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# Accessibility with SCADA

Unrestricted

[www.siemens.com/wincc-v7](http://www.siemens.com/wincc-v7)

# Agenda

- 1 PC-Based User Interfaces with SIMATIC
- 2 Cloud Connectivity with SCADA
- 3 Web Connectivity with SCADA
- 4 Live Demonstration



# SIMATIC HMI Software

## Positioning of PC-based standard solutions



### Production automation

#### WinCC Adv/Unified RT



The PC-based single-user system

#### WinCC Prof/Unified RT



The SCADA system inside TIA Portal

#### WinCC V7



The scalable and open SCADA system for any application

Machines...

...Small plants...

...Large plants

Single-user systems...

...Multi-user systems...

...Distributed systems



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# WinCC V7.5 Cloud Connection

Unrestricted

[www.siemens.com/wincc-v7](http://www.siemens.com/wincc-v7)

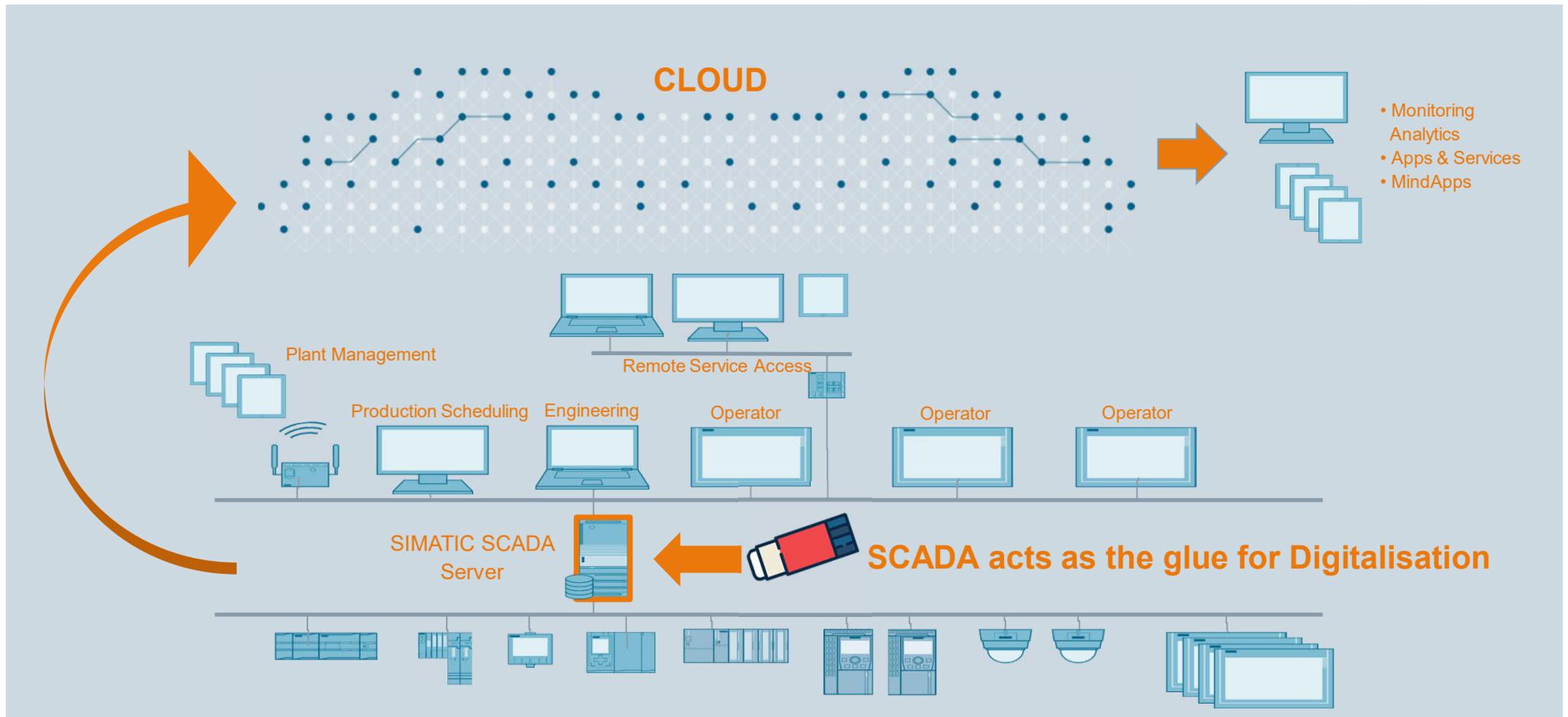
# WinCC V7.5 - Cloud Connection

- 1 General
  - 1.1 Motivation
- 2 What is the Cloud?
- 3 How to connect WinCC V7.5 to the Cloud?
  - 3.1 Configuration on Cloud
  - 3.2 Configuration in WinCC
- 4 Use Cases for Cloud Connection



# Motivation

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## What is the Cloud?



**There is no cloud.  
It is just someone else computer...**

# What is the Cloud?



*“...Cloud computing is shared pools of configurable computer system resources and higher-level services that can be rapidly provisioned with minimal management effort, often over the Internet...”*

## Cloud Provider:

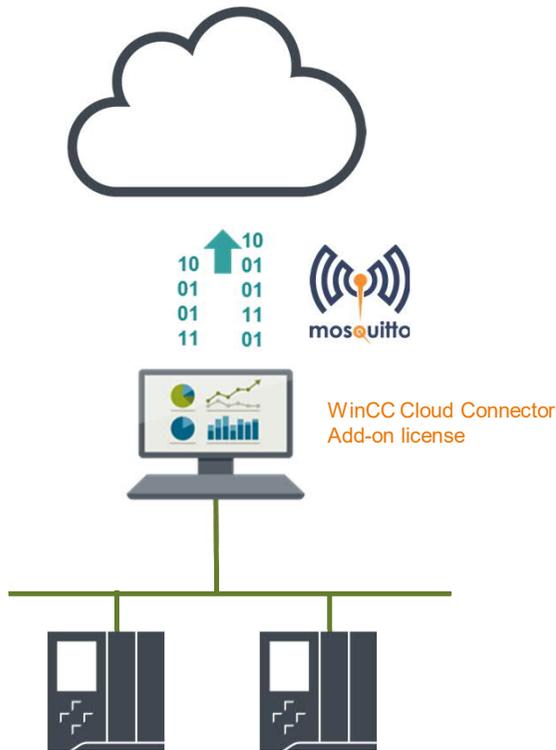


# How to connect WinCC V7.5 to a cloud?



## WinCC as data gateway into the cloud

### Cloud Provider:



Currently supported by WinCC V7.5 SP1

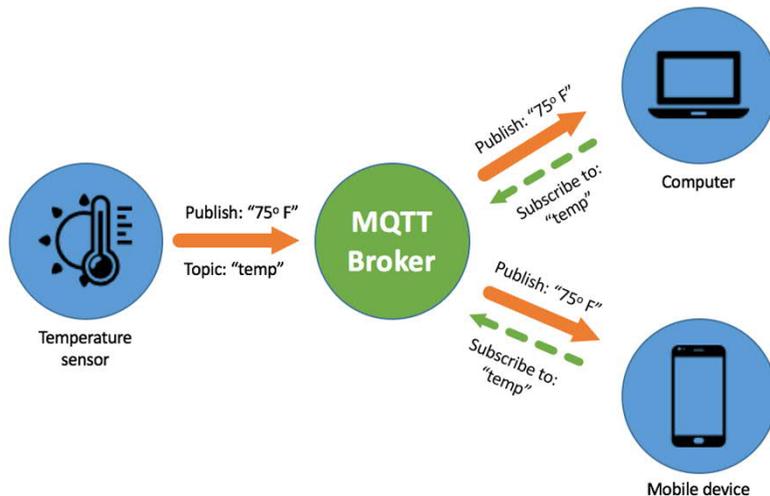
### Further suppliers



# How to connect WinCC V7.5 to a cloud?

## MQTT - Default Protocol of IoT

„...is an open message protocol for machine-to-machine (M2M) communication that allows telemetry data to be transmitted in the form of messages between devices, despite high delays or limited networks.“



- is a client-server protocol
- Clients send messages with a topic to the server ("broker") after the connection has been established
- Clients can subscribe to these topic
- Server forwards news of the topic to subscribers
- Messages always consist of a topic and the message content.

# How to connect WinCC V7.5 to a cloud?

## Schematic representation of the connection using AWS as an example



### Application example „WinCC data connection to the cloud “:

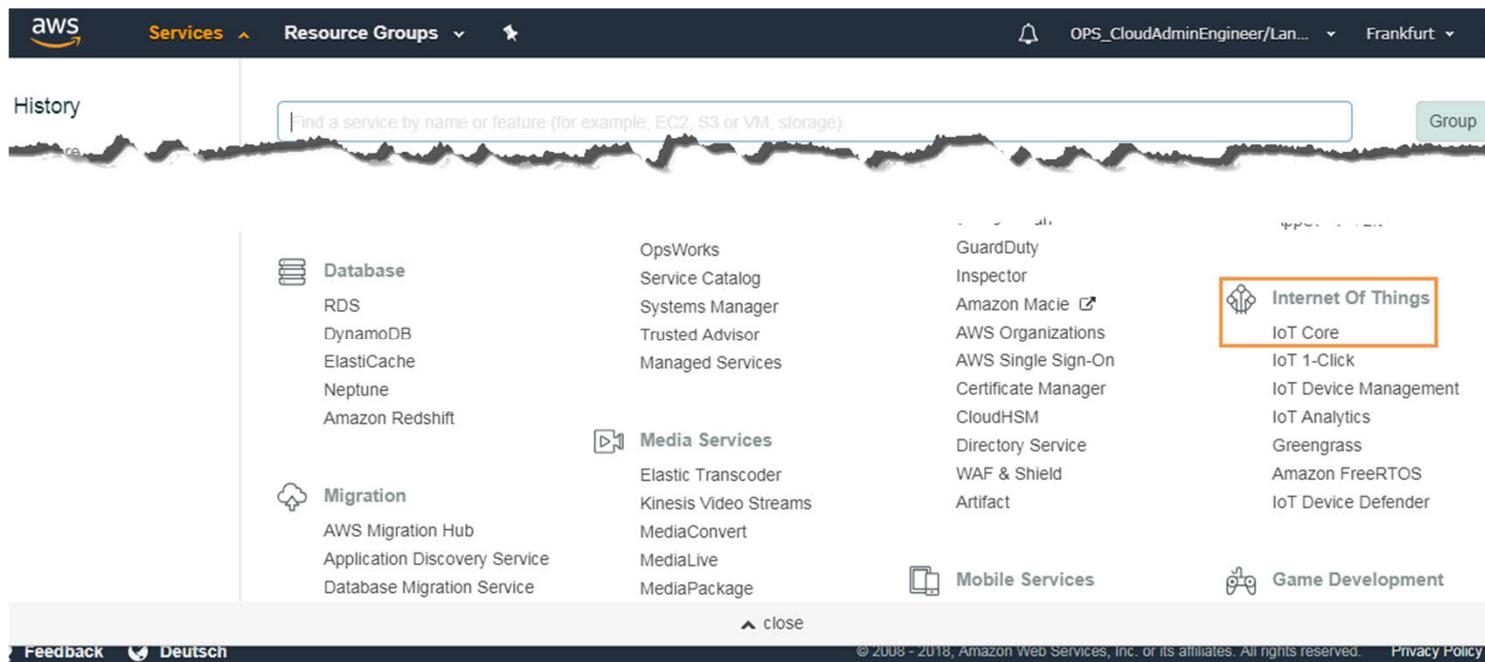
<https://support.industry.siemens.com/cs/de/en/view/109760955>

# How to connect WinCC V7.5 to a cloud?



## Configuration in the Cloud (using AWS as an example)

1. WinCC systems are connected as IoT devices
2. Via the AWS homepage → Internet of Things → IoT Core a new certificate must be created for the connected WinCC system.

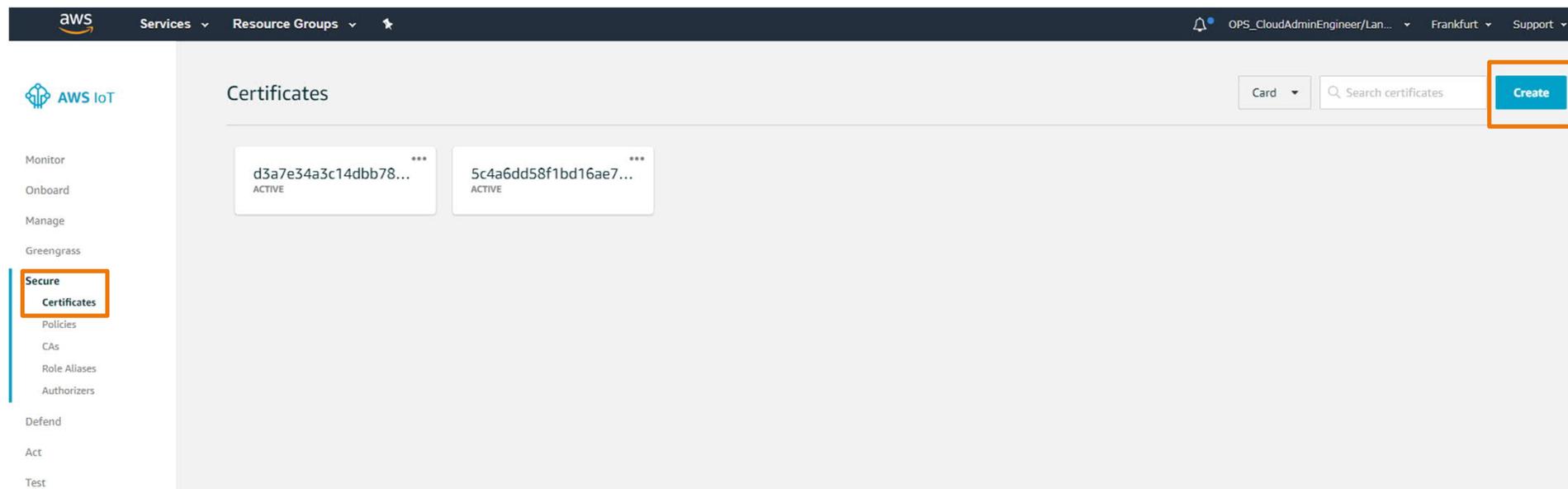


**Prerequisite:**  
The user has created an AWS account in advance.  
<https://aws.amazon.com/de/account/>

# How to connect WinCC V7.5 to a cloud?

## Configuration in the Cloud (using AWS as an example)

1. A separate certificate must be created for each connected WinCC system.
2. A new certificate will be created in the AWS IoT Service under "Secure" → "Certificates"



# How to connect WinCC V7.5 to a cloud?

## Configuration in the Cloud (using AWS as an example)

1. A separate certificate must be created for each connected WinCC system.
2. A new certificate will be created in the AWS IoT Service under "Secure" → "Certificates"

**Create a certificate**

A certificate is used to authenticate your device's connection to AWS IoT.

**One-click certificate creation (recommended)**

This will generate a certificate, public key, and private key using AWS IoT's certificate authority.

**Create certificate**

# How to connect WinCC V7.5 to a cloud?

## Configuration in the Cloud (using AWS as an example)

1. Download all created certificate files one after the other
2. Then activate the certificate and add a policy in the last step.

**Certificate created!** Successful files.

Download these files and save them in a safe place. Certificates can be retrieved at any time, but the private and public keys cannot be retrieved after you close this page.

In order to connect a device, you need to download the following:

A certificate for this thing	ccb923eb7.cert.pem	<a href="#">Download</a>
A public key	ccb923eb7.public.key	<a href="#">Download</a>
A private key	ccb923eb7.private.key	<a href="#">Download</a>

You also need to download a root CA for AWS IoT:  
A root CA for AWS IoT [Download](#)

[Activate](#)

Cancel Done [Attach a policy](#)

# How to connect WinCC V7.5 to a cloud?

## Configuration in the Cloud (using AWS as an example)

1. Create a new policy, following the example of AWS templates (see below)
2. WinCC can currently only write data to the cloud, but not read it back
3. Therefore, only "iot:publish", but not "iot:subscribe" permission is required.

The screenshot shows the AWS IAM console interface for adding a policy to a certificate. At the top, a blue header reads "Add authorization to certificate". Below it, a message states: "You are attaching a policy to the following certificate: ccbf923eb786cf57f2dbbe2c461b7797da3894ac401b35ef6c88a235992a2cf". The main area displays a list of policies. The first policy, "WinCCRestricted", is selected with a blue checkmark and has a "Hide" button. Its JSON policy document is shown in a text area: 

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": "iot:Publish",
      "Resource": "*"
    }
  ]
}
```

 Below the JSON are two other policies: "WinCC" and "PolicyforWinCC", both with "View" buttons. At the bottom left, there is a "Create new policy" button. At the bottom right, a "Done" button is highlighted with an orange border. The status "1 policy selected" is visible at the bottom left.

# How to connect WinCC V7.5 to a cloud?

## Configuration in the Cloud (using AWS as an example)

1. The certificate is then successfully created and can be used.
2. As long as no connection to the cloud is established, it is displayed as "inactive"
3. The detailed view of the certificate can be used to retrieve additional information, such as the attached policy

The screenshot illustrates the AWS IAM console interface. On the left, a list of certificates is shown, with one certificate highlighted. An orange arrow points from this certificate to a detailed view on the right. In the detailed view, the 'Details' tab is selected, and another orange arrow points to the 'Policies' section, which shows a policy named 'WinCCRestricted'.

**CERTIFICATE**  
ccbf923eb786cf5f7f2bbe2c461b7797da3894ac401b35ef6c88a235992a2cf  
INACTIVE Actions ▾

**Details**

Certificate ARN

A certificate Amazon Resource Name (ARN) uniquely identifies this certificate. [Learn more](#)

arn:aws:iot:eu-central-1:378967495175:cert/ccbf923eb786cf5f7f2bbe2c461b7797da3894ac401b35ef6c88a235992a2cf

**Details**

**Issuer**  
OU=Amazon Web Services O\=Amazon.com Inc. L\=Seattle ST\=Washington C\=US

**Subject**  
CN=AWS IoT Certificate

**Create date**  
Nov 20, 2018 8:22:24 AM +0100

**Effective date**  
Nov 20, 2018 8:20:24 AM +0100

**Expiration date**  
Jan 1, 2050 12:59:59 AM +0100

**Policies**

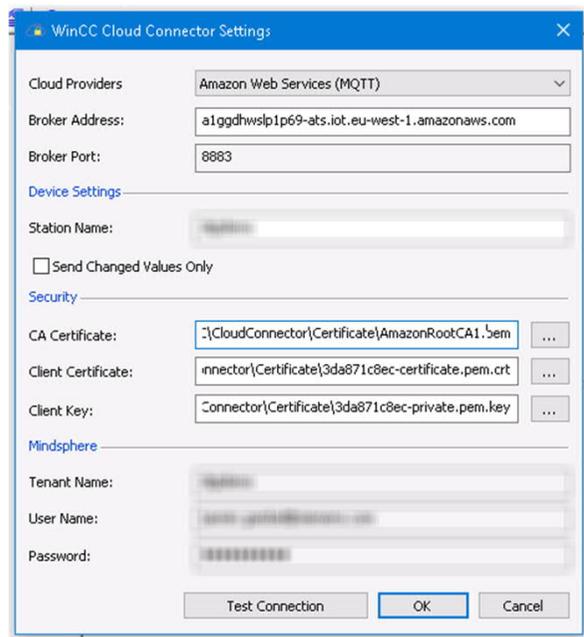
WinCCRestricted

# How to connect WinCC V7.5 to a cloud?

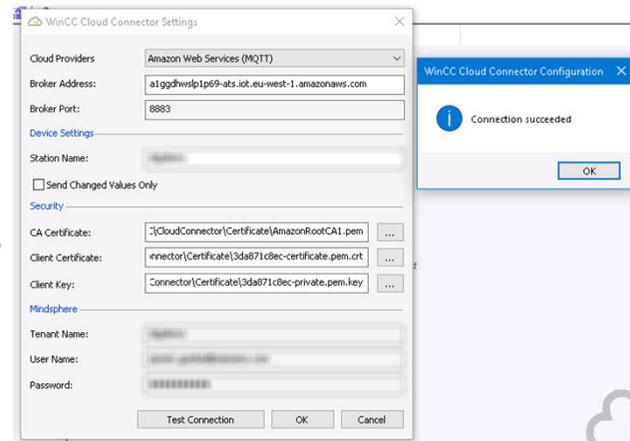


## Configuration in WinCC V7.5

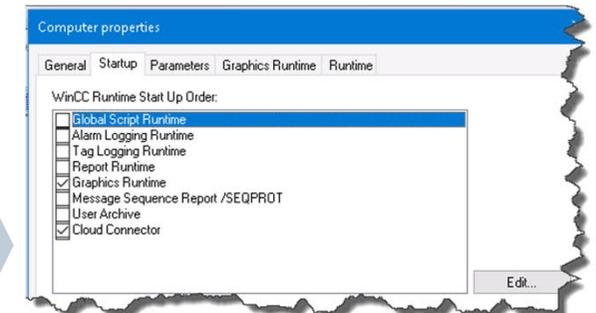
Enter connection information



Test connection via "Test Connection"



Add Cloud Connector to the Start-Up List

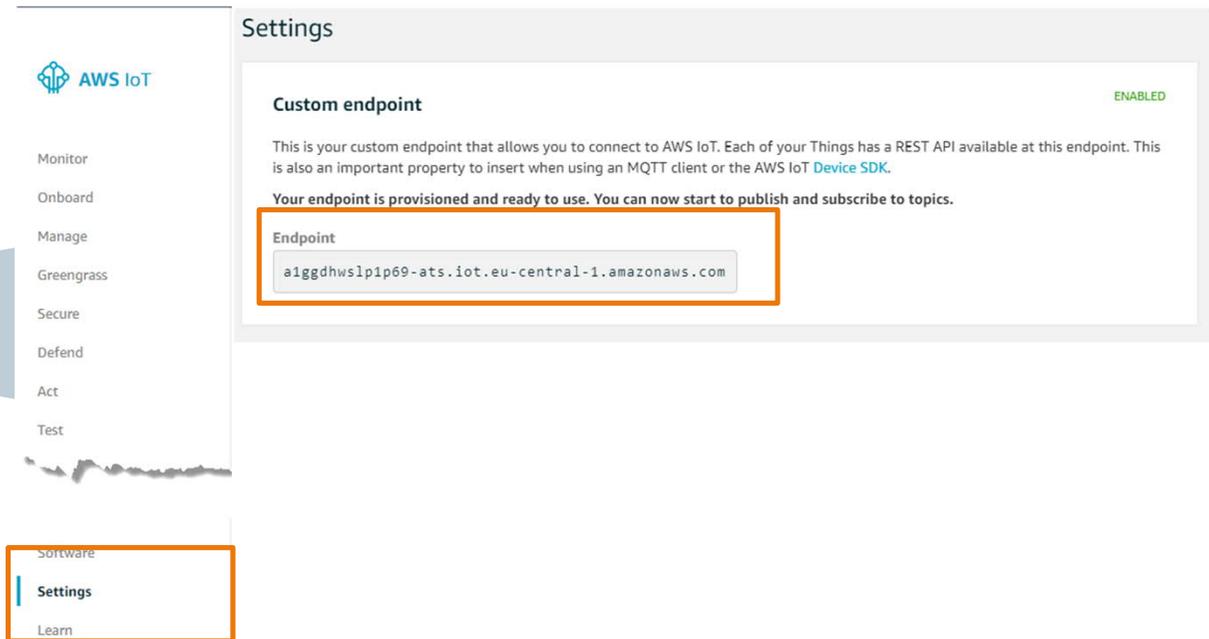
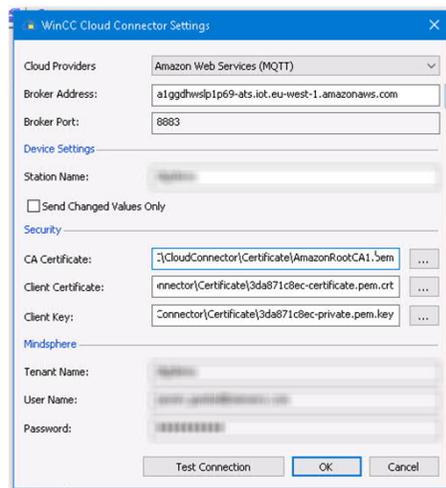


**Certificates must be stored in the following folder :**  
**C:\Program Files (x86)\SIEMENS\WinCC\CloudConnector\Certificate**

# How to connect WinCC V7.5 to a cloud?

## Configuration in WinCC V7.5

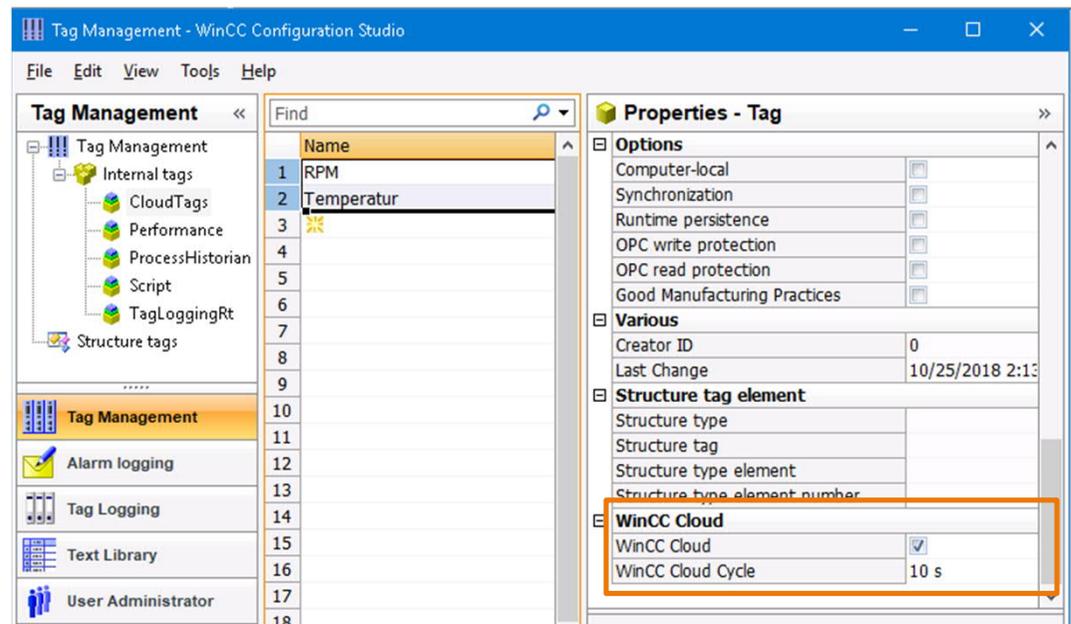
Find the Broker Address:



# How to connect WinCC V7.5 to a cloud?

## Configuration in WinCC V7.5

- In the WinCC data household, flag the corresponding tags with the "WinCC Cloud" flag and define a cycle for the transmission.
- Currently only process values can be sent to the cloud



## How to connect WinCC V7.5 to a cloud?

### How does the WinCC Cloud Connector work?



- Data is collected in "packets" which contain  $X^*$  values and then sent
- If sending has worked, the "packet" is deleted
- If the " packet " could not be sent, it will be saved and will try to send again at the next run.
- Buffer of default 1000 values across all " packets "

\*  $X$  is the number of values per cycle to be sent.

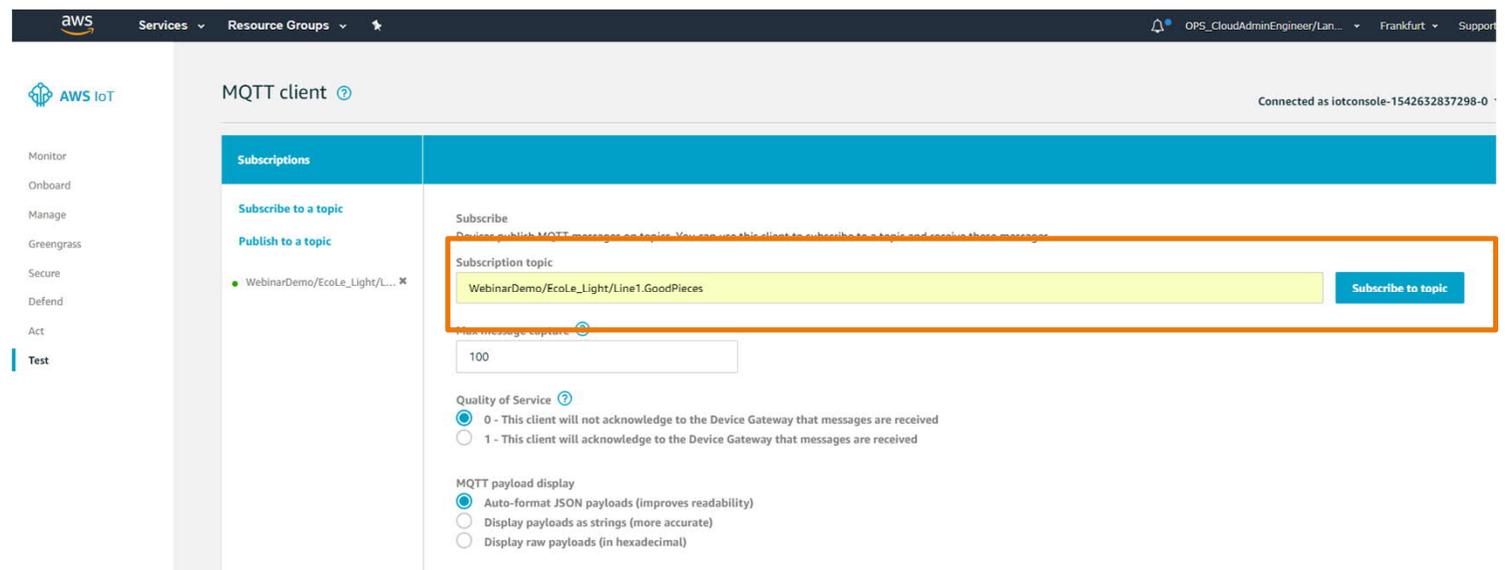


# How to connect WinCC V7.5 to a cloud?



## Configuration in WinCC V7.5 - Transmission test

- Via IoT Core → Test
- Subscription topic consists of:  
**StationName/Project/Tag**



# How to connect WinCC V7.5 to a cloud?

## Configuration in WinCC V7.5 - Result

- Connection from WinCC to AWS is established
- Tags marked as "WinCC Cloud" are displayed together with name and timestamp.
- **Data processing and storage in the cloud are the task of the user!**

The screenshot displays the AWS IoT console interface for an MQTT client. The top navigation bar includes the AWS logo, 'Services', 'Resource Groups', and user information 'OPS\_CloudAdminEngineer/Lan...'. The main content area is titled 'MQTT client' and shows a 'Subscriptions' list on the left with two entries for 'WebinarDemo/EcoLe\_Light/Line1.GoodPieces'. The right pane shows the 'Publish' section with a text input containing the topic name and a 'Publish to topic' button. Below this, a message history section shows a message received at 'Nov 19, 2018 8:27:47 AM +0100' with a JSON payload: 

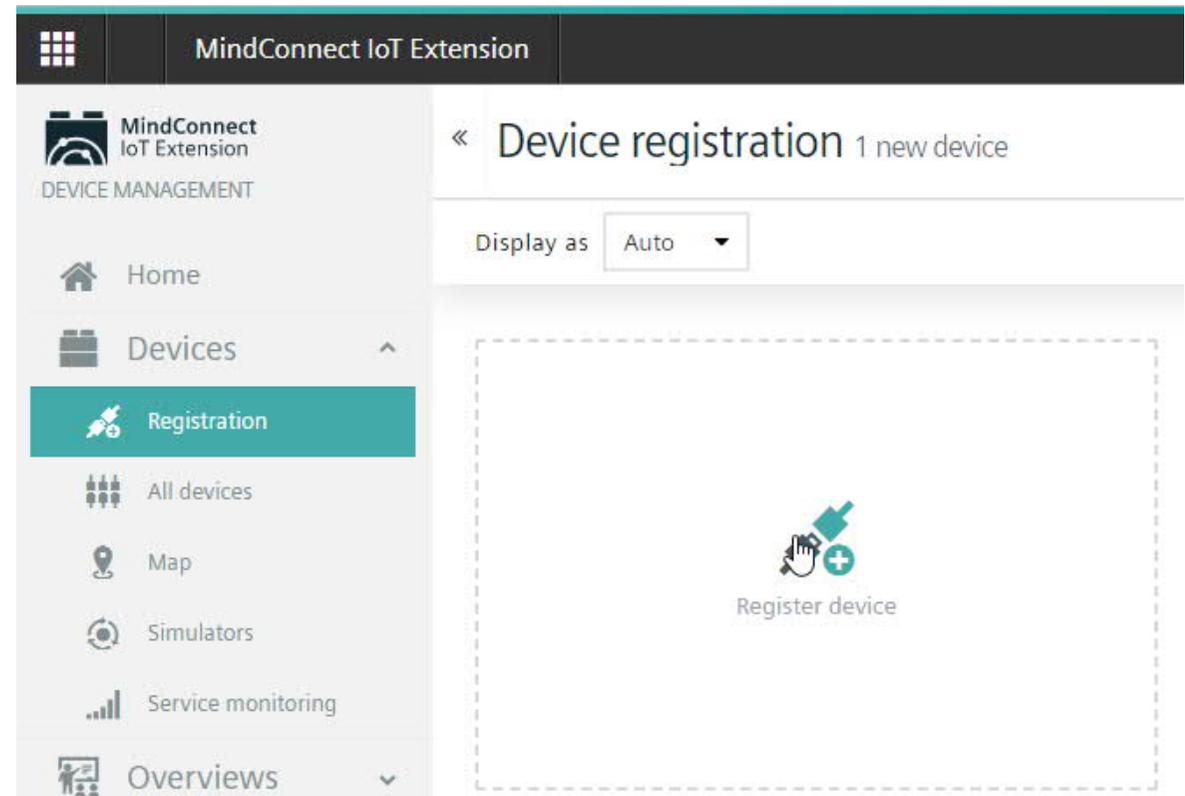
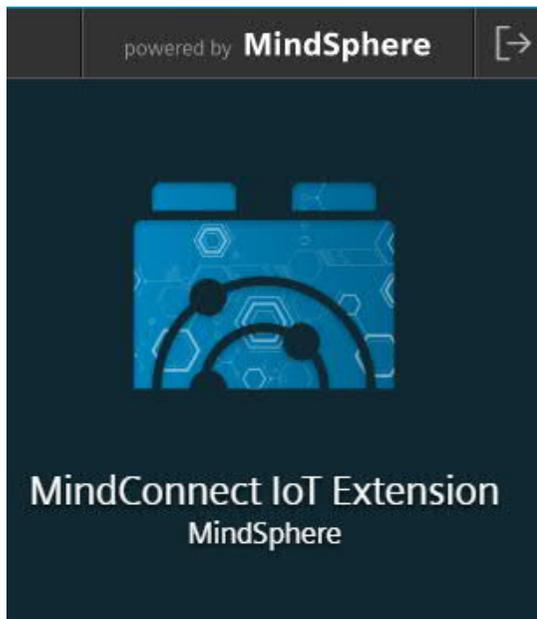
```
{
  "time": "2018-11-19T07:27:47.283Z",
  "name": "Line1.GoodPieces",
  "value": 22,
  "qualityCode": 128
}
```

 The message history also includes a 'WebinarDemo/EcoLe\_Light/Line1.GoodPieces' entry for 'Nov 19, 2018 8:27:48 AM +0100' with a similar JSON payload. The bottom of the console shows a footer with 'Feedback', 'English (US)', and copyright information.

# How to connect WinCC V7.5 SP1 to Mindsphere?



## Configuration in Mindsphere



# How to connect WinCC V7.5 SP1 to Mindsphere?

## Device registration in MindSphere IoT Extension



REGISTER DEVICES

Select one of the available options  
Find your device type in the Device Guides to get more information.

- General device registration
- Bulk device registration

Cancel



REGISTER DEVICES

DEVICE INFO REGISTRATION

Device ID  
EDWCC75SP1-158

Add to group  
WinCC Stationen

+ Add another device

Back Next



REGISTER DEVICES

DEVICE INFO REGISTRATION

Device registered.

Turn on the registered device(s) and wait for connection(s) to be established. Once a device is connected, its status will change to "Pending acceptance". You will need to approve it by clicking on the "accept" button.

✓ EDWCC75SP1-158

Complete

# How to connect WinCC V7.5 SP1 to Mindsphere?



## Configuration in WinCC V7.5 SP1

### Enter connection information

WinCC Cloud Connector Settings

Cloud Providers: MindSphere (MindConnect IoT Extension)

Broker Address: mqtt.mciotextension.eu1.mindsphere.io

Broker Port: 8883

Device settings

Station Name: EDWCC75SP1-158

Send Changed Values Only

MindSphere

Register WinCC as device for MindConnect IoT Extension to establish the connection. The station name corresponds to the device ID when registering the MindConnect device.

You can no longer change the configuration after the registration.

User name:

Password:

Test connection OK Cancel Help

### Register device

WinCC Cloud Connector Settings

Cloud Providers: MindSphere (MindConnect IoT Extension)

Broker Address: mqtt.mciotextension.eu1.mindsphere.io

Broker Port: 8883

Device settings

Station Name: EDWCC75SP1-158

Send Changed Values Only

MindSphere

Register WinCC as device for MindConnect IoT Extension to establish the connection. The station name corresponds to the device ID when registering the MindConnect device.

You can no longer change the configuration after the registration.

User name:

Password:

Register

WinCC Cloud Connector Configuration

The configuration is saved prior to registering WinCC. Confirm the device registration in MindConnect IoT Extension with "Accept".

OK Cancel

WinCC Cloud Connector Settings

Cloud Providers: MindSphere (MindConnect IoT Extension)

Broker Address: mqtt.mciotextension.eu1.mindsphere.io

Broker Port: 8883

Device settings

Station Name: EDWCC75SP1-158

Send Changed Values Only

MindSphere

Register WinCC as device for MindConnect IoT Extension to establish the connection. The station name corresponds to the device ID when registering the MindConnect device.

You can no longer change the configuration after the registration.

User name: device\_EDWCC75SP1-158

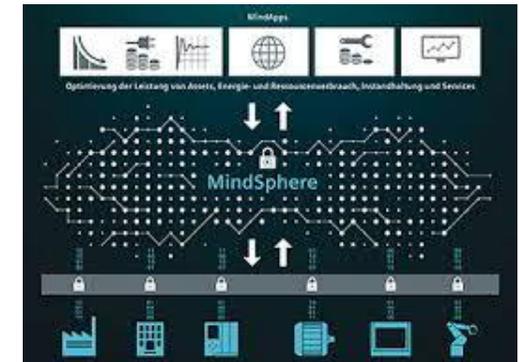
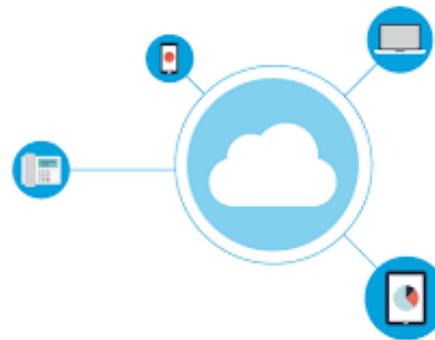
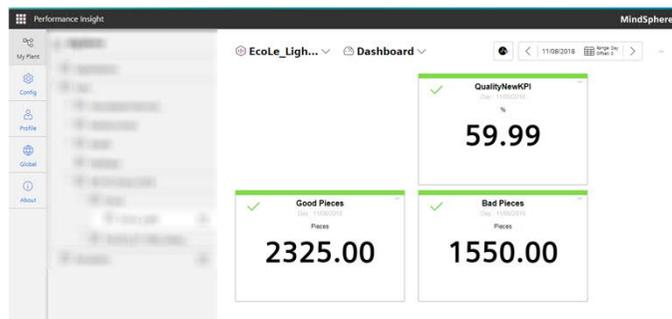
Password: .....

Test connection OK Cancel Help

# Use Cases for Cloud Connection



- Dashboards with KPIs based on WinCC values
- Openness towards Cloud Communication
- Cloud based applications already exist at the user's site
- Comparability across several stations worldwide / nationwide



Thank you very much for your attention!

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