Remote Access to WinCC Runtime Advanced

Sm@rtServer

WinCC (TIA Portal) / V16

https://support.industry.siemens.com/cs/ww/en/view/109476153

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1 Task

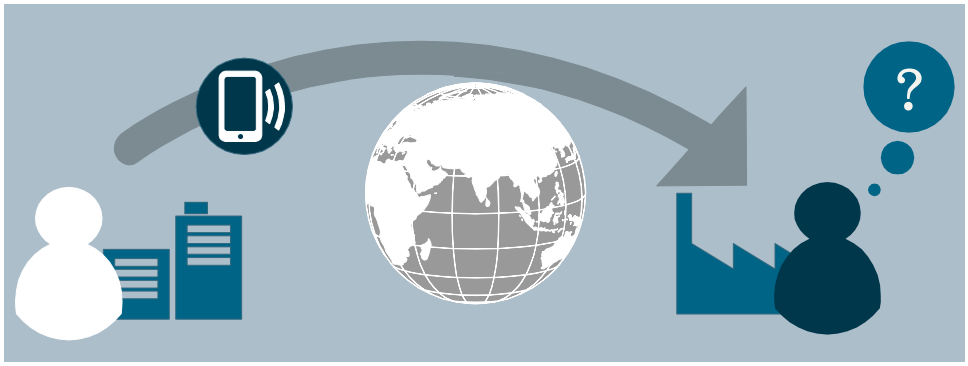
Remote access is used to its full extent when you can use the same functions as if you were standing right in front of the operator panel. Using existing hardware such as your smartphone, tablet or standard notebook enables you to achieve the greatest possible flexibility.

Apart from all the advantages remote access provides, you still need to be aware of the hazards such an intervention may involve.

In most cases, the user remotely accessing the plant cannot see what is happening in the plant at the moment of access. The intervention must not put the staff on site or the plant at risk. To this end, it is important that you lock certain functions (e.g., manual control of a gripper) for the remote maintenance user. In addition, the staff on site should be informed of an intervention and be able to stop it at any time if necessary.

Moreover, it must be ensured that only authorized persons are provided with access to the plant. Unfortunately, total network security cannot be guaranteed. Therefore, it makes sense to inform the staff not only of the fact **that** a remote maintenance user is accessing the operator panel, but also of **who** this is.

Figure 1-1



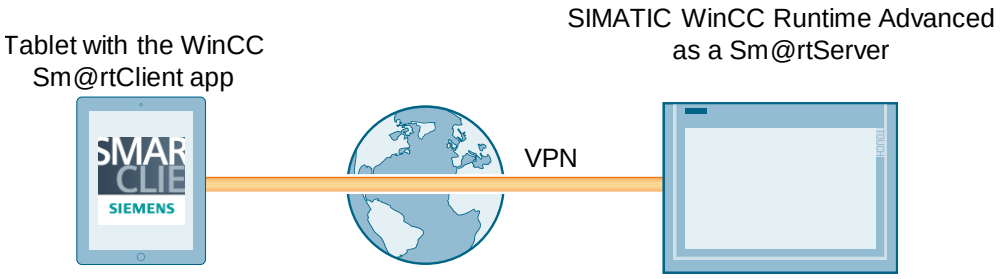
2 Solution

2.1 Overview

Diagrammatic representation

The diagrammatic representation below shows the most important components of the solution:

Figure 2-1



Configuration

The WinCC Runtime Advanced PC operates as a Sm@rtServer. To reduce the risk of third-party intervention, connect your Sm@rtClient, a tablet with the SIMATIC WinCC Sm@rtClient app in the above figure, to the SIMATIC HMI operator panel using VPN.

The "Sm@rtServiceMonitor" tool is used to check the Sm@rtClient connections to the operator panel. The IP addresses of the devices accessing the operator panel are stored in internal WinCC tags for further processing. This allows you to check who is currently accessing the operator panel at any time and, if necessary, terminate remote access.

Advantages

The solution presented here offers the following advantages:

- Flexibility through a variety of Sm@rtClient solutions
  - The Sm@rtClient app for Android and iOS enables you to access the Sm@rtServer from mobile devices such as smartphones or tablets.
  - The Sm@rtClient Viewer enables you to access the Sm@rtServer from a programmer or another standard PC.
  - The Sm@rtClient View WinCC control enables you to access the Sm@rtServer via a WinCC Runtime Advanced station.
  - Internet Explorer enables you to access the Sm@rtServer from any PC.
- The operator panel layout is represented by the Sm@rtClient app and the Sm@rtClient Viewer and you can use, for example, keyboards
- Up to four Sm@rtClients per WinCC Runtime Advanced station are possible simultaneously (number depends on the device, see \5\)
- Operator actions are displayed on the device on site; i.e., an employee on site can follow your operator steps
- Wide range of possible applications (see scenarios in the "General information" document)

- Checking the incoming connections using "Sm@rtServiceMonitor"
- Increased security through a VPN connection

Scope

This application does not include a description of

- the basics of configuring with WinCC (TIA Portal)
- setting up a VPN connection; information on this topic can be found in the "VPN connection" document.

2.2 Hardware and software components

2.2.1 Validity

This application is valid for

- WinCC Runtime Advanced PC stations

Note Starting with TIA Portal V15, the "Sm@rtServiceMonitor" tool for SIMATIC Comfort Panels was fully integrated into the "SIMATIC HMI Option+" tool. For more information on SIMATIC HMI Option+, use the following link: https://support.industry.siemens.com/cs/ww/en/view/109754400

Note With TIA Portal V14 or higher, Sm@rtServer is also available for SIMATIC HMI Basic Panels. The "Sm@rtServiceMonitor" tool can only be used with WinCC Runtime Advanced.

2.2.2 Components used

The application was created with the following components:

Hardware components

Table 2-1

Component	No.	Article number	Note
PC station (general)	1		
Smartphone	1		Android or iOS

Software components and licenses

Table 2-2

Component	No.	Article number	Note
WinCC Comfort V16	1	6AV2101-0AA06-0AA5	
SIMATIC WinCC Sm@Client app	1		Only when using a smartphone as a client
WinCC Sm@rt Server for Runtime Advanced	1	6AV2107-0CA00-0BB0	

Configuring and using the VPN connection requires more components. Details can be found in the "VPN connection" document.

Sample files and projects

The following list contains all files and projects that are used in this example.

Table 2-3

Component	Description
109476153_Remote_Panels_SmartServer_V16_DOC_en.pdf	This document
109476153_Remote_Panels_RTAdv_ V16_CODE.zip	WinCC (TIA Portal) project for WinCC Runtime Advanced PC stations
109476153_Remote_Panels_SmartServer_ V16_Library.zip	WinCC (TIA Portal) library
109476153_Remote_Panels_RTAdv_ V16_Tool.zip	"Sm@rtServiceMonitor" tool for WinCC Runtime Advanced

3 Principle of Operation

3.1 Sm@rtServer

The WinCC Sm@rtServer option enables operator control and monitoring of operator panels via the intranet/internet. The Sm@rtServer provides its user interface to the Sm@rtClients. Various devices can be used as a Sm@rtClient, for example a standard PC, a smartphone or another SIMATIC HMI Panel. The Sm@rtClient concept is not only used for operator control and monitoring when performing service jobs, it can also be used for large, geographically distributed machines and plants. The mobile end use option makes this solution also suitable for commissioning as you can move around the entire plant, regardless of the operator panel's place of installation.

3.2 Application example

Sm@rtServiceMonitor

The "Sm@rtServiceMonitor" tool is used to check the Sm@rtClient connections to a WinCC Runtime Advanced PC station. The IP addresses and the number of devices accessing the operator panel are stored in internal WinCC tags for further processing (VncClient1, VncClient2, VncClient3, VncClient4 and VncConnectionCount).

SOAP web service

The SOAP (Simple Object Access Protocol) web service is used for writing the tags. The operator panel provides this service via the integrated web server. It can be used to access the HMI Runtime tags from external applications. Using the SOAP service requires a web user with the appropriate permission on the operator panel (see chapter 4.2.4 Operator panel settings).

Sample project

In the event of a value change of one of the tags, "VncClient1", "VncClient2", "VncClient3" or "VncClient4", the "CheckConnections" script is called.

This script first checks what has changed compared to the previous cycle.

If a user is logged in to the operator panel on site and a new Sm@rtClient connects, a message appears on the operator panel. This message is displayed for a defined time and enables the operator on site to directly terminate the incoming connection. (see chapter 5.2 Sample project). The remote operator cannot access WinCC Runtime Advanced until this time has elapsed. In the sample project, the default setting for this time is 10 seconds; however, you can change this setting (see chapter 6 Additional Notes).

As long as (at least) one Sm@rtClient connection to the operator panel is active, this is indicated by a flashing button. Clicking this button allows you to terminate the connections at any time.

4 Installation and Startup

4.1 Installing the software

To use this application example, at least the SIMATIC WinCC Comfort software must be installed on your programmer.

4.2 Startup

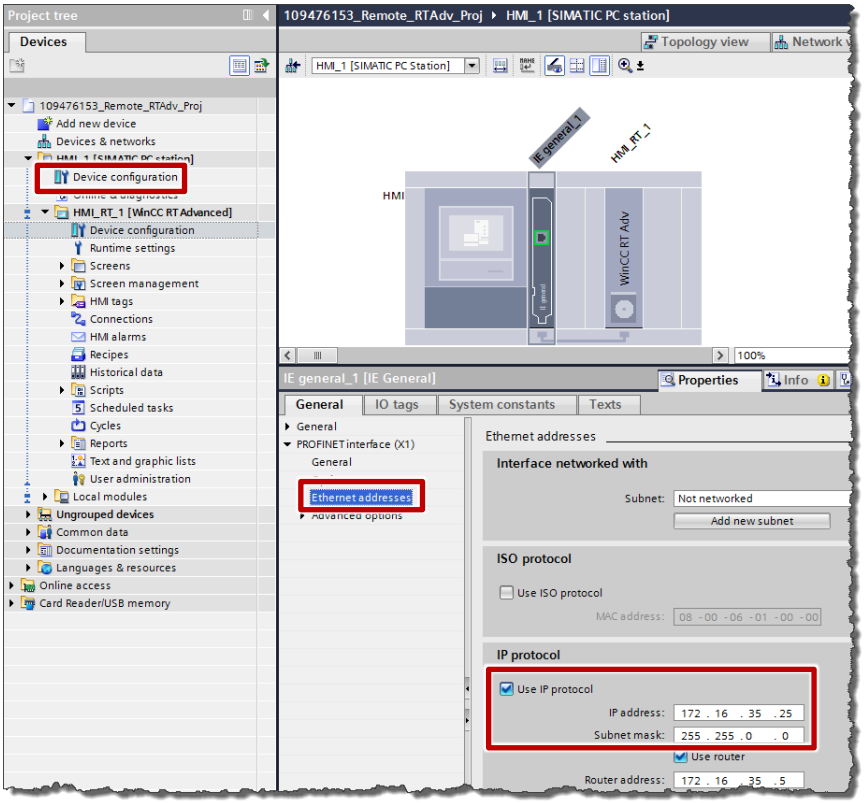
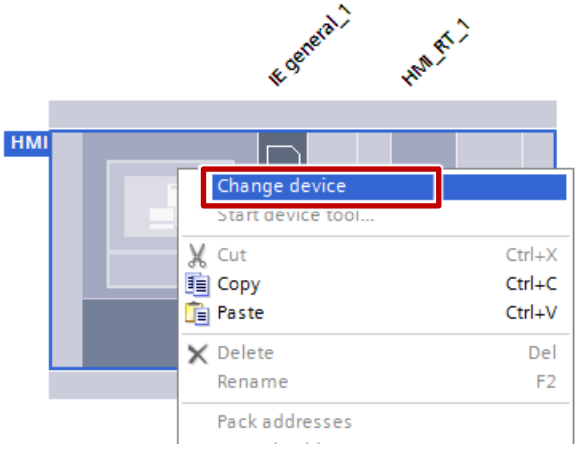
The application example can be started up in different ways.

- First, establish a VPN connection between the WinCC Runtime Advanced PC station and the Sm@rtClient. More information can be found in the "VPN connection" document.
- Depending on whether you want to use the project contained in this entry or include the functionality in your own project, follow the steps described in chapter 4.2.1 Sample project or 4.2.2 Project library.
- Then transfer, if not yet available, the Sm@rtServer license to the operator panel as described in chapter 4.2.3 Transferring the license.
- Make the necessary Sm@rtServer and web server settings as described in chapter 4.2.4 Operator panel settings and then configure the tool following the steps in chapter 4.2.5 Sm@rtServiceMonitor.
- Depending on the Sm@rtClient you are using, follow the instructions in chapter 4.2.6 Sm@rtClient app, 4.2.7 Sm@rtClient application, 4.2.8 Sm@rtClient control or 4.2.9 Internet Explorer.

4.2.1 Sample project

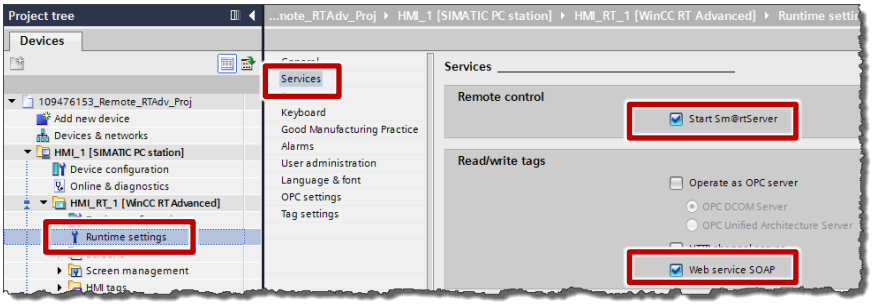
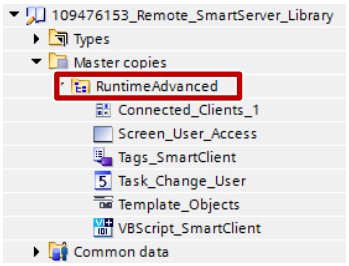
Table 4-1

No.	Action
1.	Depending on your operator panel, download the "109476153_Remote_Panels_RTAdv_CODE.zip" sample project.
2.	Unzip the project.
3.	Use WinCC (TIA Portal) to open the project.
4.	Go to the project view.

No.	Action
5.	Open the device configuration and set the IP address and subnet mask of the operator panel. 
6.	If you are using a different SIMATIC IPC, right-click the device and select "Change device / version".  Select the operator panel you are using.
7.	Download the project to the device.

4.2.2 Project library

Table 4-2

No.	Action
1.	Download the "109476153_Remote_Panels_SmartServer_Library.zip" library.
2.	Unzip the folder.
3.	Open the project into which you want to integrate the functionality and go to the project view.
4.	Open the Runtime settings of the operator panel and in Services, select "Start Sm@rtServer" and "Web service SOAP". 
5.	Open the "Libraries" tab on the right-hand side of TIA Portal.
6.	Click the icon to open a global library and open the library of the application example. Then open the "RuntimeAdvanced" folder. 
7.	Use drag and drop to move the "Task_Change_User" task to the task scheduler.
8.	Use drag and drop to move the "Tags_SmartClient" tag table to the "HMI tags" folder.
9.	Use drag and drop to move the "Screen_User_Access" screen to the "Screens" folder.
10.	Drag the "Connected_Clients" faceplate to a screen.
11.	Use drag and drop to move the "VBScript_SmartClient" VB scripts to the "Scripts > VB scripts" folder.
12.	Use drag and drop to move the "Template_Objects" objects to your template.
13.	Transfer the project to your operator panel.

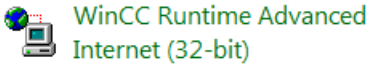
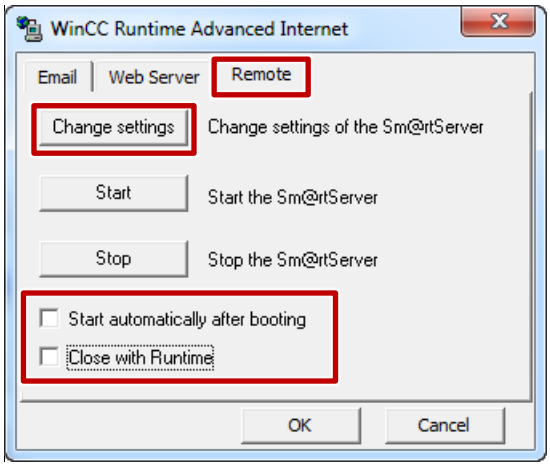
4.2.3 Transferring the license

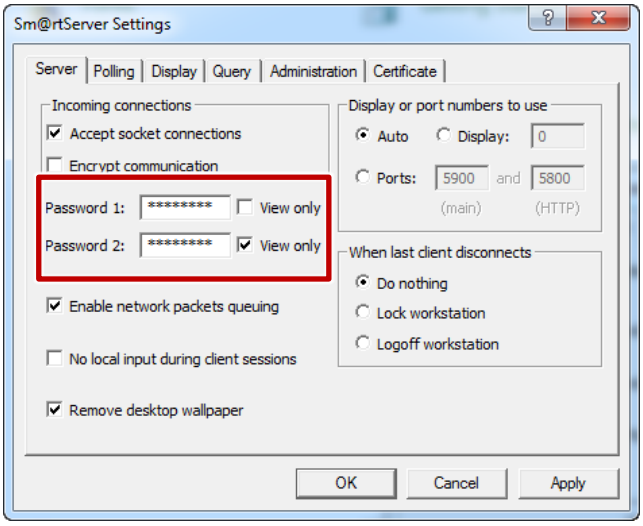
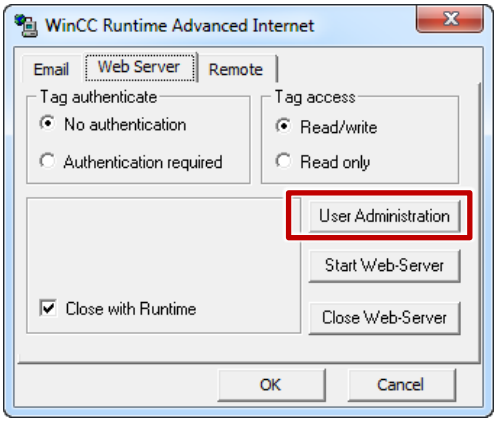
On the WinCC Runtime Advanced PC station, open the Automation License Manager and use drag and drop to move the "Sm@rtServer for WinCC Runtime Advanced" license from the license data medium to the PC.

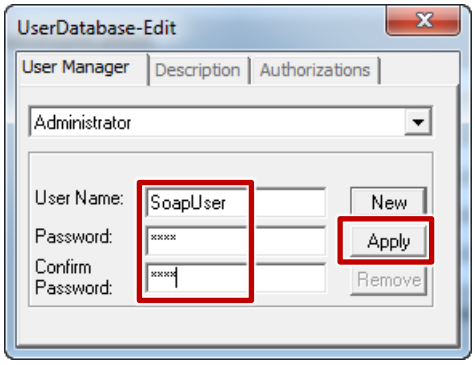
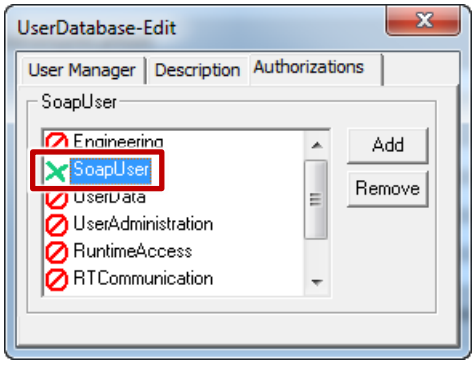
Note With TIA Portal V14 SP1, the Sm@rtServer in conjunction with WinCC Runtime Advanced no longer requires a license.

4.2.4 Operator panel settings

Table 4-3

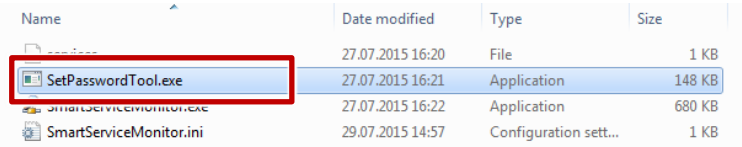
No.	Action
1.	**WinCC Runtime Advanced**: Open the PC's Control Panel and select "WinCC Runtime Advanced Internet". 
2.	Go to the "Remote" tab. Check "Start automatically after booting" if you want the Sm@rtServer to start with the operator panel and not later with Runtime. Check "Close with Runtime" if you want the Sm@rtServer to close with Runtime. Click the "Change settings" button. 

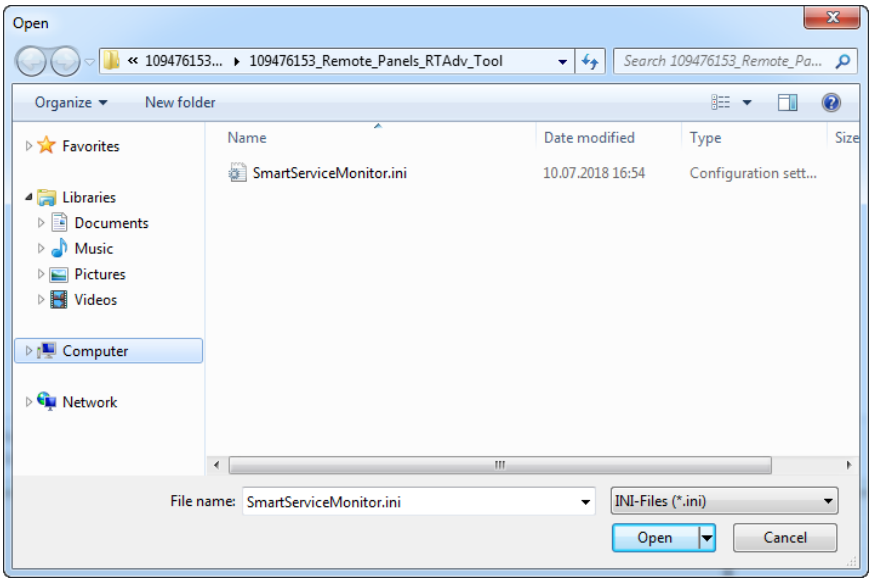
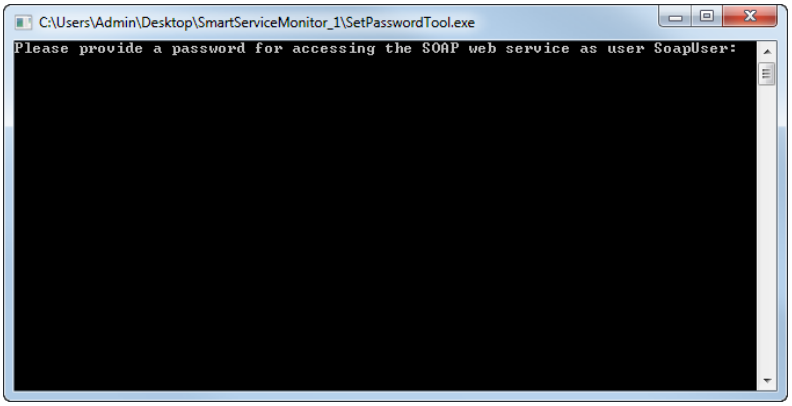
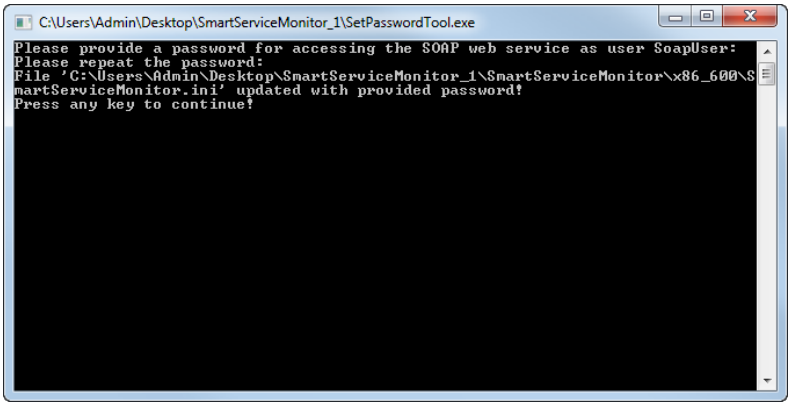
No.	Action
3.	In Password 1 and Password 2, enter secure passwords for access of the Sm@rtClients and check the "View only" check box if you want a Sm@rtClient to only monitor the operator panel with this password. If you are using an operator panel with a version lower than V13, always change the default passwords. 
4.	If necessary, make other settings such as the ports. More information on the settings can be found in the manual: "WinCC Advanced > Visualize processes > Options > WinCC Sm@rtServer > Basics > Settings for Sm@rt options > Configurations on the HMI device > 'Sm@rtServer Dialog: Current User Properties'". Use the "Apply" button to confirm the changes.
5.	Go to the "Web Server" tab. For "Close with runtime", make the same settings as for the Sm@rtServer (Step 3).
6.	Click the "User Administration" button. 

No.	Action
7.	Create a new user, "SoapUser", and assign a password to this user. Click the "Apply" button. 
8.	Go to the "Authorizations" tab and enable the "SoapUser" authorization for this user. 
9.	Close the open dialogs.
10.	Open the "Transfer" settings.

4.2.5 Sm@rtServiceMonitor

Table 4-4

No.	Action
1.	Download the "Sm@rtServiceMonitor for WinCC Runtime Advanced" tool and unzip the zip folder.
2.	Start the "SetPasswordTool.exe" tool. 

No.	Action
3.	In the file browser, select the "SmartServiceMonitor.ini" file. 
4.	Enter the password of the "SoapUser" user and press Enter to confirm. Repeat this step. 
5.	Close the "SetPasswordTool" by pressing any button. 
6.	

To use the tool on a WinCC Runtime Advanced PC, copy the files to the Runtime PC and manually start the "SmartServiceMonitor.exe" or add a shortcut to this file to the PC's Startup folder.

4.2.6 Sm@rtClient app

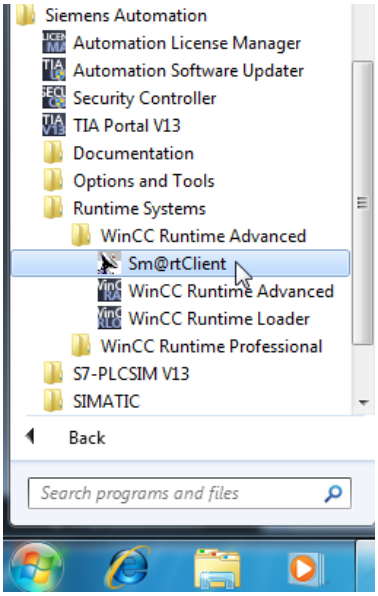
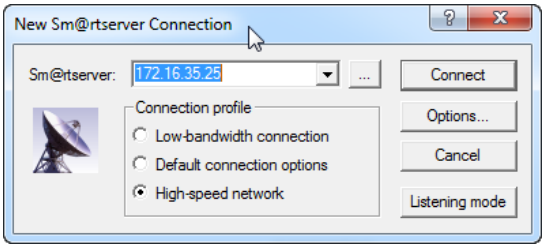
Table 4-5

No.	Action
1.	Download the "SIMATIC WinCC Sm@rtClient" app to your smartphone or tablet and install it. You can find the app in \3\ (iOS), \4\ **Fehler! Verweisquelle konnte nicht gefunden werden.**(Android) or using the following QR code.
2.	Start the NCP VPN Client app and establish a connection to the automation cell. Detailed information on this topic can be found in the "VPN connection" document.
3.	Start the SIMATIC WinCC Sm@rtClient app and either manually add a new connection or use automatic Sm@rtServer detection to search for the desired SIMATIC HMI operator panel. 
4.	Password protect both the device and the app to prevent unauthorized persons from accessing the Sm@rtServer. If possible, do not save the password along with the connection settings, but enter it manually when prompted.

4.2.7 Sm@rtClient application

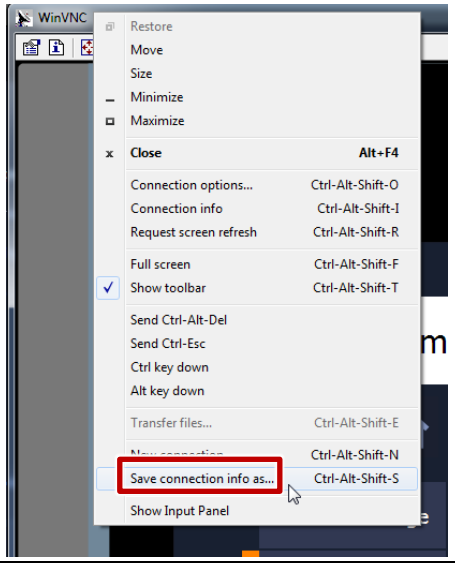
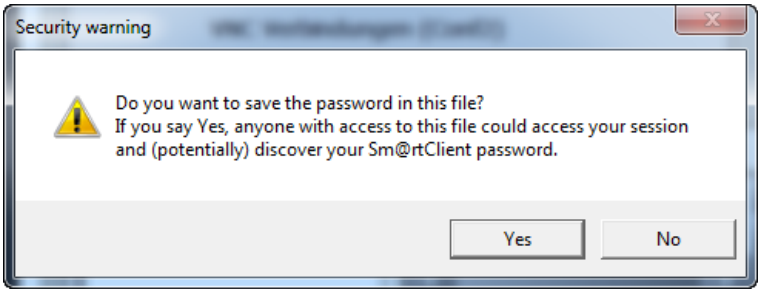
If WinCC Runtime Advanced is installed on the PC, the Sm@rtClient application is also installed. Otherwise, you can copy it from the "Support\SmartClient" folder of the WinCC product DVD or from another PC from the "...\Siemens\Automation\WinCC RT Advanced" folder.

Table 4-6

No.	Action
1.	Start the SOFTNET Security Client and establish a connection to the automation cell. Detailed information on this topic can be found in the "VPN connection" document.
2.	Select "Start > All Programs > Siemens Automation > Runtime Systems > WinCC Runtime Advanced > Sm@rtClient" to start the Sm@rtClient Viewer. 
3.	Enter the Sm@rtServer's IP address and, if necessary, change the settings in "Options". Click the "Connect" button. 
4.	Enter a Sm@rtClient password and click "OK".

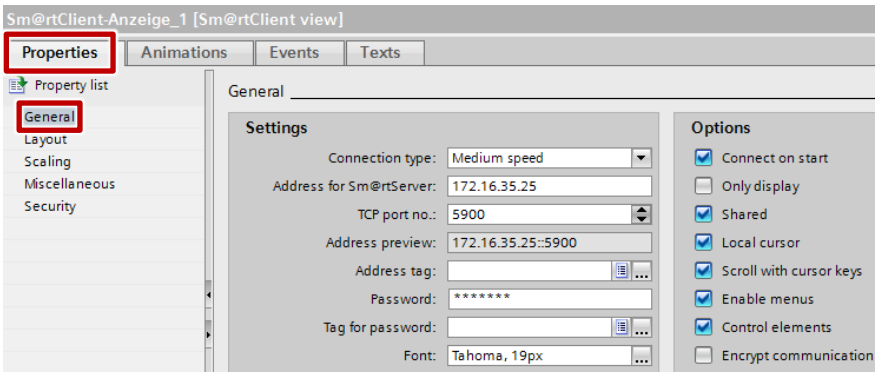
You can save the connection settings and therefore automatically save the Sm@rtClient application without user input.

Table 4-7

No.	Action
1.	When the connection has been established, right-click the title bar of the Sm@rtClient application.
2.	Select "Save connection info as...". 
3.	Select a storage location and a file name and click "Save".
4.	The following warning appears:  Confirm the message with "Yes" only if you can ensure that no unauthorized person can access this file.
5.	Using command prompt or a batch file, you can then open the Sm@rtClient application with this configuration as a parameter. Example: "*smartclient.exe –config Configuration.sac"*

4.2.8 Sm@rtClient control

Table 4-8

No.	Action
1.	Open the WinCC (TIA Portal) project with the operator panel from which you want to access the Sm@rtServer.
2.	Insert the "Sm@rtClient view" control into a screen.
3.	In "Properties > General", enter the IP address or device name, port and, if necessary, other settings. 
4.	In "Properties > Scaling", you can set whether the display will be scaled when using, for example, operator panels with different display sizes.

4.2.9 Internet Explorer

Table 4-9

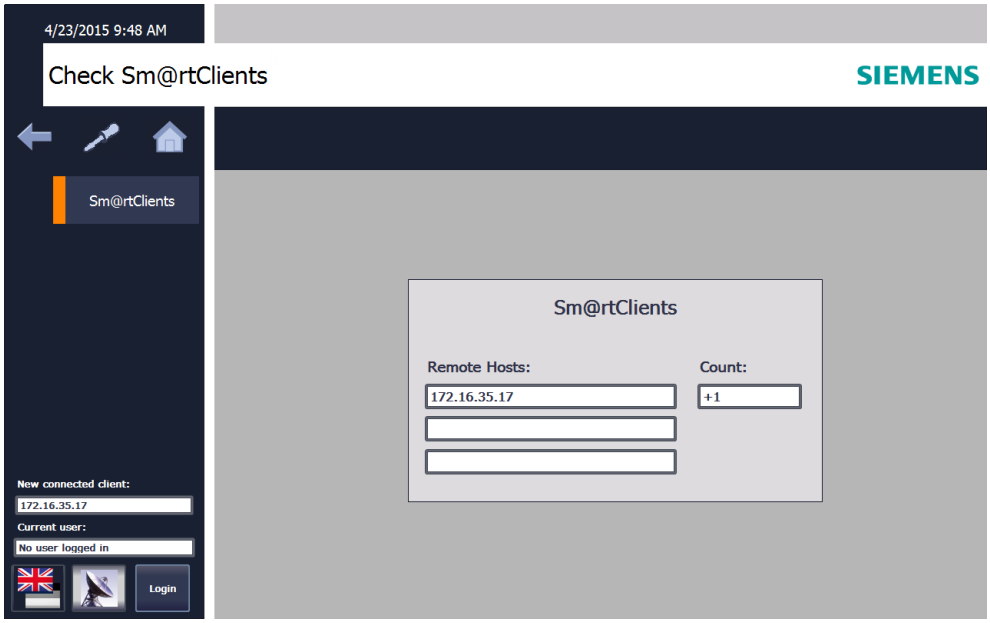
No.	Action
1.	Download Java Runtime from www.java.com and install it.
2.	Open Internet Explorer. In the address bar, enter "http://IP address:port". Enter the Sm@rtServer password and click "OK".

Note More information on the Java security settings can be found here: http://support.automation.siemens.com/WW/view/en/101977511

5 Operation of the Application

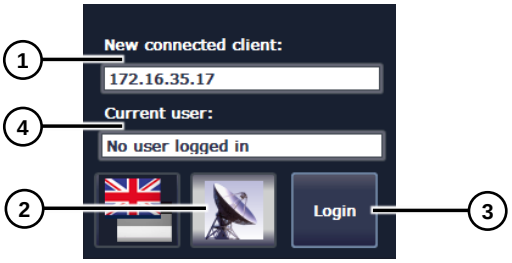
5.1 Overview

Figure 5-1



5.2 Sample project

Figure 5-2



The items included in the screen are part of the "Template_Topic_001" template.

Field 1, "New connected client:", displays the IP address of the Sm@rtClient last connected to the Sm@rtServer. Use static IP addresses on your Sm@rtClients so that the operating staff on site can immediately decide whether unauthorized users are accessing the plant.

Button 2 flashes blue/yellow while one or more Sm@rtClients are accessing the Sm@rtServer. The button is not displayed until a Sm@rtClient is connected. Clicking the button disconnects all connected Sm@rtClients.

Button 3 allows you to log in a user. The sample project contains the following users:

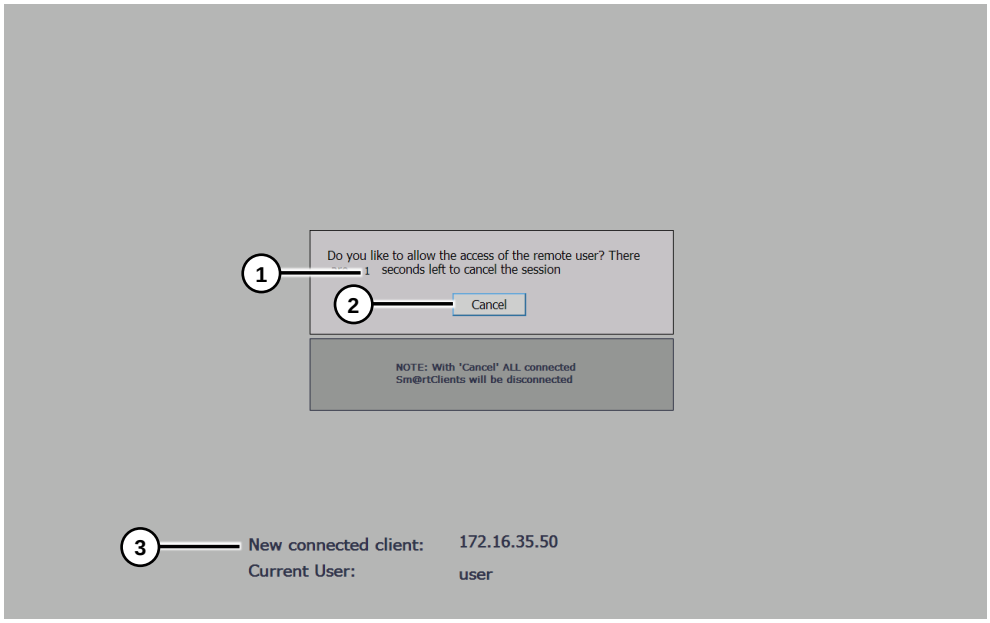
Table 5-1

User name	Password
User	user
Administrator	admin

Field 4 displays the user name of the logged in user.

Logging in a user is necessary for the following function.

Figure 5-3



If a user has logged in to the operator panel and a Sm@rtClient connects to the Sm@rtServer, this user interface appears.

A ten-second time window starts, in which the user can decide whether the connection may be established. An I/O field (1) displays the remaining time.

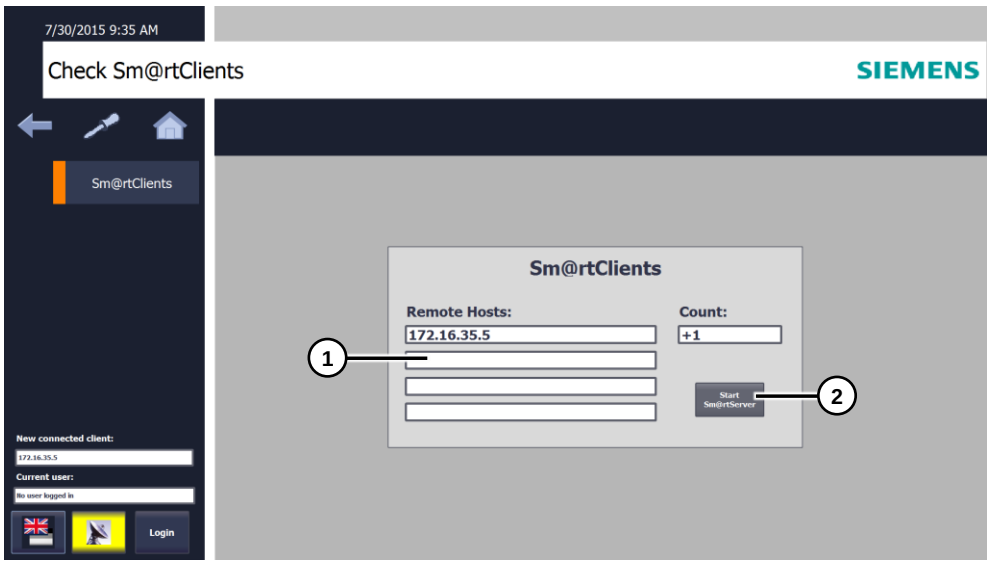
The time can be set in the WinCC project. For details, see the Additional Notes chapter.

The "Cancel" (2) button allows you to terminate the connection. Clicking the button disconnects all connected Sm@rtClients.

The I/O field (3) displays the IP address of the newly connected client so that the operator on site can decide whether this client gains access.

To allow the connection and to be able to access the operator panel, wait until the time expires. Then the previous screen is activated and the locally logged in user is logged out.

Figure 5-4



This screen displays the IP addresses and the number of currently connected Sm@rtClients (1).

To disconnect the connected Sm@rtClients, the Sm@rtServer is restarted. If the Sm@rtServer does not start correctly, you can use the button (2) to start it manually.

5.3 Sm@rtServiceMonitor

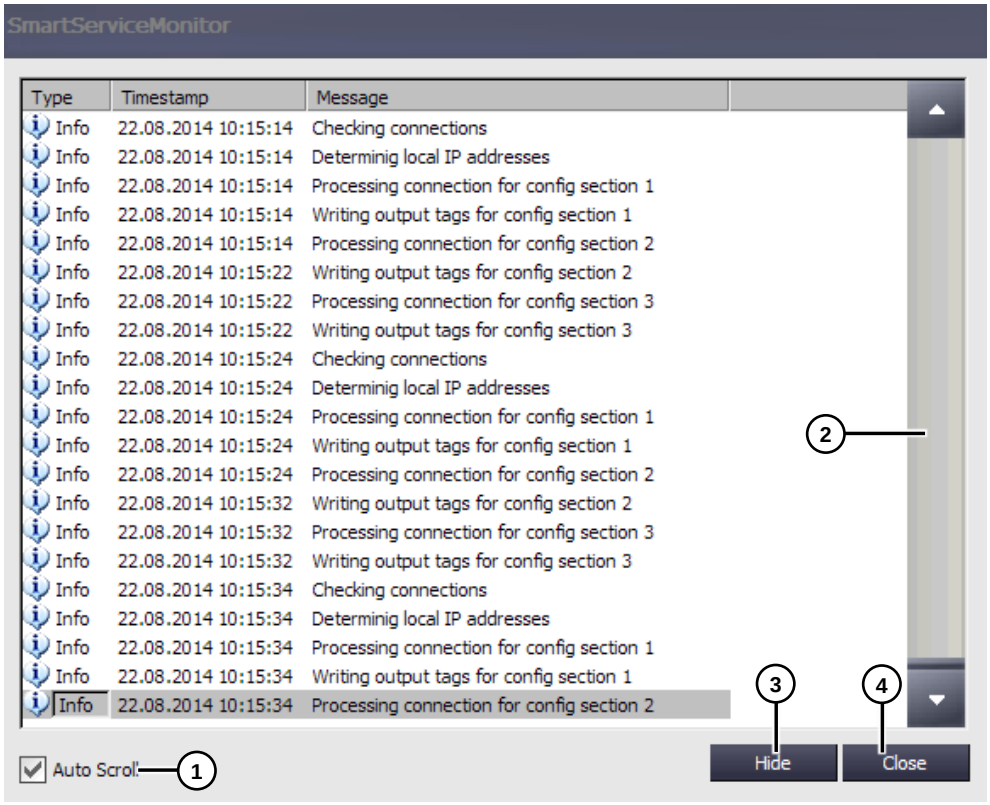
If you are using the tool on a PC, you can copy a shortcut to the tool to the PC's Startup folder.

As can be seen in the screenshot below, the icon bordered in red in the Comfort Panel's/PC's taskbar indicates whether the tool has been started.

Figure 5-5

Double-clicking the icon opens the diagnostic window. It allows you to check whether the "Sm@rtServiceMonitor" tool works correctly.

Figure 5-6



If the "Auto Scroll" check box (1) is checked, the most recent messages are automatically displayed. However, you can also use the scroll bar (2) to search for old entries.

The "Hide" (3) button closes the diagnostic window.

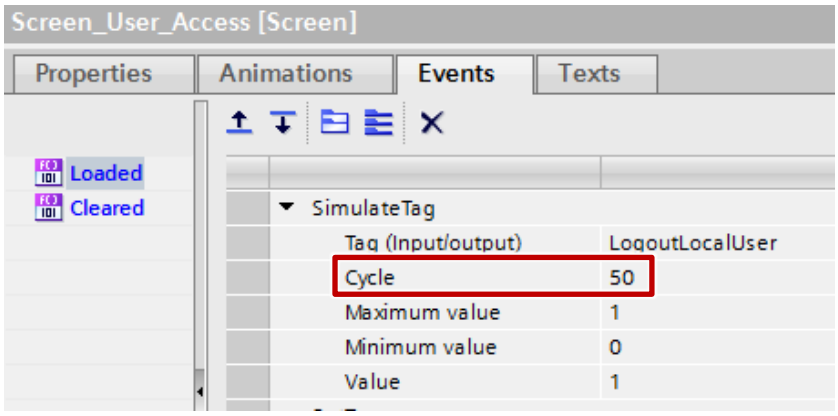
The "Close" (4) button exits the tool.

6 Additional Notes

The time until the remote maintenance user gains access to the operator panel can be set in the WinCC (TIA Portal) project.

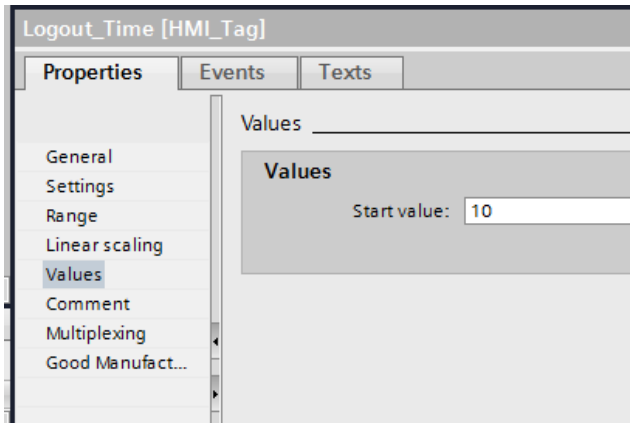
To do this, open the "Screen_User_Access" screen. Open the "Properties > Events" of the screen. Change the cycle of the "SimulateTag" system function with the "LogoutLocalUser" tag. The value corresponds to a multiple of 200 ms, i.e., for example, 50 for 10 seconds.

Figure 6-1



Open the "Tags_SmartClient" tag table. For the "Logout_Time" tag, set the desired time in seconds as the start value.

Figure 6-2



7 Appendix

7.1 Service and support

Industry Online Support

Do you have any questions or need assistance?

Siemens Industry Online Support offers round the clock access to our entire service and support know-how and portfolio.

The Industry Online Support is the central address for information about our products, solutions and services.

Product information, manuals, downloads, FAQs, application examples and videos – all information is accessible with just a few mouse clicks:
support.industry.siemens.com

Technical Support

The Technical Support of Siemens Industry provides you fast and competent support regarding all technical queries with numerous tailor-made offers – ranging from basic support to individual support contracts. Please send queries to Technical Support via Web form:
www.siemens.com/industry/supportrequest

SITRAIN – Training for Industry

We support you with our globally available training courses for industry with practical experience, innovative learning methods and a concept that's tailored to the customer's specific needs.

For more information on our offered trainings and courses, as well as their locations and dates, refer to our web page:
www.siemens.com/sitrain

Service offer

Our range of services includes the following:

- Plant data services
- Spare parts services
- Repair services
- On-site and maintenance services
- Retrofitting and modernization services
- Service programs and contracts

You can find detailed information on our range of services in the service catalog web page:
support.industry.siemens.com/cs/sc

Industry Online Support app

You will receive optimum support wherever you are with the "Siemens Industry Online Support" app. The app is available for iOS and Android operation systems:
support.industry.siemens.com/cs/ww/en/sc/2067

7.2 Links and literature

Table 7-1

No.	Topic
\1\	Siemens Industry Online Support https://support.industry.siemens.com
\2\	Link to this entry page of this application example https://support.industry.siemens.com/cs/ww/en/view/109476153
\3\	SIMATIC WinCC Sm@rtClient for iOS https://itunes.apple.com/gb/app/simatic-wincc-sm-rtclient/id874209707
\4\	SIMATIC WinCC Sm@rtClient for Android https://play.google.com/store/apps/details?id=com.siemens.smartclient&hl=en
\5\	WinCC Advanced manual, Performance features Comfort Panel chapter https://support.industry.siemens.com/cs/ww/en/view/109091876/56146218635
\6\	Application example: SIMATIC HMI Option+ https://support.industry.siemens.com/cs/ww/en/view/109754400

7.3 Change documentation

Table 7-2

Version	Date	Modifications
V1.0	05/2015	First version
V1.1	08/2018	New for WinCC Runtime Advanced, description extended
V1.2	12/2016	TIA Portal V14 update
V1.3	12/2018	Description reduced to WinCC Runtime Advanced; starting with TIA Portal V15, Sm@rtServiceMonitor for Comfort Panels integrated into SIMATIC HMI Option+
V2.0	04/2020	TIA Portal V16 update