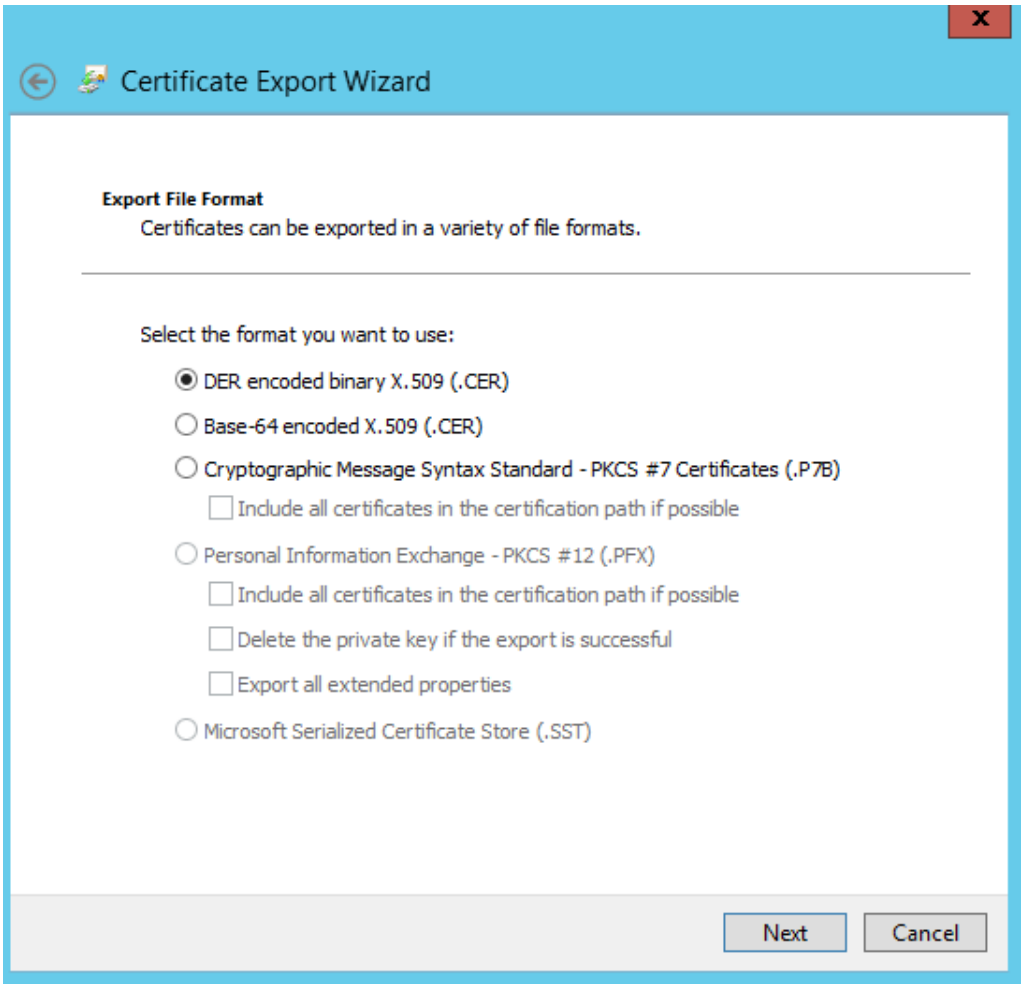


✧ Click **View certificates**. The **Certificate** dialog opens.

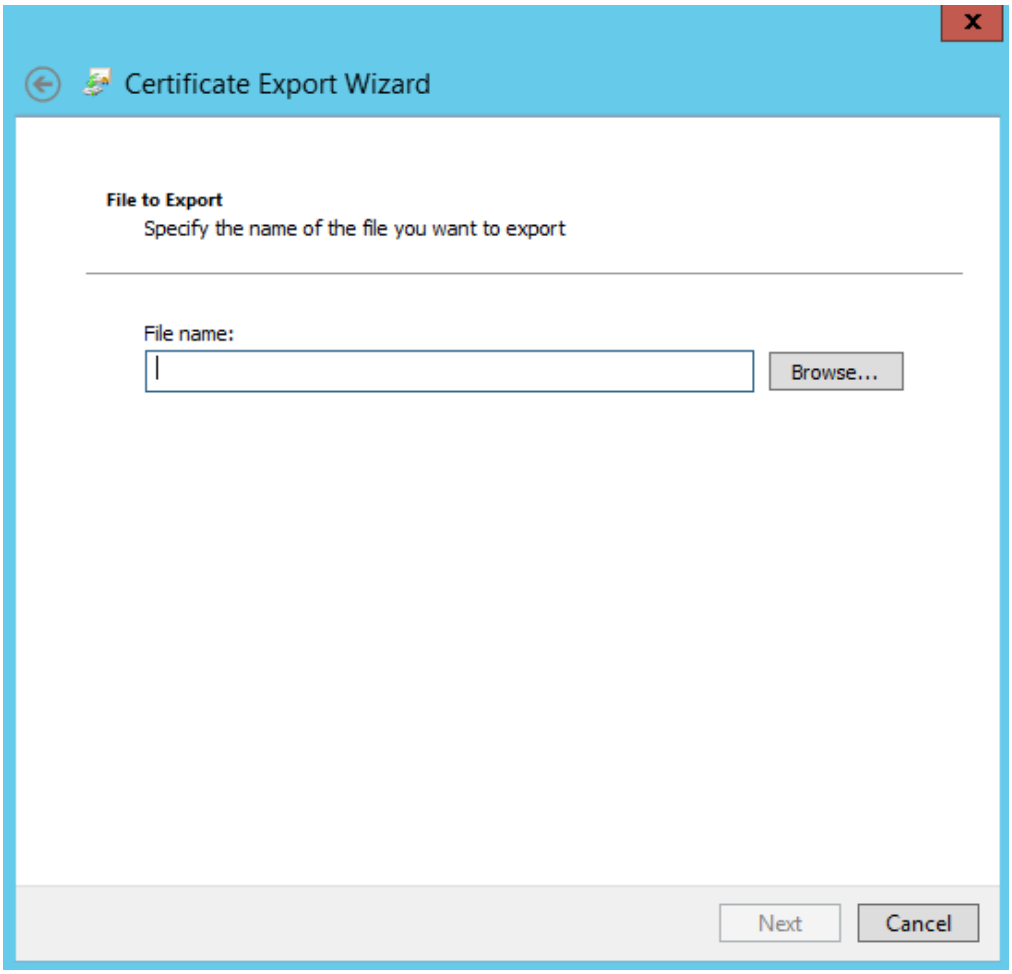


✧ Navigate to the **Details** tab and click **Copy to File...**. The **Welcome to the Certificate Export Wizard** dialog opens.

✧ Click **Next** >. The **Export File Format** dialog opens.



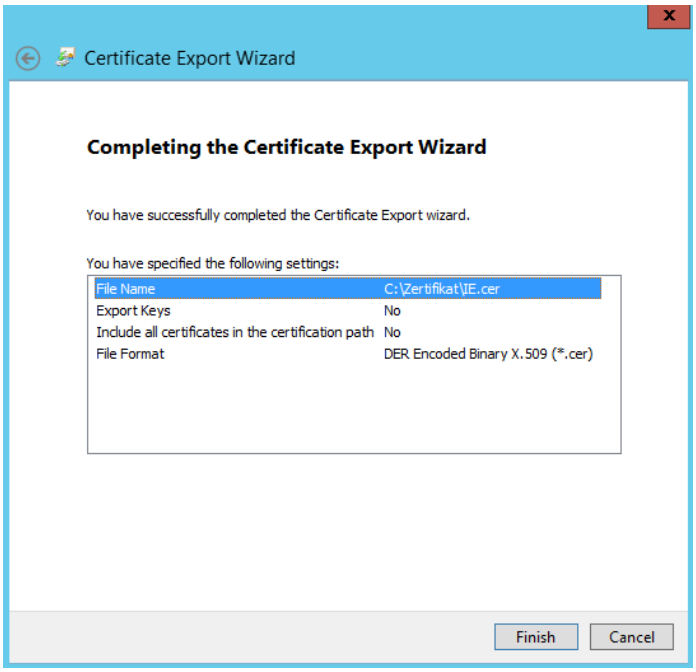
✧ Click **Next** >.



✧ Click **Browse...**.

✧ Select a name and a location where to store the certificate, then click **Save**.

✧ Click **Next** >. The **Completing the Certificate Export Wizard** dialog opens.

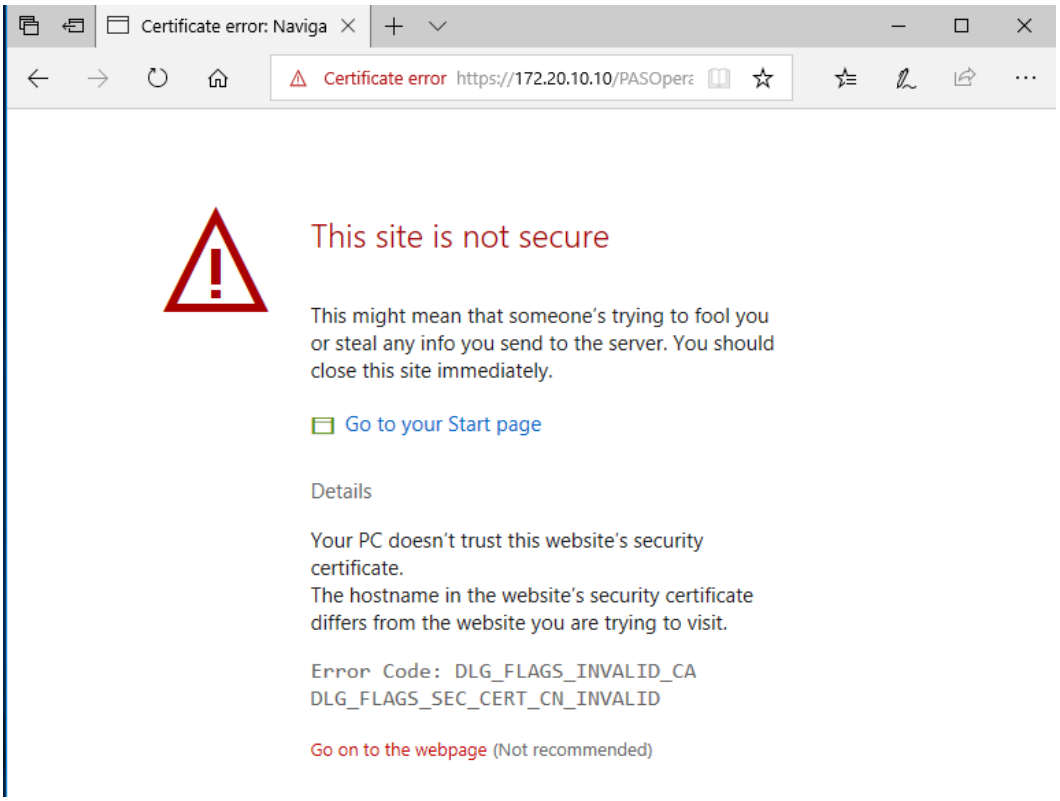


✧ Click **Finish**. The **Export was successful** dialog opens.

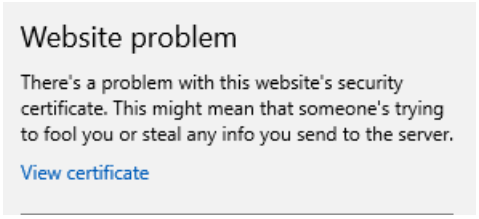
✧ Click **OK** to finish the export of certificate.

2.2.2 Microsoft Edge

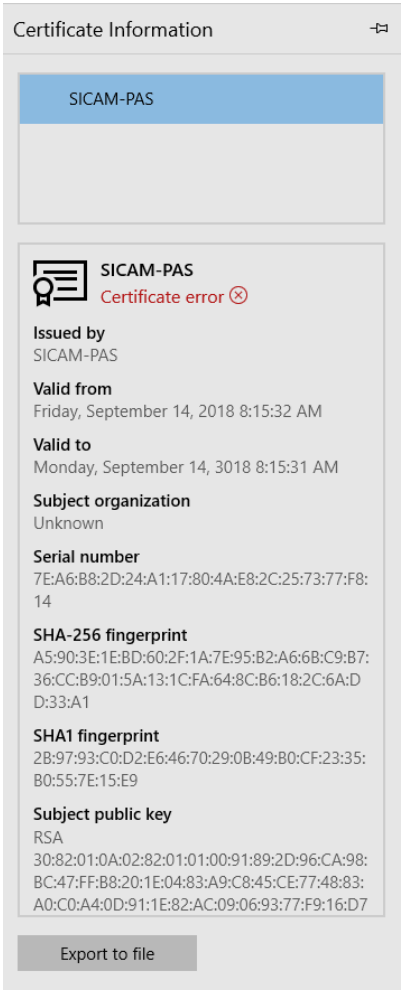
✧ Navigate to the website of your device by entering the target IP address in the address bar of the browser. A privacy error site is shown.



✧ Click **Certificate error**



✧ Click **View certificate**



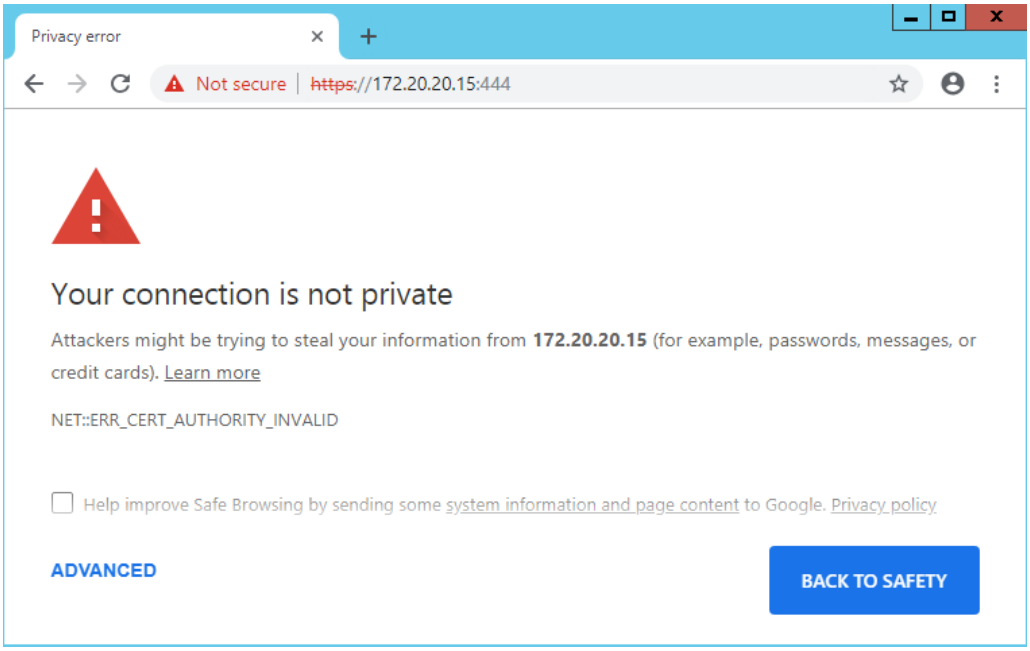
✧ Click **Export to file**

✧ Save the Certificate to a X.509 Certificate file

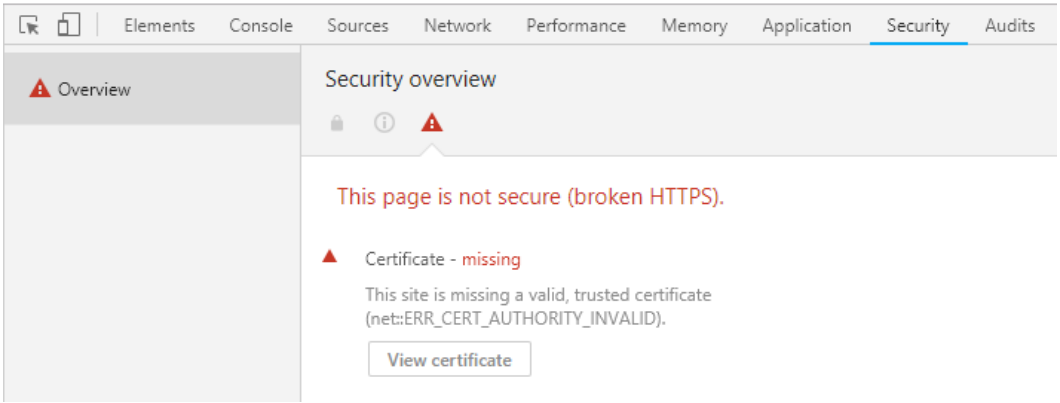
✧ Proceed from here with the **Adding Self-Signed Certificates to the Microsoft Certificate Store** as described in 2.3

2.2.3 Google Chrome

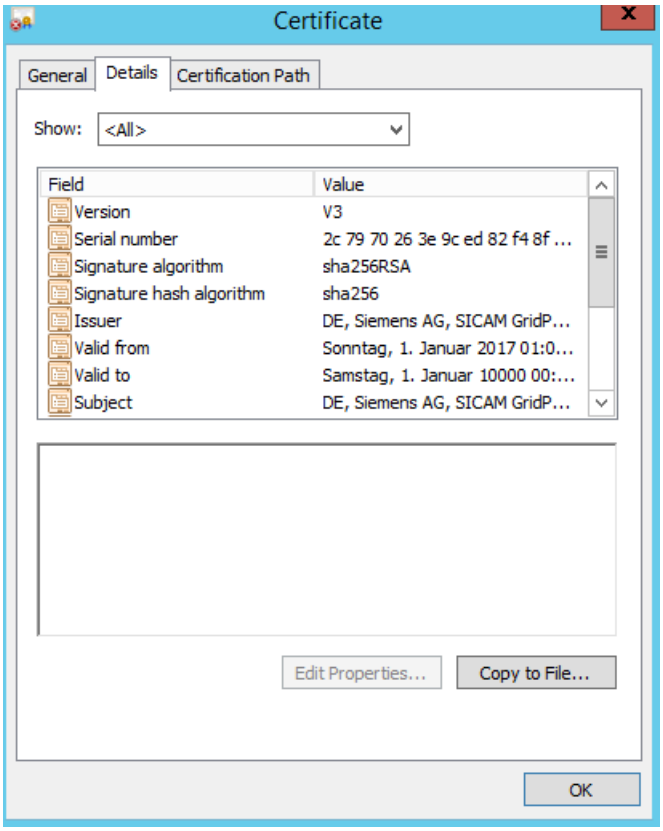
✧ Navigate to the website of your device by entering the target IP address in the address bar of the browser. A privacy error site is shown.



✧ Press <**F12**> and click **Security**.



✧ Click **View certificate**. The **Certificate** dialog opens.



✧ Proceed from here with the **Certificate Export Wizard** as described in 2.2.1 Microsoft Internet Explorer

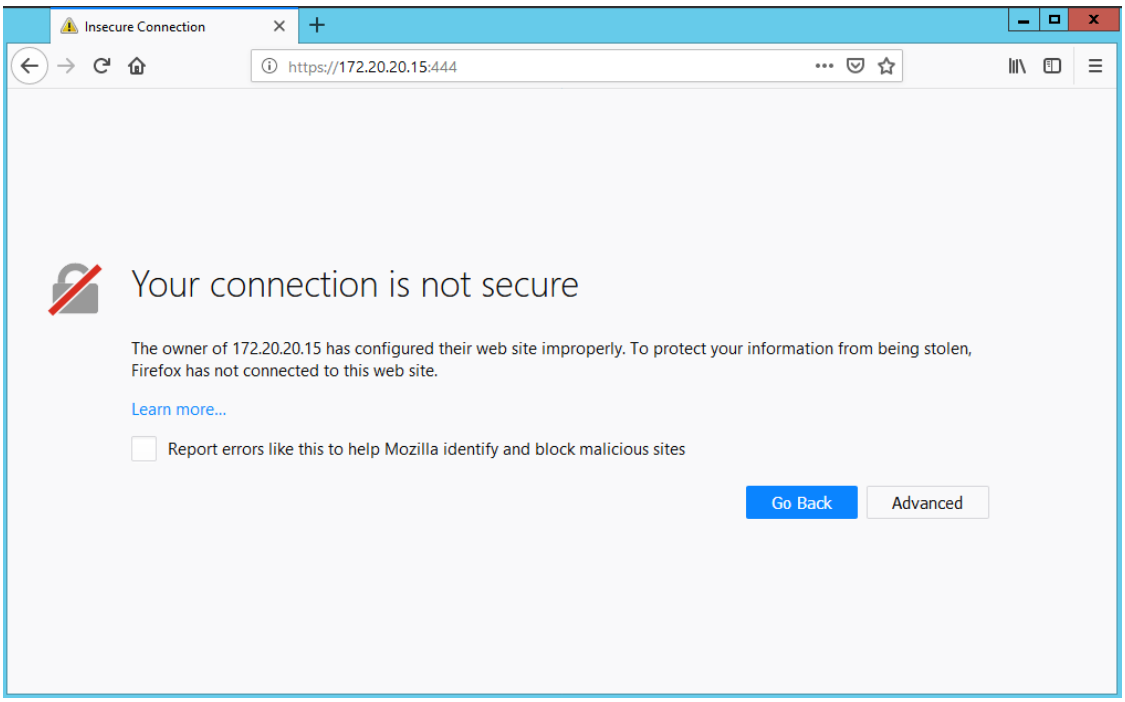
2.2.4 Mozilla Firefox

As of Version 59, Mozilla Firefox doesn´t support self-signed certificates anymore.

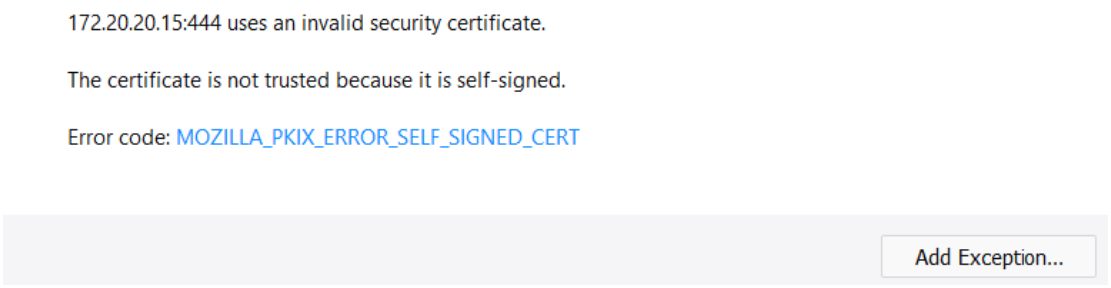
As workaround add the web site as an exception.

✧ Navigate to the website of your device by entering the target IP address in the address bar of the browser.

An **Insecure Connection** site is shown.

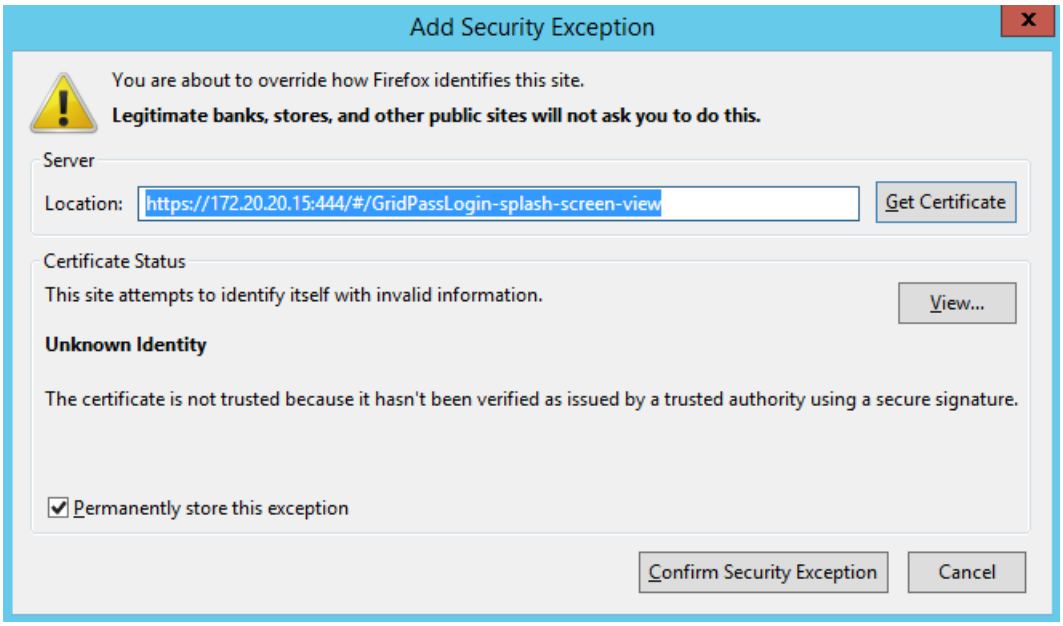


✧ Click **Advanced**.



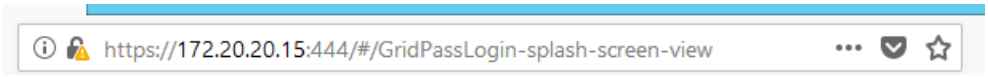
✧ Click **Add Exception**.

The **Add Security Exception** dialog opens.



✧ Click **Confirm Security Exception...**.

The web site is shown.



2.3 Adding Self-Signed Certificates to the Microsoft Certificate Store

To execute the following steps, your user account must at least be a member of the user groups **Users** or **Local Administrators**:

- ✧ In the **Start** menu, click **Run**, then type **mmc**. Click **OK** and confirm the **UAC window** with **Yes**. The **Microsoft Management Console** (MMC) is shown.
- ✧ In the console, click the **File** menu, then click **Add/Remove Snap-in**.
- ✧ From the **Snap-in** list, select **Certificates** and click **Add**.
- ✧ In the **Certificates Snap-in** window, select **Computer account**, then click **Next** >.
- ✧ In the **Select Computer** window, select **Local computer**, then click **Finish**. This adds the **Certificates** snap-in to the list.
- ✧ In the **Add/Remove Snap-in** window, click **OK**. This adds the **Certificates** snap-in to the **mmc** console.
- ✧ Double-click **Certificates (Local Computer)** in the left panel.
- ✧ Right-click **Trusted Root Certification Authorities** and select **All tasks** – **Import…** from the context menu.
- ✧ In the **Welcome to the Certificate Import Wizard** window, click **Next** >.
- ✧ Click **Browse**, select the self-signed certificate in the file system, and confirm the dialog with **Open**.
- ✧ Confirm the dialog with **Next** >.
- ✧ Select **Place all certificates in the following store** and click **Next** >.
- ✧ Confirm the **Completing the Certificate Import Wizard** dialog with **Finish**.
- ✧ A dialog with the message **The import was successful** appears. Click **OK** to close it.

The self-signed certificate is now imported into Microsoft Certificate Store.

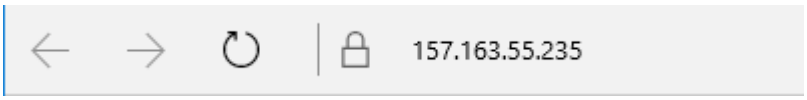
2.4 Using the Microsoft Certificate Store in a Browser

Trusted Connection

The following screenshots show how a trusted connection is displayed in the address bar of browsers.

- Microsoft Internet Explorer

- Microsoft Edge



- Google Chrome

Microsoft Internet Explorer, Microsoft Edge, Google Chrome

Microsoft Internet Explorer, Microsoft Edge, and Google Chrome use the Microsoft Certificate Store of the operating system (for example, Windows 7) for certificate trusting.

A Appendix

A.1 Browser Versions

This document is based on the following browser versions:

- Microsoft Internet Explorer: 11.0.125
- Microsoft Edge: 42.17134.0 and 44.17763
- Mozilla Firefox: 67.0.1
- Google Chrome: 75.0.3770.80

A.2 Mismatched Address Error in Microsoft Internet Explorer and Microsoft Edge

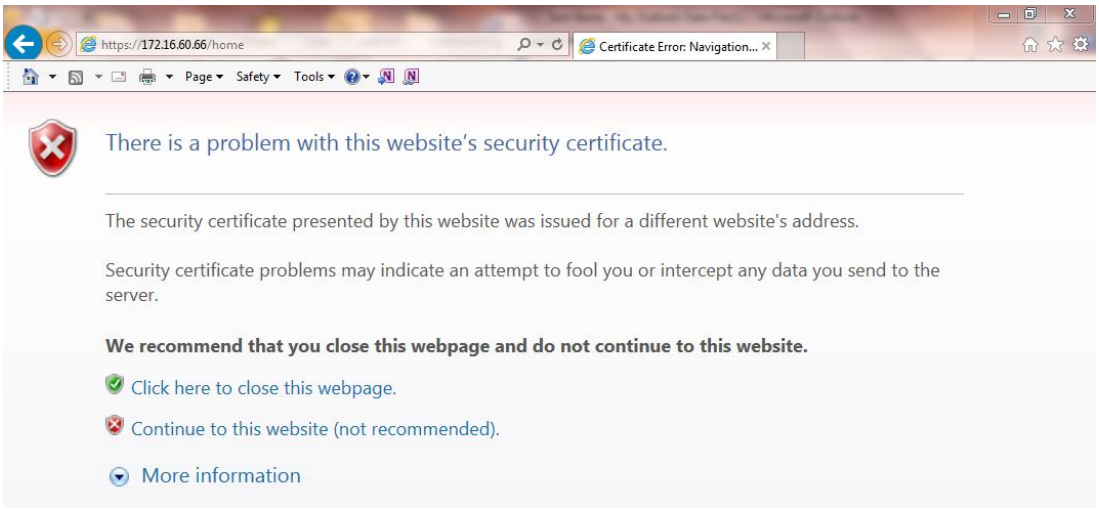
This error occurs when using old versions of Microsoft Internet Explorer and Microsoft Edge.

Use Internet Explorer 11.545.10586.0 or higher, or Edge 25.10586.0.0 or higher on Microsoft Windows 10 to avoid this issue. Alternatively, use Google Chrome or Mozilla Firefox to avoid this issue.

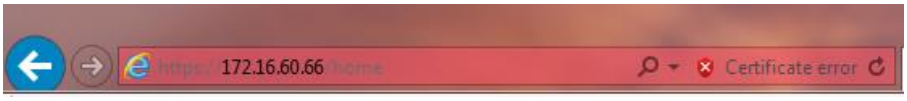
Error Example

The following example shows what the error looks like in the Microsoft Internet Explorer:

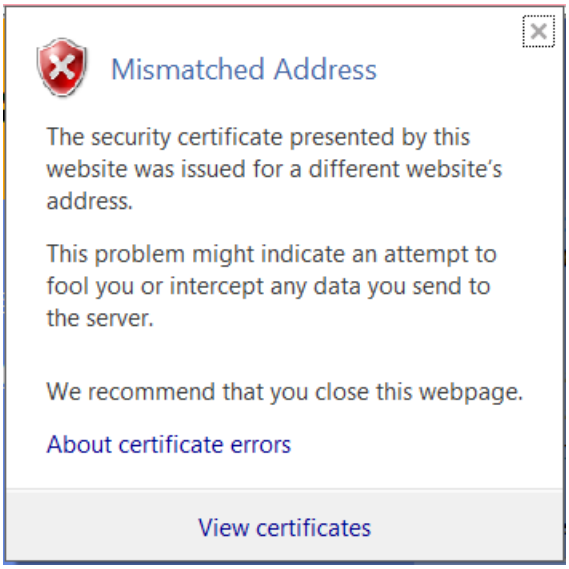
✧ Navigate to the website of your device by entering the target IP address in the address bar of the browser. A certificate error site is shown.



✧ Click **Continue to this website (not recommended)**. The website is opened and the address bar of the browser shows a **Certificate error**.



✧ Click **Certificate error** to open the details.


Mismatched Address
The security certificate presented by this website was issued for a different website's address.
This problem might indicate an attempt to fool you or intercept any data you send to the server.
We recommend that you close this webpage.
About certificate errors
View certificates

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