

# Accessibility with SCADA

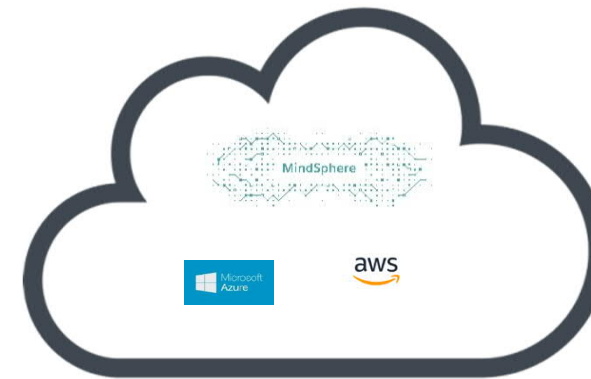
Unrestricted

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

# Agenda

**SIEMENS**  
*Ingenuity for life*

- 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**



# 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

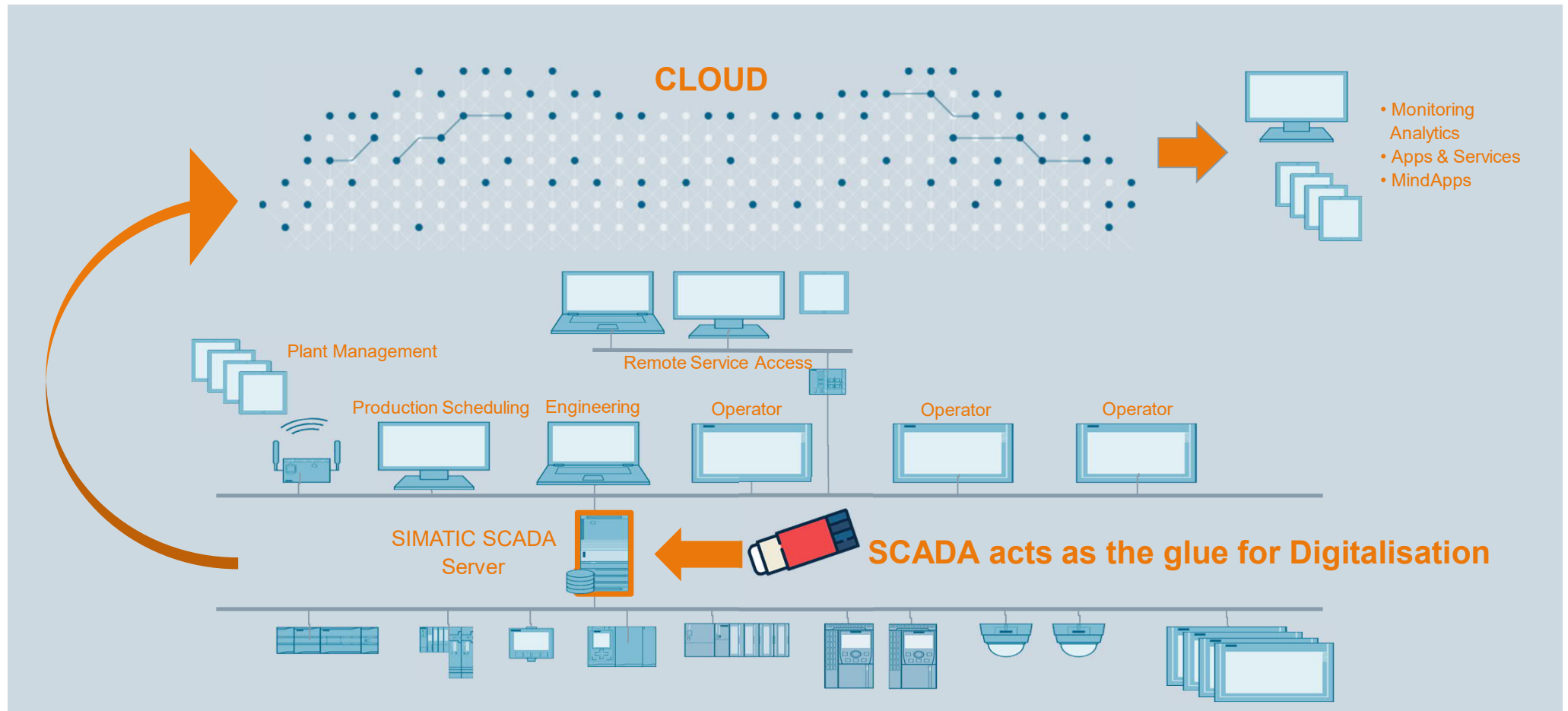


  
Windows  
Server 2019



# Motivation

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*Ingenuity for life*



## 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:



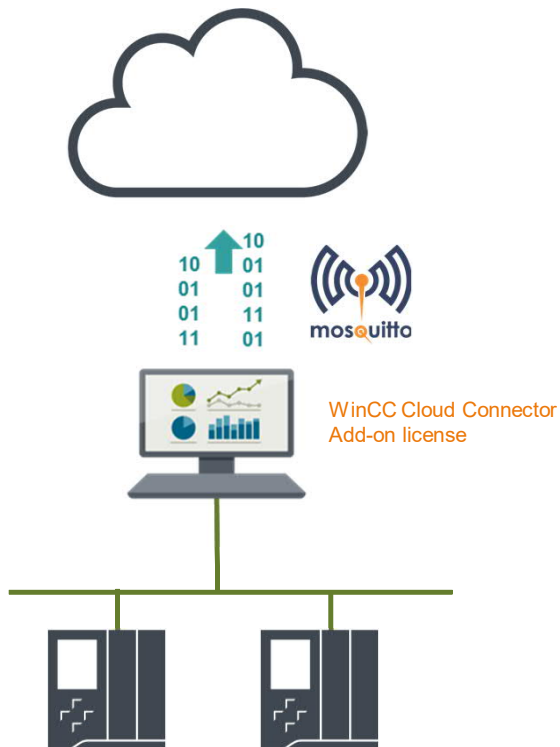


# How to connect WinCC V7.5 to a cloud?



## WinCC as data gateway into the cloud

### Cloud Provider:



Currently supported by WinCC V7.5 SP1

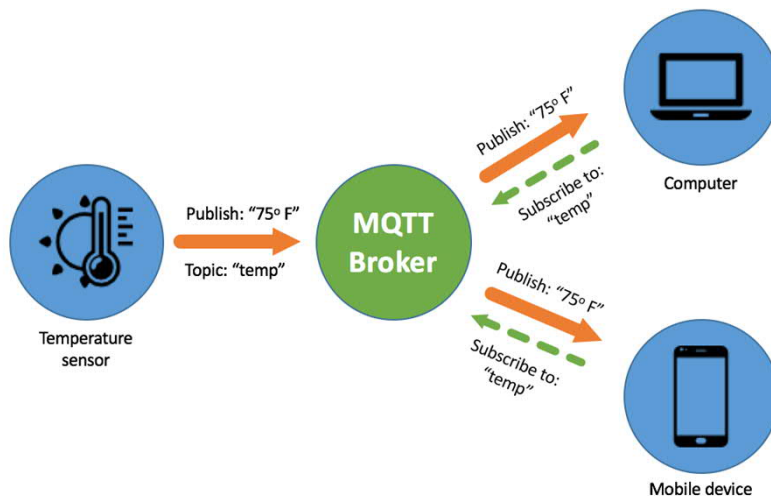
### Further suppliers



# 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>

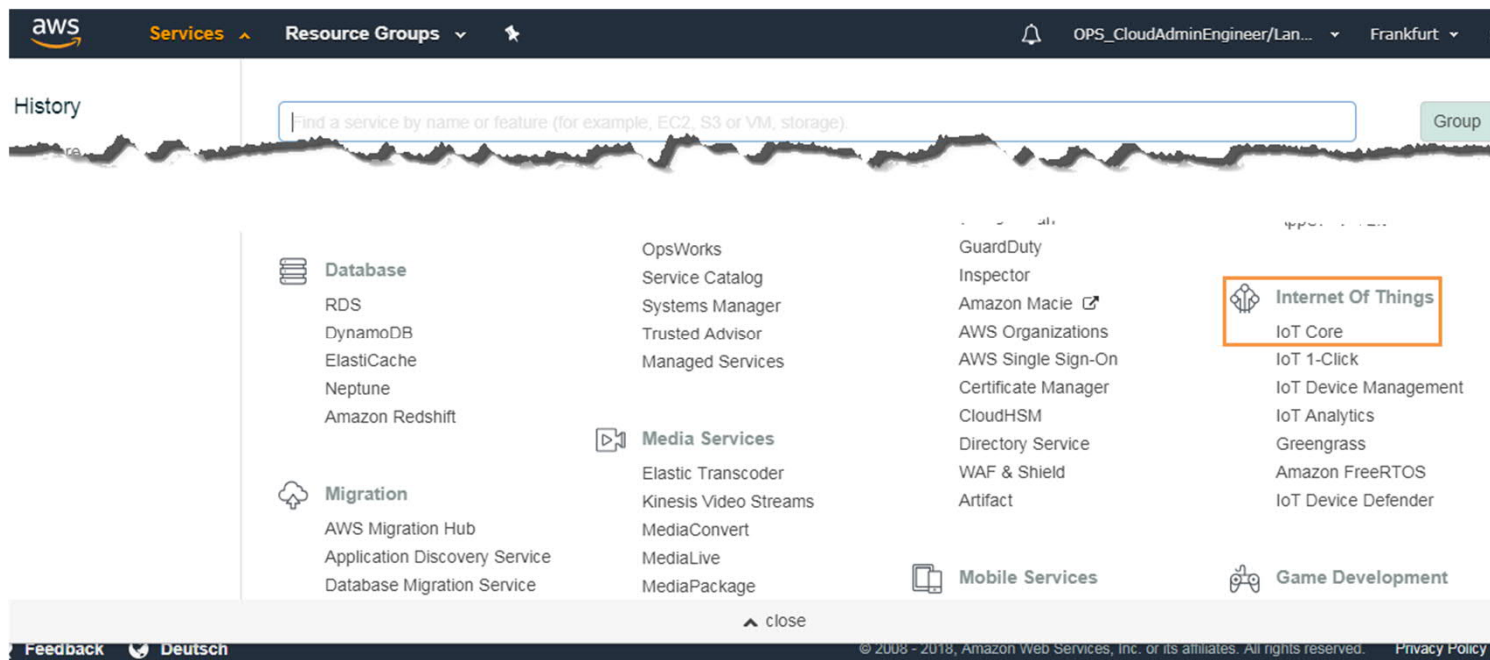


# How to connect WinCC V7.5 to a cloud?



## 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.

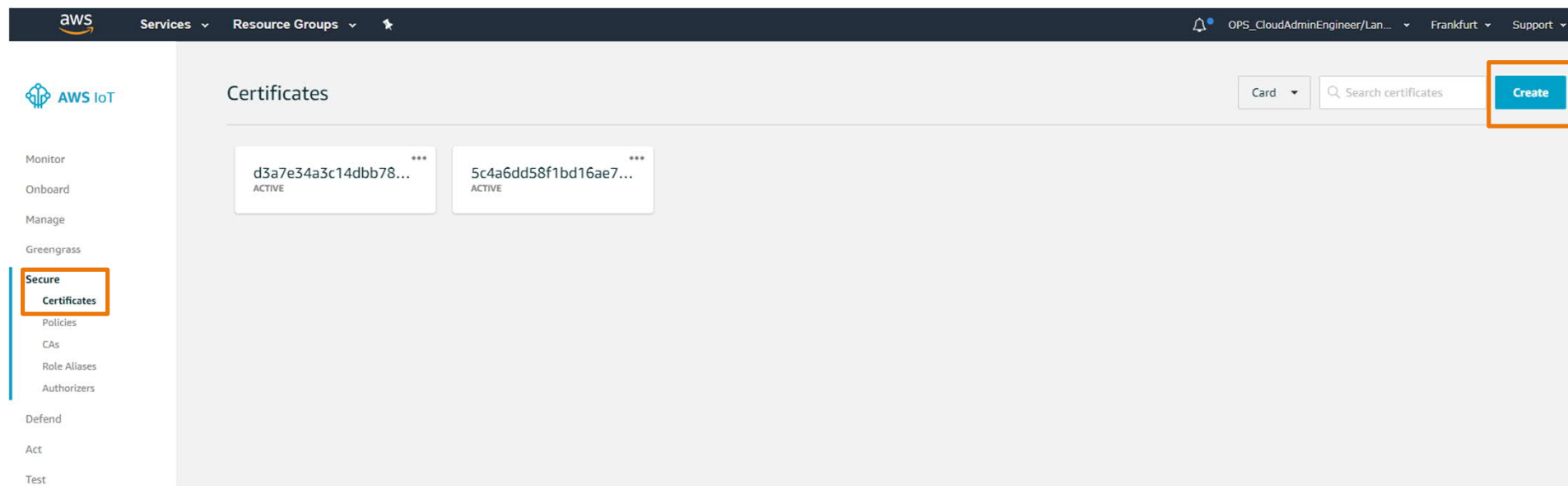
<https://aws.amazon.com/de/account/>

# 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.

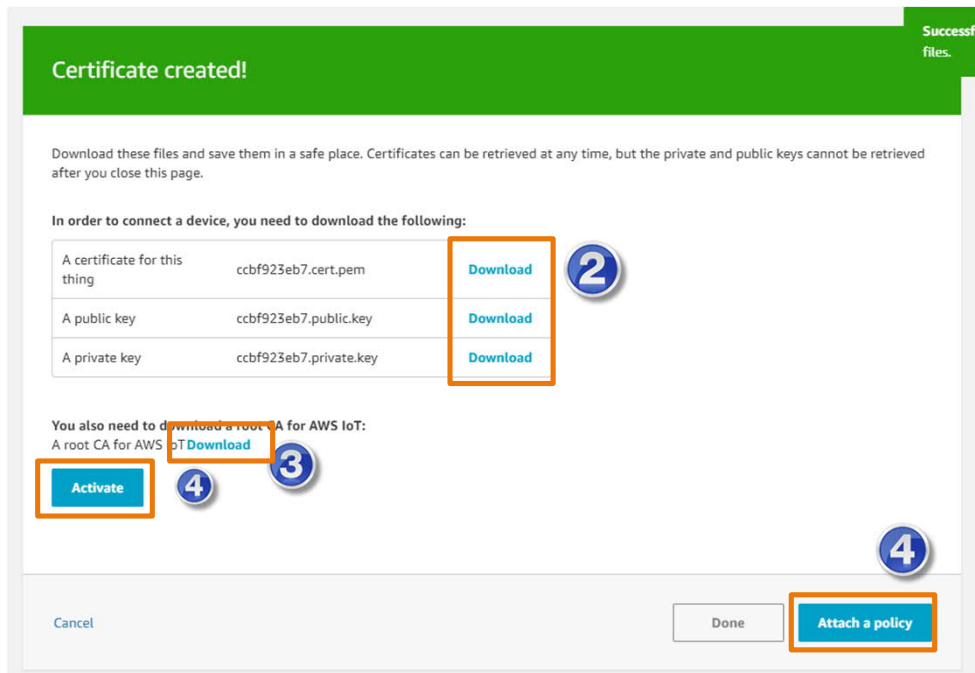
Create certificate



# 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.



# 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.

**Add authorization to certificate**

You are attaching a policy to the following certificate:  
ccbf923eb786cf5f7f2dbbe2c461b7797da3894ac401b35ef6c88a235992a2cf

☒ WinCCRestricted [Hide](#)

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

☐ WinCC [View](#)

☐ PolicyforWinCC [View](#)

[Create new policy](#)

1 policy selected

[Done](#)

# 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 IoT console interface. On the left, a list of certificates is shown, with one certificate highlighted: `ccbf923eb786cf5f7f2...` with a status of `INACTIVE`. An orange arrow points from this certificate to the main details view on the right. In the details view, the `Details` tab is selected and highlighted with an orange box. Below the tab, the `Policies` section shows a policy named `WinCCRestricted`. The `Details` section provides further information about the certificate, including its ARN, issuer, subject, and dates.

**CERTIFICATE**  
`ccbf923eb786cf5f7f2dbbe2c461b7797da3894ac401b35ef6c88a235992a2cf`  
`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/ccbf923eb786cf5f7f2dbbe2c461b7797da3894ac40`

**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

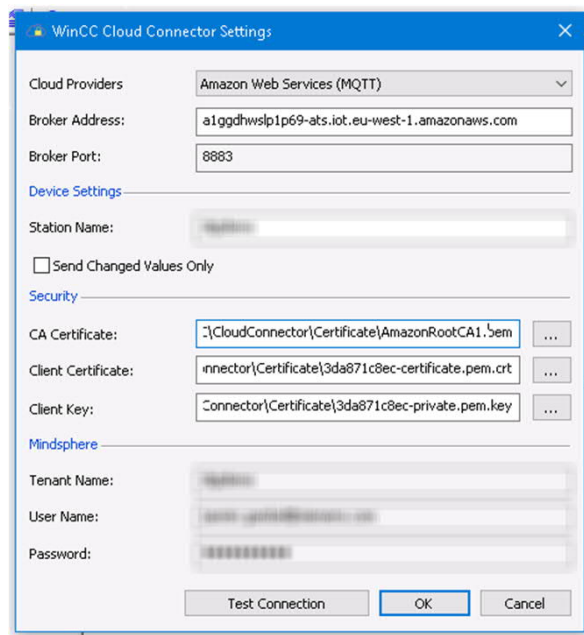
**Expiration date**  
Jan 1, 2050 12:59:59 AM +0100



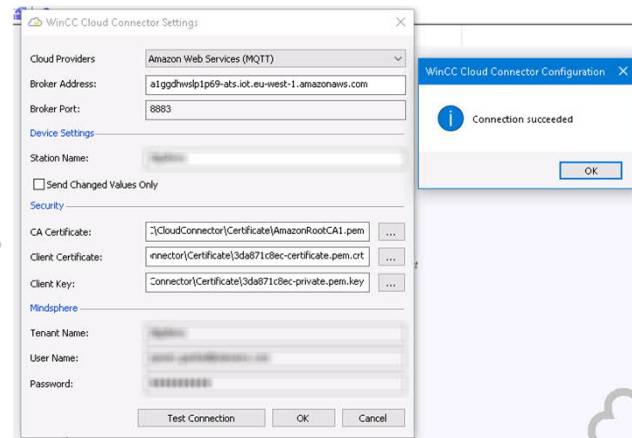
# How to connect WinCC V7.5 to a cloud?

## Configuration in WinCC V7.5

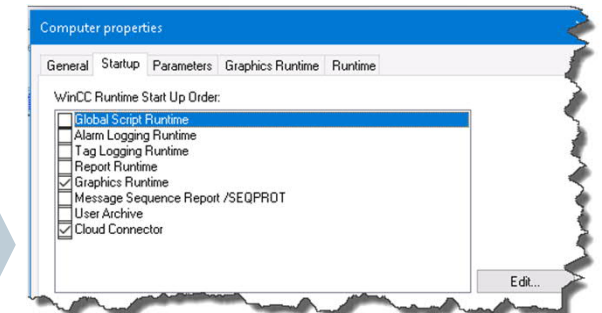
Enter connection information



Test connection via "Test Connection"



Add Cloud Connector to the Start-Up List

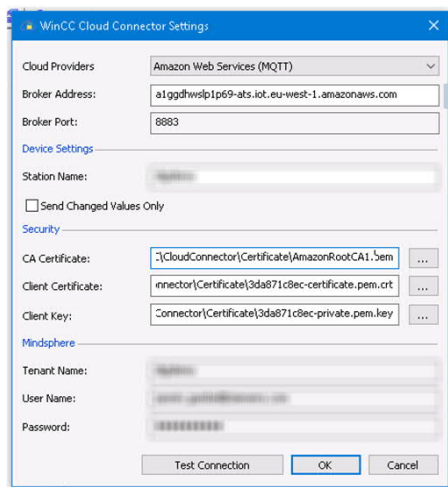


**Certificates must be stored in the following folder :**  
**C:\Program Files (x86)\SIEMENS\WinCC\CloudConnector\Certificate**

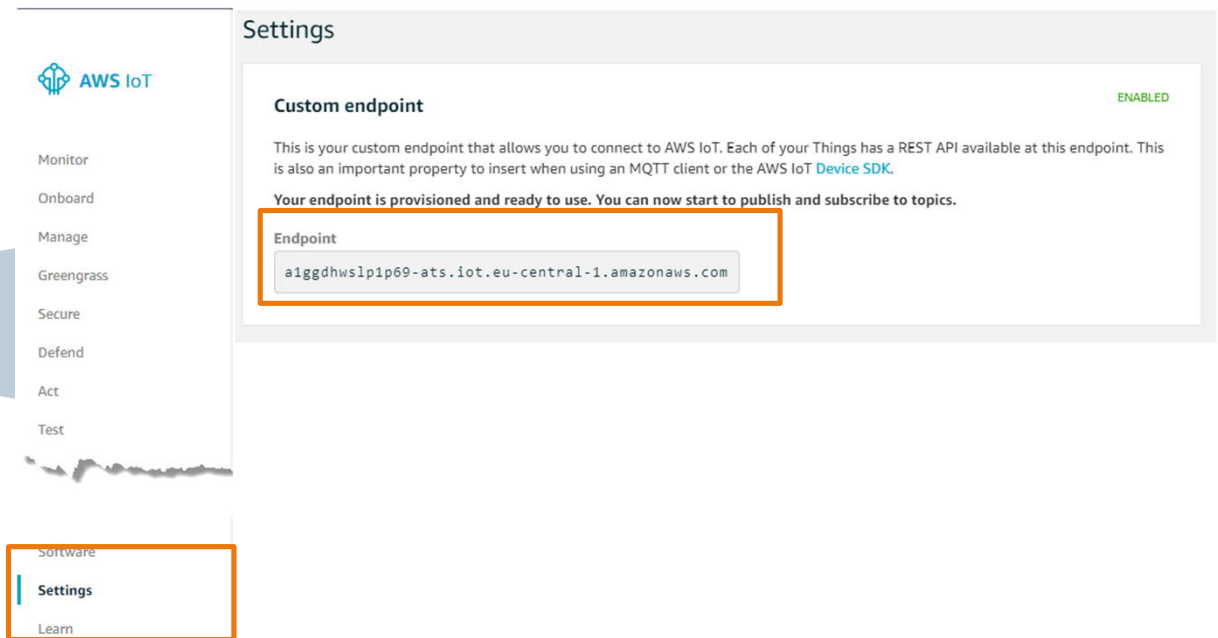
# How to connect WinCC V7.5 to a cloud?

## Configuration in WinCC V7.5

Find the Broker Address:



The WinCC Cloud Connector Settings dialog box is shown. It has several sections: Cloud Providers (set to Amazon Web Services (MQTT)), Broker Address (a1gddhws1p69-ats.iot.eu-west-1.amazonaws.com), Broker Port (8883), Device Settings (Station Name), Security (CA Certificate, Client Certificate, Client Key), and Mindsphere (Tenant Name, User Name, Password). A blue arrow points from the Broker Address field to the AWS IoT console screenshot on the right.

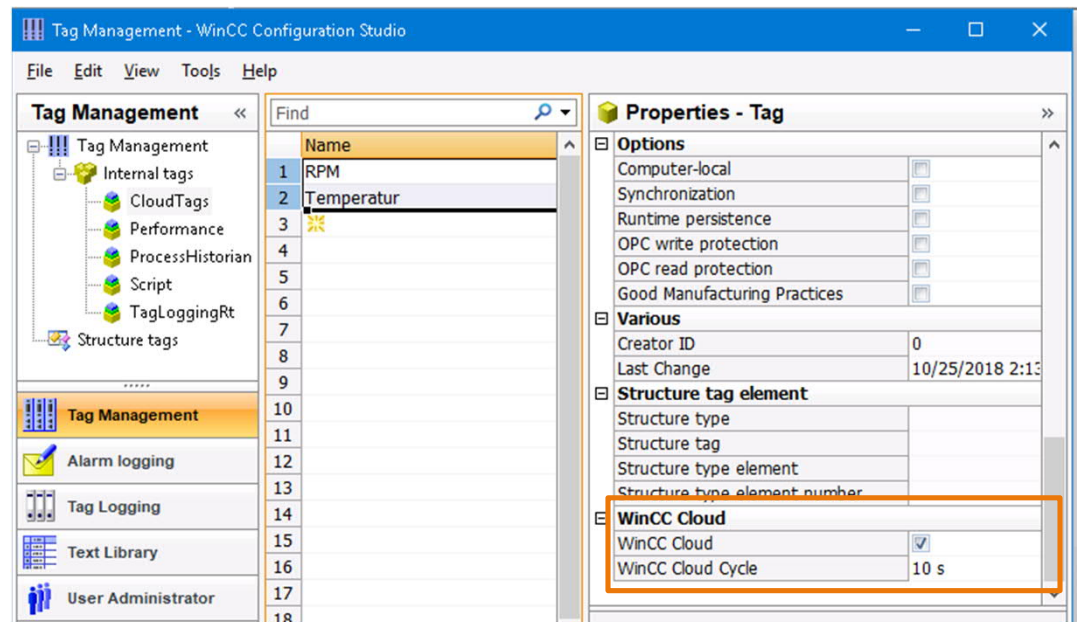


The AWS IoT console Settings page is shown. The left sidebar has a menu with options: Monitor, Onboard, Manage, Greengrass, Secure, Defend, Act, and Test. The 'Settings' option is highlighted with an orange box. The main content area is titled 'Settings' and shows the 'Custom endpoint' status as 'ENABLED'. It explains that this is the custom endpoint for connecting to AWS IoT. Below this, the 'Endpoint' field is highlighted with an orange box and contains the value 'a1gddhws1p69-ats.iot.eu-central-1.amazonaws.com'.

# 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***

The screenshot shows the AWS IoT console's MQTT client interface. The 'Subscriptions' tab is active. Under the 'Subscribe to topic' section, the 'Subscription topic' field is populated with 'WebinarDemo/EcoLe\_Light/Line1.GoodPieces'. The 'Subscribe to topic' button is visible. Below this, the 'Quality of Service' is set to 0, and the 'MQTT payload display' is set to 'Auto-format JSON payloads (improves readability)'.

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

## Configuration in WinCC V7.5 - Result

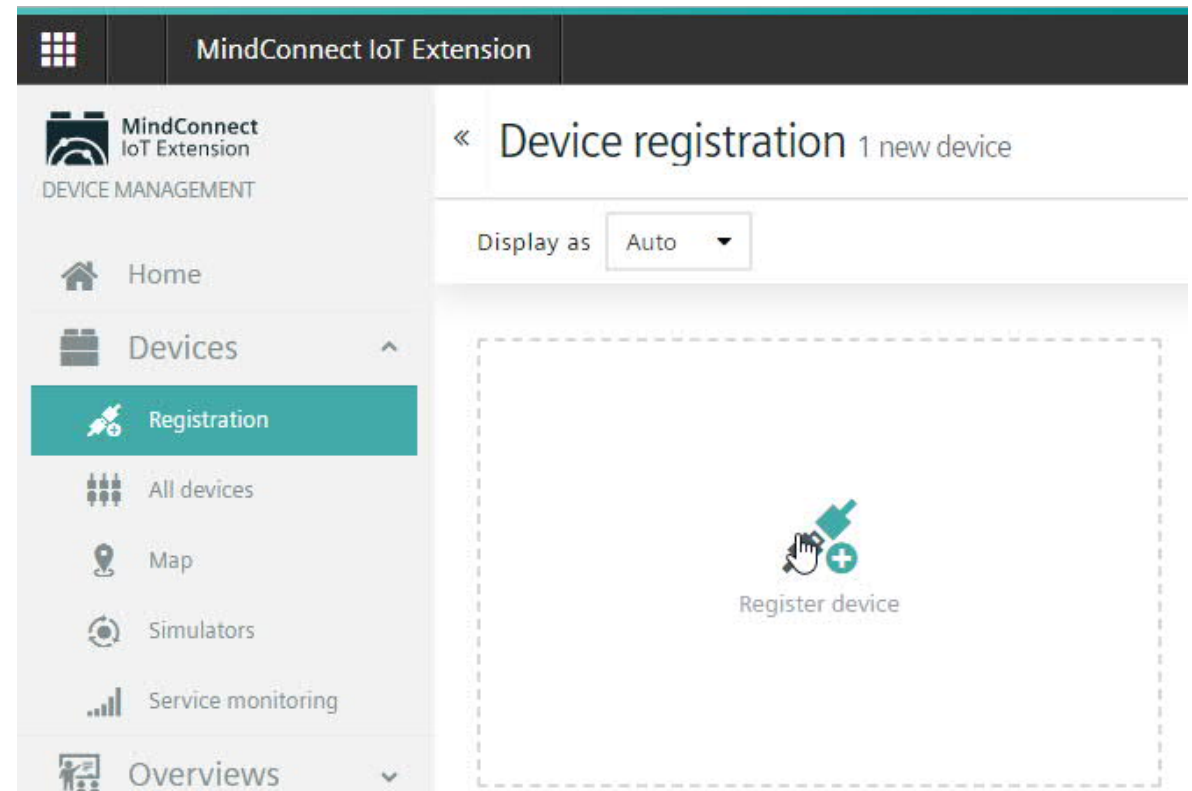
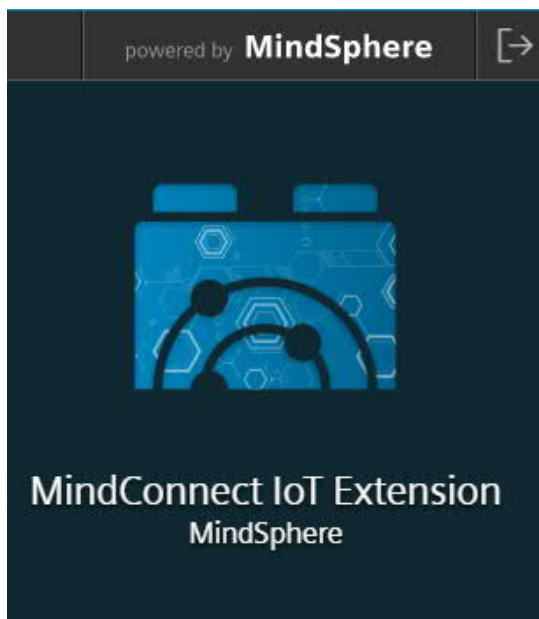
- Connection from WinCC to AWS is established
- Tags marked as "WinCC Cloud" are displayed together with name and timestamp.
- **Data processing and storage in the cloud are the task of the user!**

The screenshot displays the AWS IoT console's MQTT client interface. On the left, a sidebar lists navigation options: Monitor, Onboard, Manage, Greengrass, Secure, Defend, Act, Test, Software, Settings, and Learn. The main area is titled 'MQTT client' and shows a 'Subscriptions' list with two entries: 'WebinarDemo/EcoLe\_Light/L...' and 'WebinarDemo/EcoLe\_Light/...'. The 'Publish' section allows users to specify a topic and a message to publish with a QoS of 0. The 'Publish to topic' button is visible. Below this, a message history section shows a message received at 'Nov 19, 2018 8:27:48 AM +0100'. The message payload is a JSON object: {\"time\": \"2018-11-19T07:27:47.283Z\", \"name\": \"Line1.GoodPieces\", \"value\": 22, \"qualityCode\": 128}. This message is highlighted with an orange box. The bottom of the console shows a footer with 'Feedback', 'English (US)', and copyright information for Amazon Web Services, Inc.

# 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:

Test connection OK Cancel Help

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

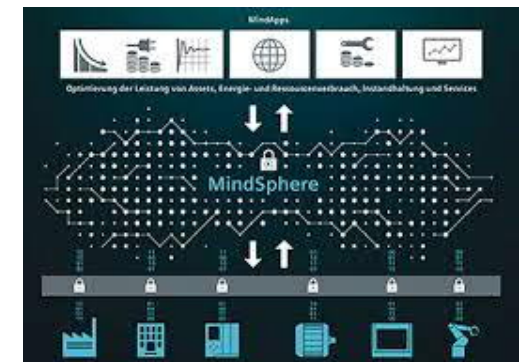
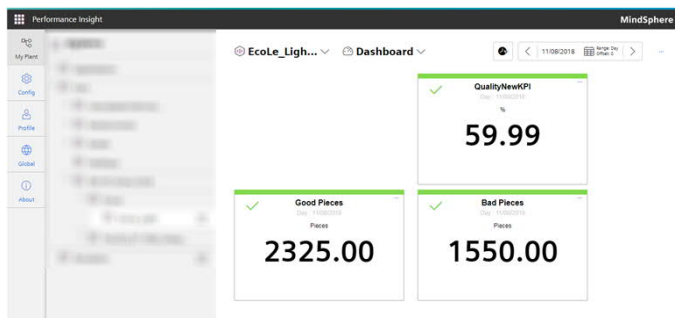
Password: .....

Test connection OK Cancel Help

# Use Cases for Cloud Connection

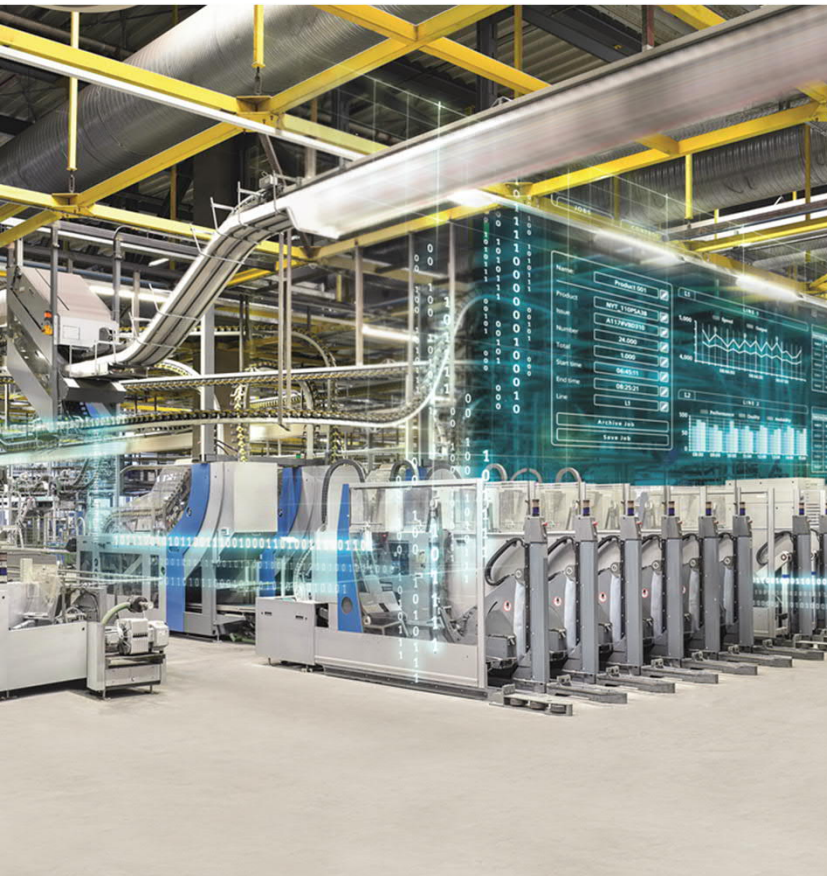


- Dashboards with KPIs based on WinCC values
- Openness towards Cloud Communication
- Cloud based applications already exist at the user's site
- Comparability across several stations worldwide / nationwide



Thank you very much for your attention!

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