

ABB MOTION SERVICES

ABB Ability™ Smart Sensor Bluetooth® Gateway

Cassia X1000 installation manual



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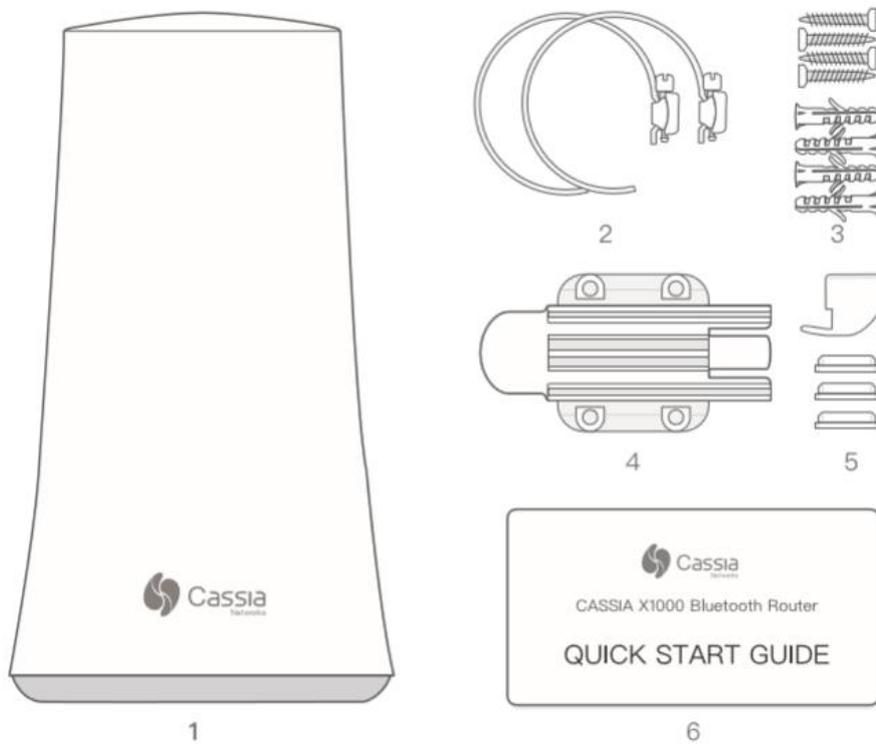
1 General

The ABB Ability™ Smart Sensor gateway is used to upload the Smart Sensor data automatically to the Smart Sensor portal. The gateway needs to be configured for Internet access before it can start reading the Smart Sensors. Following Internet connections are supported:

- LAN/Ethernet network together with PoE injector.
- 2.4GHz WIFI network.
- 3G/4G Mobile network with specific USB dongle.

The sales package includes:

- X1000 Bluetooth router, wall and pole mounting kits and a quick guide.



- | | | | | | |
|-------------------------|-----|------------------------------|------------------|----------------------|-----|
| 1. X1000 Router | (1) | 3. Anchors with Screws (2*4) | 5. Silicon Plugs | (4) | |
| 2. Pole Mounting Straps | (2) | 4. Mounting Bracket | (1) | 6. Quick Start Guide | (1) |

Figure 1 Content of the sales package

For general information about the Cassia gateway, please refer to the **Cassia User Manual** on https://www.cassianetworks.com/download/docs/Cassia_User_Manual.pdf

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2 Installation

2.1 Prerequisites for installation

Internet connection:

- Gateway does not operate in networks with a VPN (Virtual Private Network).
- The default DNS server address is the Google DNS server for Global customers (8.8.8.8) and the Baidu DNS server for customers located in China (114.114.114.114).
- In case there is a firewall used, the following ports need to be open for **outbound** communication:

Type	Port	M/O	Communication Partner for Gateway	Description
UDP	5246, 5247	* Mandatory	Access Controller (AC)	Default CAPWAP communication between AC and router. Mandatory for FW 1.4.3 * Optional for FW 2.1.0
UDP	6246, 6247	Optional	Access Controller (AC)	Backup CAPWAP communication between AC and router.
TCP	8883	Mandatory	Access Controller (AC)	MQTT communication between AC and router.
TCP	1883	Optional	Local MQTT broker	MQTT bypass function.
TCP/HTTP	80	Optional	Access Controller (AC)	Container/APP download from AC .
TCP/HTTPS	443	Mandatory	Access Controller (AC) Smart Sensor Platform	Container/APP download from AC Communication with Smart Sensor Platform
TCP	9999	Mandatory	Access Controller (AC)	Remote SSH to container
UDP	53	Mandatory	DNS server	DNS lookup for AC address

AC – Access Controller

Global: **gw.smartsensor.abb.com**

China: **gw.smartsensor.abb.com.cn**

Smart Sensor Platform

Global: **smartsensor.abb.com**

China: **smartsensor.abb.com.cn**

- Only one AC address must be whitelisted in the network. For the gateways working outside China, the Global AC address must be whitelisted. For gateways working inside China, only the China AC address must be whitelisted.
- Smart Sensor Platform and all the existing subdomains must be whitelisted in the network for a successful communication and measurement report to the Portal.

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- Mobile network needs to have adequate signal strength. In the most demanding locations, an extension USB cable or external antenna might be needed for the USB modem/dongle.

Power supply:

- In case PoE network is not available, a PoE injector (power supply) is needed.
- PoE is 802.3af/at compliant.
- **Recommended PoEs:**
 - **Procet PT-PSE104GO-30-5, Indoor PoE Injector**
 - **Procet PT-PSE108GBR-OT, Outdoor PoE Injector**

Ethernet cable:

- 1 CAT6 shielded Ethernet cable (RJ45), with a length of 50 meters maximum, is needed for PoE, while WIFI or mobile network is used.
- 2 CAT6 shielded Ethernet cables (RJ45), with a length of 50 meters maximum, are needed when LAN/Ethernet network is used.

Computer:

- A computer with WIFI adapter is needed for gateway configuration. A tablet computer or mobile phone can also be used.
- Google Chrome web browser is recommended to be used.

USB Cellular Modem / Dongle

- The gateway has built in drivers for several USB dongles. For the list of supported dongles please check the section 2.7 USB mobile dongle connection.
- A SIM card with Internet data plan.
- The gateway also supports the use of any USB powered WIFI modems.

Mounting:

- Flat head screwdriver for pole mounting.
- Phillips head screwdriver and a drill (if needed) for wall mounting.
- Mounting is not mandatory, but it is recommended to secure the gateway somehow to its intended place.

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2.2 Recommended location

Height:

- The recommended height for the gateway is 3-30 meters from ground level. Lower levels are also acceptable, but the gateway Bluetooth range might be shorter due to obstacles.

Orientation:

- The gateway has the best reception in the direction where the Cassia logo is shown on its side. If the gateway has trouble connecting to a specific Smart Sensor, it is recommended to rotate the gateway to point in that direction.

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2.3 Gateway configuration

When the gateway is powered on, the blue LED at the bottom of the gateway turns ON. After bootup, the gateway will turn on the configuration WIFI hotspot. The bootup takes about 30-60 seconds.

Configuration WIFI hotspot has SSID “cassia-XXXXXX”, where XXXXXX are the last 6 characters of the gateway’s MAC address. MAC address can be found on the bottom of the gateway. Password for this WIFI hotspot is the same as the SSID.

Connect to this WIFI hotspot with the device used for configuration (computer, phone or tablet) and open the web browser. Type **192.168.40.1** to the web browser’s address field and press enter. Cassia configuration page will open. During the first login the default **password needs to be changed**. Default credentials are:

- Login: **admin**
- Password: **admin**

Figure 2 Cassia (Firmware 1.4.3) Login

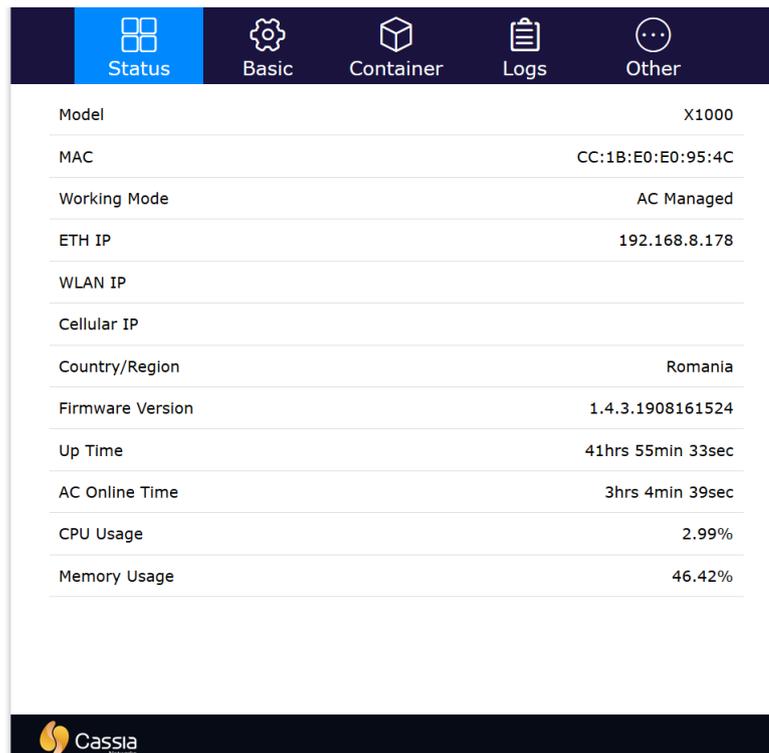
Figure 3 Cassia (Firmware 2.1.0) Login

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Once logged in, the **Status Page** is shown. This page shows current operation mode and connection status of the gateway. AC Online Time shows how long the gateway has been connected to the AC (Access Controller) server. If no time is shown, it means that the gateway does not have a connection to the AC server.

Access Controller server connection is needed for a successful Smart Sensor data transfer.

As the gateway now supports two firmware versions, the UI is different between the old firmware (1.4.3) and the new firmware (2.1.0), the latter having more information about the current state of the gateway.



Parameter	Value
Model	X1000
MAC	CC:1B:E0:E0:95:4C
Working Mode	AC Managed
ETH IP	192.168.8.178
WLAN IP	
Cellular IP	
Country/Region	Romania
Firmware Version	1.4.3.1908161524
Up Time	41hrs 55min 33sec
AC Online Time	3hrs 4min 39sec
CPU Usage	2.99%
Memory Usage	46.42%

Figure 4 Cassia (Firmware 1.4.3) Status

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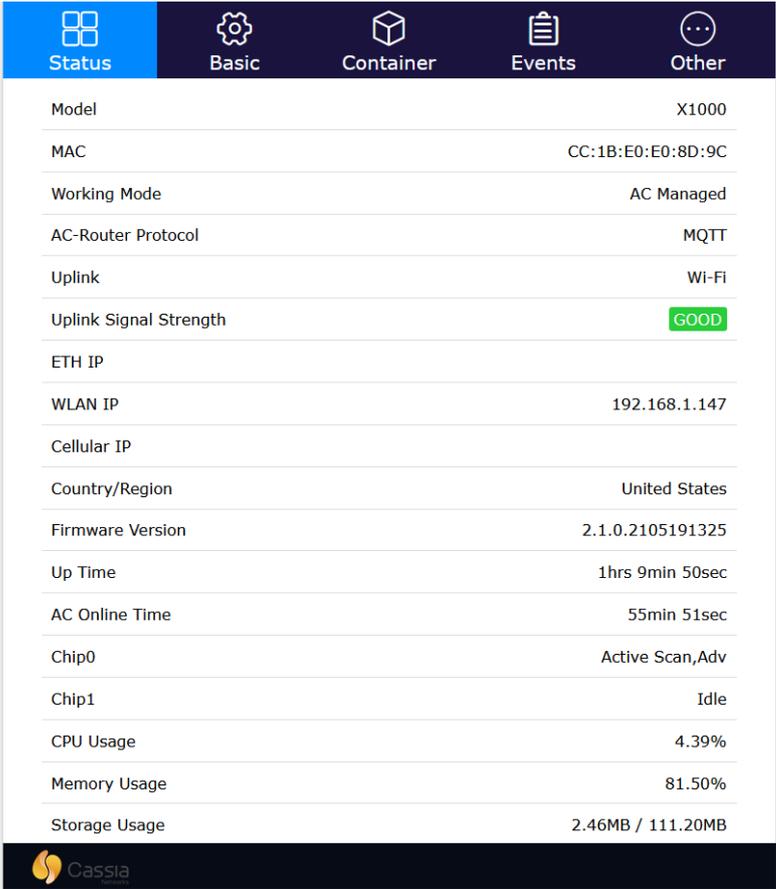


Figure 5 Cassia (Firmware 2.1.0) Status

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2.3.1 Network configuration – Firmware 1.4.3

The **Basic Page** is where the configuration is done.

Following values are common for all network configurations (LAN, WIFI, Mobile):



- Router Mode: **AC Managed Router**
- Tx Power: **20**
- Statistics Report Interval: **5 minutes**
- AC Server Address: **gw.smartsensor.abb.com**
- AC Server Address for China: **gw.smartsensor.abb.com.cn**
- AC Router Comm. Ports: **5246, 5247**
- Remote Assistance: **ON**

Connection Priority is where a priority connection method is selected in case there are several in use. Select the priority according to connection in use:

- **Wired** for PoE and LAN connections.
- **Wireless** for WIFI connection.
- **3G/4G** for mobile USB dongle connection.

If all the information has been filled as shown above and the **Wired**, **Wireless** or **3G/4G** sections are configured according to your **network specifications**, please refer to **2.9 Verifying the configuration** to check if the connection has been successfully set-up.

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2.3.2 Network configuration – Firmware 2.1.0

The values in the first section of the **Basic page** are similar to firmware 1.4.3, but with some extra options that the newer firmware brings:



- Router Mode: **AC Managed Router**
- Tx Power: **20**
- Statistics Report Interval: **5 minutes**
- AC Server Address: **gw.smartsensor.abb.com**
- AC Server Address for China: **gw.smartsensor.abb.com.cn**
- AC-Router Protocol Priority: **MQTT**
- Enable OAuth2 Token For Local API: **OFF**
- Remote Assistance: **ON**

Connection Priority in 2.1.0 firmware is similar to firmware 1.4.3, only the naming of the three connection types have changed:

- **Wired** for PoE and LAN connections.
- **Wi-Fi** for WIFI connection.
- **Cellular** for mobile USB dongle connection.

If **Cellular** connection is used, the option **Recovery Action** must be set to **ON**.



This option enables the gateway to attempt a **reboot** of the 3G dongle when it is not being able to provide a network connection anymore.

If all the information has been filled as shown above and the **Wired, Wi-Fi** or **Cellular** sections are configured according to your **network specifications**, please refer to **2.9 Verifying the configuration** to check if the connection has been successfully set-up.

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Status
Basic
Container
Logs
Other

Router Mode

Tx Power

Statistics Report Interval

AC Server Address

AC-Router Comm. Ports

Remote Assistance

Connection Priority

Wired

IP Allocation

DNS1

DNS2

Wireless (5Ghz WiFi is not supported)

Operating Mode

SSID

Password

IP

Netmask

Cellular Modem

USB Modem Type

Apply

Cassia

Figure 6 (Firmware 1.4.3) Basic page

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Status
 Basic
 Container
 Events
 Other

Router Mode

Tx Power

Statistics Report Interval

AC Server Address

AC-Router Protocol Priority

Connection Priority

Enable OAuth2 Token For Local API

Remote Assistance

Wired

IP Allocation

DNS1

DNS2

Wi-Fi (5Ghz Wi-Fi is not supported)

Operating Mode

SSID

Password

IP

Netmask

Cellular Modem

USB Modem Type

Recovery Action

Figure 7 (Firmware 2.1.0) Basic page

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In case dongle is used to provide internet through the USB slot of the gateway (**Cellular connection**), please make sure the dongle is set to use **4G only** (see an example in “**Error! Reference source not found.**” below).

If left on Auto mode the gateway could end up not properly connecting to the internet, needing to be power cycled to restore connection.

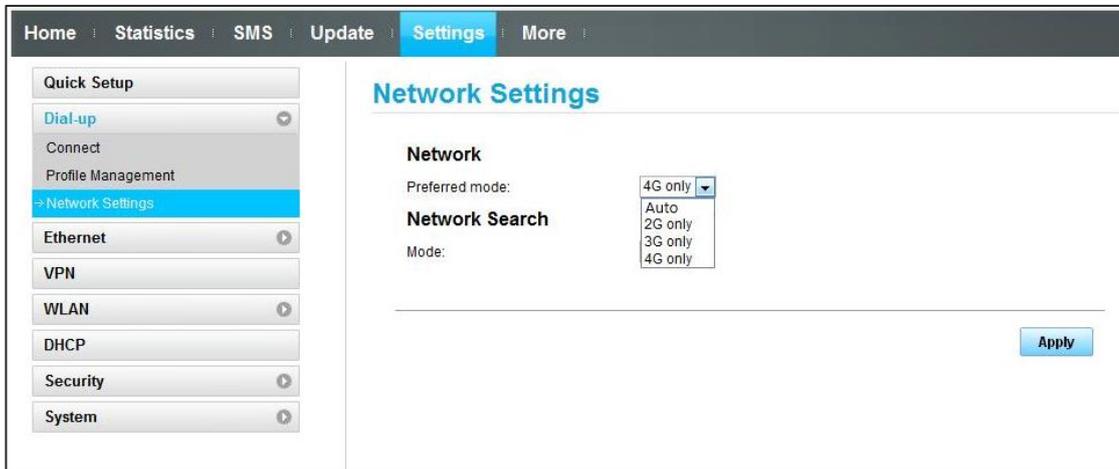


Figure 8 4G only network mode

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2.4 PoE connection

If a PoE (Power Over Ethernet) network is available, the gateway can be configured to use it without any additional power supply.

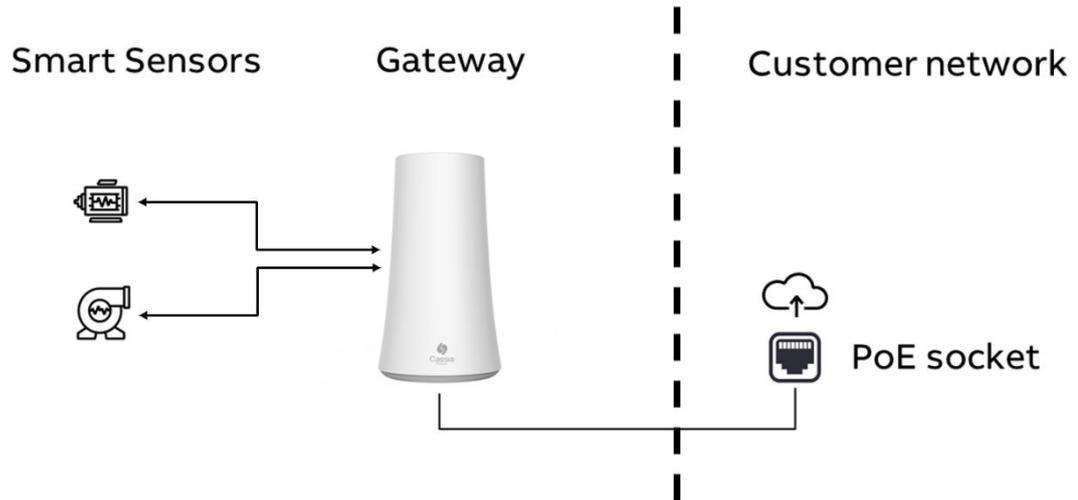


Figure 9 PoE network configuration

From the Gateway Basic Page select:

- Connection Priority: **Wired**
- IP Allocation: **DHCP** or **Static** (in case the IP address is given)

Press **Apply** at the bottom of the screen.

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2.5 LAN/Ethernet cable connection

If a LAN/Ethernet network is available, the gateway can be configured to use it. An additional PoE injector is needed for power supply (see **2.1 Prerequisites for installation** on page 5). Make sure to connect the gateway using an ethernet cable to the port labelled as “**PoE**”, on the injector.

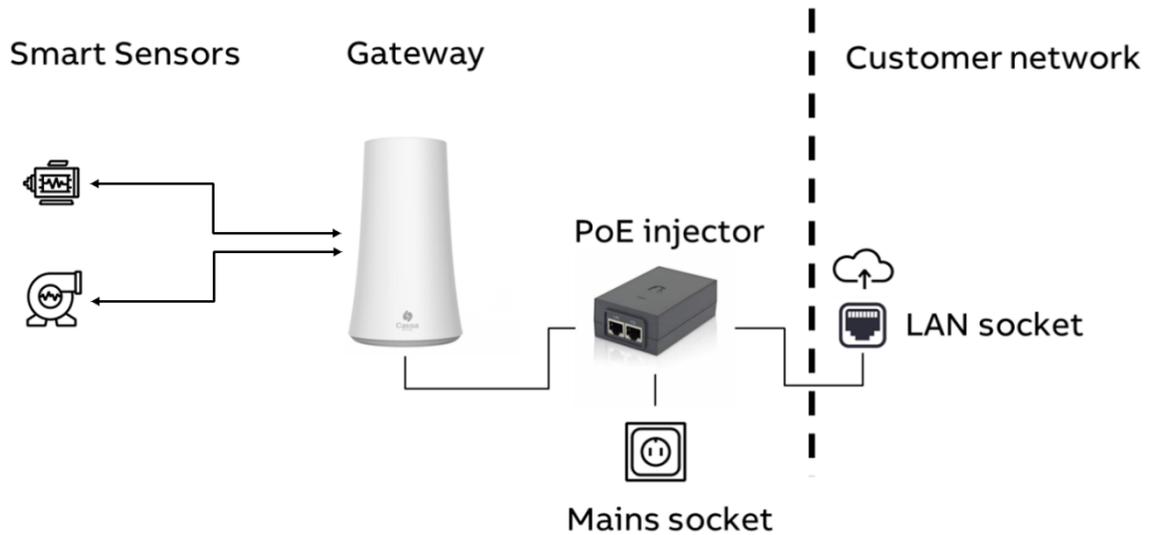


Figure 10 LAN network configuration

From the Gateway Basic Page select:

- Connection Priority: **Wired**
- IP Allocation: **DHCP** or **Static** (in case the IP address is given)

Press **Apply** at the bottom of the screen.

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2.6 WIFI connection

The gateway can be configured to use an existing WIFI network. An additional PoE is needed for power supply (see **2.1 Prerequisites for installation** on page 5). Make sure to connect the gateway using an ethernet cable to the port labelled as “**PoE**”, on the injector.

Only 2.4GHz WIFI is supported!

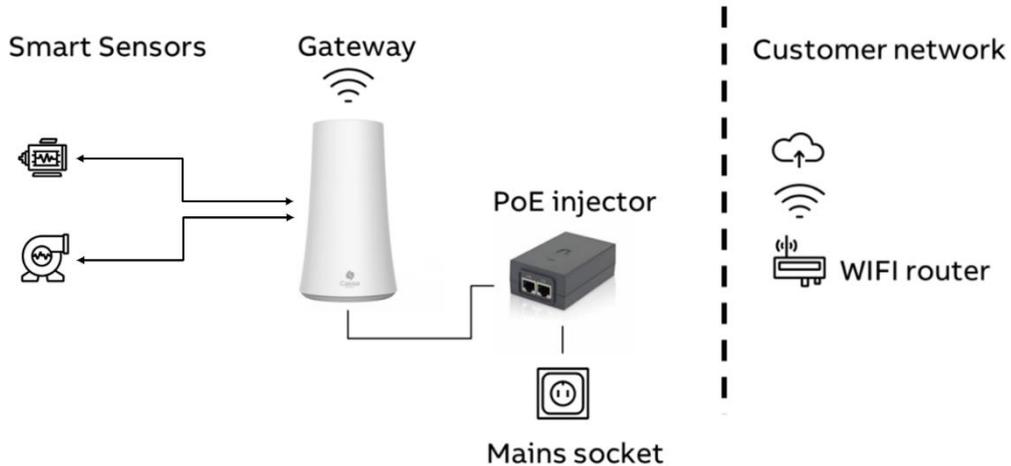


Figure 11 WIFI network configuration

From the Gateway Basic Page select:

- Connection Priority: **Wireless** (fw 1.4.3) / **Wi-Fi** (fw 2.1.0)
- Enter the **SSID** (name) of the WIFI network
- Enter the WIFI network **password**
- Change the Wireless operation mode from Hotspot to **Client**
- IP Allocation: **DHCP** or **Static** (in case the IP allocation is given)

Press **Apply** at the bottom of the screen.

NOTE! Once the Apply button is pressed, the gateway WIFI adapter stops sharing the WIFI hotspot and changes the connection to configured WIFI network. In case the DHCP is used, the gateway has now a new IP address. This IP address is needed to reconnect to the gateway e.g. to check the Status Page or scan the devices within the gateway’s range. Local IT department can find out the gateway’s IP address by accessing the WIFI router device list or by performing the network scan for IP addresses. In case a static IP is used, the address is known.

Connect your computer, tablet or mobile phone to the same WIFI network as the gateway is connected. Open a web browser and type the new IP address to the address field and press enter. Access to gateway configuration pages is established again.

NOTE! If there was an error in SSID, password or IP address configurations, you cannot access the gateway anymore. In this case the gateway isn’t shown in WIFI router device list or in network scans. Press the reset button at the bottom of the gateway for 10 seconds to reset the gateway to factory default values, **while the gateway is connected to power**.

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2.7 USB mobile dongle connection

Mobile network can be used with a specific USB dongle. An additional PoE injector is needed for power supply (see **2.1 Prerequisites for installation** on page 5), supported USB dongle and a SIM card are needed. Make sure to connect the gateway using an ethernet cable to the port labelled as “PoE”, on the injector.

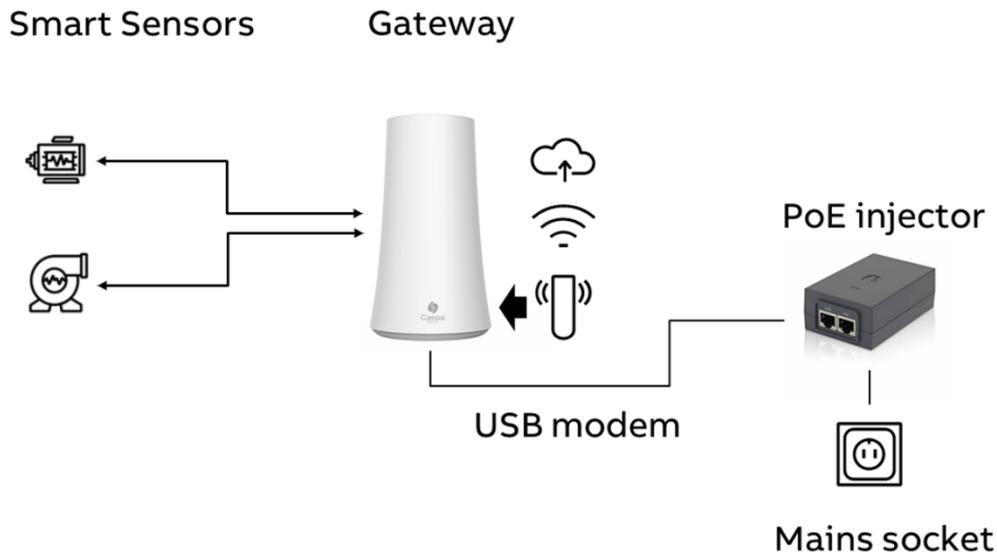


Figure 12 **Mobile** network configuration

Insert the USB dongle with SIM card to USB port at the bottom of the gateway. PIN query needs to be disabled from the SIM card.

From the Gateway Basic Page select:

- Connection Priority: **3G/4G** (fw 1.4.3) / **Cellular** (fw 2.1.0)
- USB Dongle Type: select correct **dongle type** used
- Type the **Access Point Name** (APN) which the SIM carrier is using
- Type the username and password for the APN if needed

Press **Apply** at the bottom of the screen.

Reboot the gateway by removing the power supply for a few seconds and then reconnecting it.

The **Recommended Dongles** for industrial environments are the following:

- **MTCM2-L4G1-B03-KIT for Europe (LTE/CAT4)**
- **MTCM-LNA3-B03-KIT for US/Canada (LTE/CAT1)**

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NOTE! With a USB dongle the gateway needs to be in place where there is a good network coverage. In case of weak signal strength, an extension USB cable or additional external antenna for USB dongle might be needed.

If a WIFI modem is used, insert the modem to USB port at the bottom of the gateway and follow the 2.6 WIFI connection section instructions.

NOTE! For supported USB dongle modems, please consult the Cassia User Manual (see **Figure 1** Content of the sales package) or check the **dropdown** at the bottom of **Basic** page, under **Cellular Modem** section. Please note that some countries may have regulations which may forbid the usage of certain types of hardware providers (e.g. Check if Huawei can be used in the US)

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2.8 Firewall configuration

In case there is a firewall in the network which the gateway is using, specific ports need to be opened.

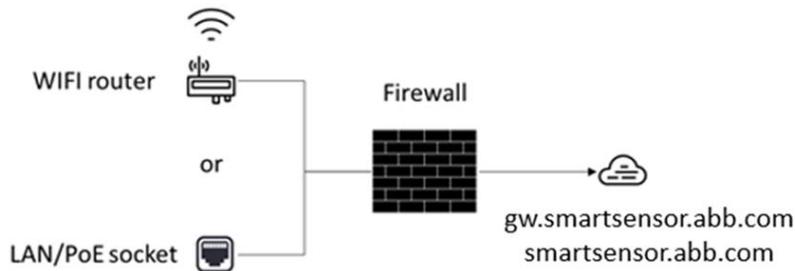


Figure 13 Firewall Configuration for **Global**

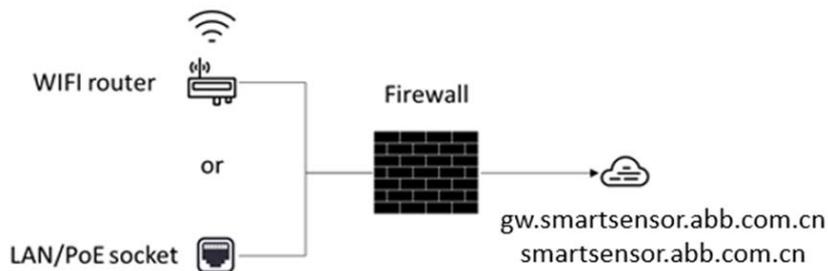


Figure 14 Firewall configuration for **China**



- Firewall should allow communication between the gateway and Access Controller, and gateway and Smart Sensor platform respectively (see required ports in section **2.1 Prerequisites for Installation**).

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2.9 Verifying the configuration

Once the configuration is done, it can be verified from the status page. When connection is established to Access Controller the AC Online Time is shown.

Parameter	Value
Model	X1000
MAC	CC:1B:E0:E0:8D:9C
Working Mode	AC Managed
AC-Router Protocol	MQTT
Uplink	Wi-Fi
Uplink Signal Strength	GOOD
ETH IP	
WLAN IP	192.168.1.147
Cellular IP	
Country/Region	United States
Firmware Version	2.1.0.2105191325
Up Time	1hrs 9min 50sec
AC Online Time	55min 51sec
Chip0	Active Scan, Adv
Chip1	Idle
CPU Usage	4.39%
Memory Usage	81.50%
Storage Usage	2.46MB / 111.20MB

Figure 15 Gateway with FW **2.1.0** connected to **gw.smartsensor.abb.com**

If the **AC Online Time** is not shown within few minutes:

- Double check the configuration and Internet connection
- Reboot the gateway (power off/on)

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Connection to **Access Controller** can be verified with **Debug Tools** in **Other** tab:

- To check the connection to the Access Controller, select **NetCat**, add Address **gw.smartsensor.abb.com** (or **gw.smartsensor.abb.com.cn** in case of China), Protocol **TCP**, Timeout **2**, Port **8883** and press Start.
- Wait for the black screen with the result to appear below.
- If you receive a message containing the text "... **8883 (?) open**", the gateway status should be properly sent to the AC.

The screenshot shows the 'Debug Tools' interface with the following configuration:

- Tool: NetCat
- Address: gw.smartsensor.abb.com
- Protocol: TCP
- Timeout(Second): 2
- Port: 8883

A blue 'Start' button is visible. Below it, a black terminal window displays the following output:

```
Warning: inverse host lookup failed for 168.63.71.157: Unknown host
gw.smartsensor.abb.com [168.63.71.157] 8883 (?) open
sent 0, rcvd 0
```

Figure 16 Test connection to Access Controller

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Connection to **Smart Sensor Portal** can be verified as well with **Debug Tools** in **Other** tab:

- To verify TCP port open/close status select **NetCat**, add Address **smartsensor.abb.com** (or **smartsensor.abb.com.cn** in case of China), Protocol **TCP**, Timeout **2**, Port **443** and press Start. Wait for the black screen with the result to appear below.
- If you receive a message containing the text “... **443 (https) open**”, the connection for measurement upload should work.

The screenshot shows the 'Debug Tools' interface with the following configuration:

- Tool: NetCat
- Address: smartsensor.abb.com
- Protocol: TCP
- Timeout(Second): 2
- Port: 443

A blue 'Start' button is visible. Below it, a black terminal window displays the following output:

```
Warning: inverse host lookup failed for 40.114.162.160: Unknown host
smartsensor-ip-prod-02.westeurope.cloudapp.azure.com [40.114.162.160] 443 (https) open
sent 0, rcvd 0
```

Figure 17 Test connection to Smart Sensor Portal

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2.10 Commissioning the gateway

- With the Smart Sensor mobile app, you can commission an organization's gateway to assign it to an organization.
- Make sure that the mobile app is near to the gateway you want to commission. The app detects all the nearby gateways in the range, so you can manually identify the gateway with its MAC address and commission it to the required plant name, then follow the steps below:
- In Smart Sensor mobile app, under Service menu, tap **Commission gateway**. Read the popup message, and make sure the gateway is in the required range. Tap **OK**, to confirm.

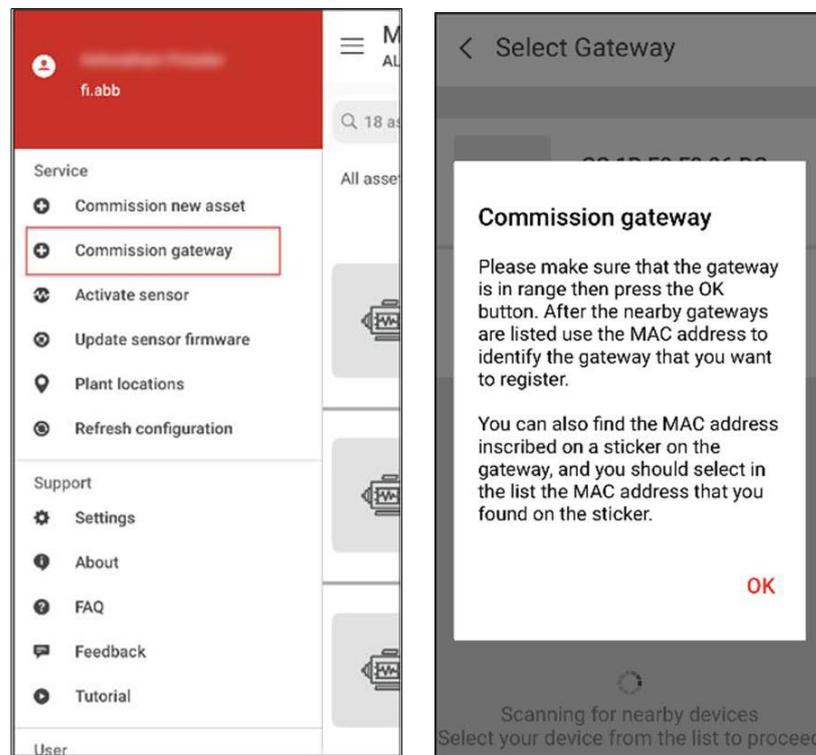


Figure 18 Mobile APP **Commission** gateway option

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- In the list of detected gateways, **select** the **gateway** you want to commission and in the popup message tap **OK** to confirm that correct gateway is selected.

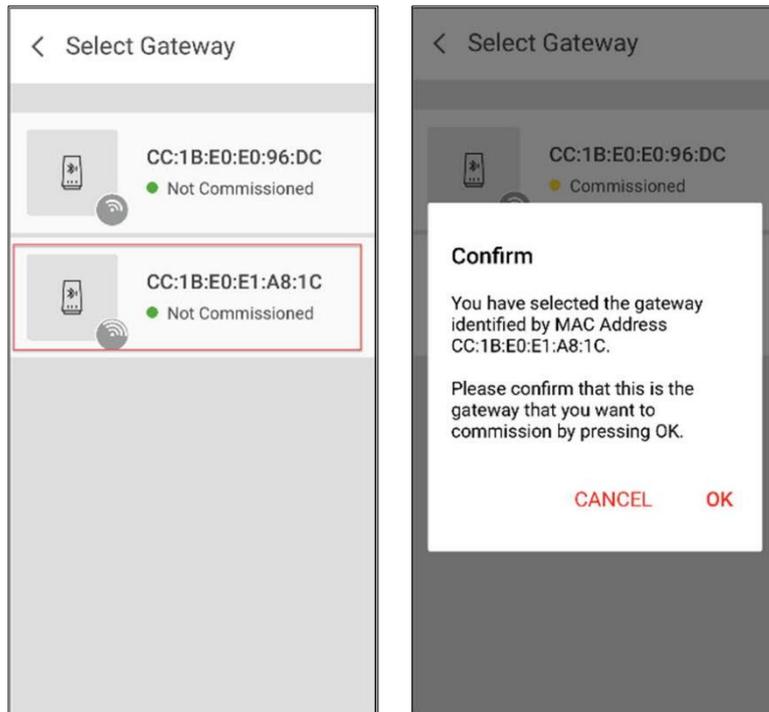


Figure 19 Select gateway for commissioning

- Finally, select a **plant** where you want to commission the gateway.

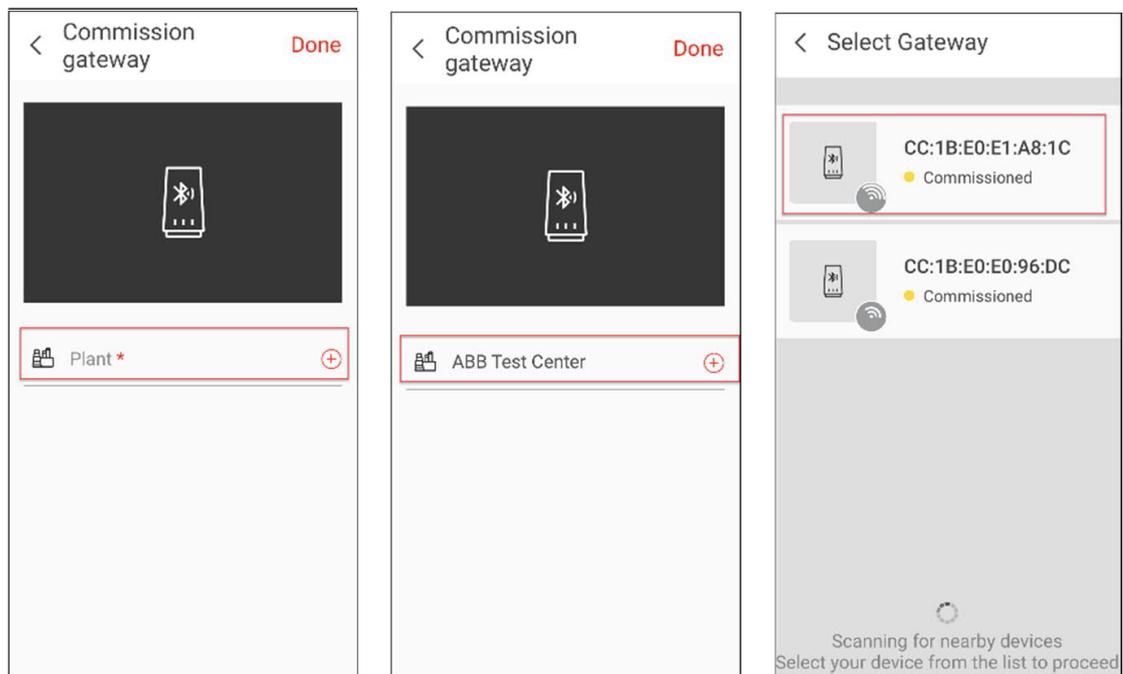


Figure 20 Assign gateway to a plant

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3 Troubleshooting

Forgetting the login credentials or making a mistake while configuring the WIFI network SSID or password:

- Press the reset button for 10 seconds while the gateway is powered on. This will reset all gateway settings to factory default values. Reset button is located at the bottom of the gateway.

Gateway does not generate the WIFI hotspot for setup:

- Check the power supply and that the blue LED is ON at the bottom of the gateway.
- If the gateway is configured to use a WIFI network, it does not generate a WIFI hotspot.
- Try to reset the gateway by pressing the reset button for 10 seconds while the gateway is powered on. Reset button is located at the bottom of the gateway.

Gateway does not connect to AC server:

- Check the Internet access.
- In case a USB dongle is used, check the model is supported by the gateway and that the dongle has established a connection to a mobile network.
- Check that the used network does not use VPN.
- Check the used network firewall settings. The necessary ports need to be open for outbound communication.
- Check if the Router Web Security under **Other** tab is toggled **OFF** (see below).

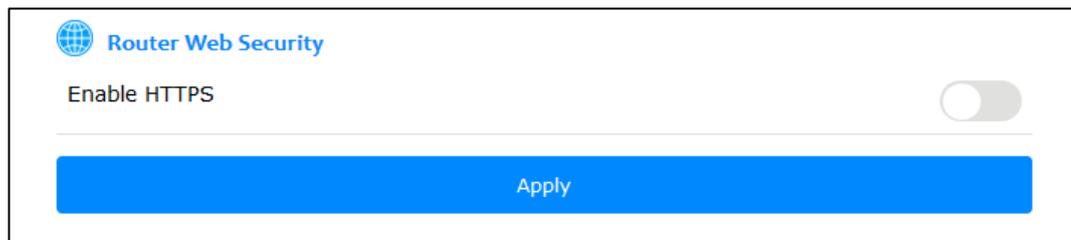


Figure 21 Router Web Security option

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Gateway is not reading the Smart Sensor data:

- Check that the Smart Sensors are within the gateway's range.
- The gateway is reading the data from Smart Sensors periodically. It can take couple of hours to see the first measurements in Smart Sensor portal.
- Check from the **Status** Page if it shows the Online Time. If not, please check the Internet connection.
- If the Online Time is shown, check in the **Container** page that under **Installed APPs** section (in fw 1.4.3 the section is called **List of installed apps**) there is an APP called **GwAppProd**. If not, contact the Smart Sensor Support (email address at the end of the manual) requesting the gateway application to be installed.

Testing the internet speed (fw 2.1.0):

The **SpeedTest** tool can be used to measure the throughput of the internet connection.

This tool can be found in the local configuration page, under the **Other** tab in the **Debug Tools** section of the page.

The fields must be completed as shown below, then click **Start**.

It will take ~10 seconds for the result to be shown.

Figure 22 **SpeedTest** tool

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Traceroute tool (fw 2.1.0):

This tool helps with pinpointing where on network are the biggest delays in communication. Each hop has three packets sent and three response delays, thus you could detect exactly which part of the packet journey is the slowest.

This tool can be found in the local configuration page, under the **Other** tab in the **Debug Tools** section of the page.

The fields must be completed as shown below, then click **Start**.

It will take ~10 seconds for the result to be shown.

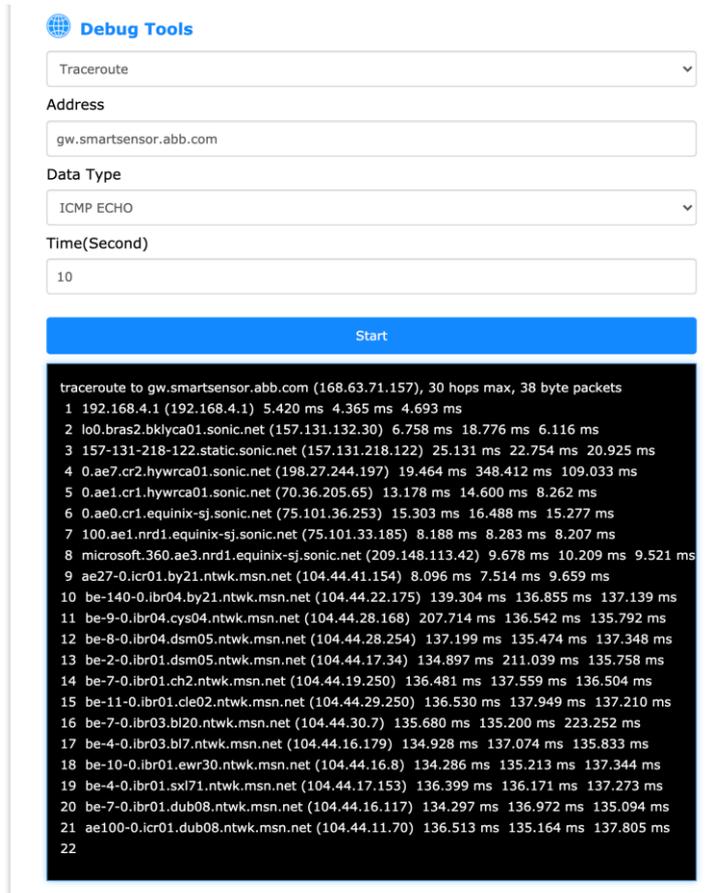


Figure 23 Traceroute tool

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Scanning for Bluetooth devices:

- Smart Sensor mobile app supports a commissioning toolset that helps the field engineer install sensor and gateway on the field and make sure that the platform can collect the sensor or gateway information.
- In Smart Sensor mobile app, tap **Commissioning toolset** which will open a menu with different actions such as:
 - Scan for sensors
 - Sensor information
 - Gateway information
 - Commission gateway

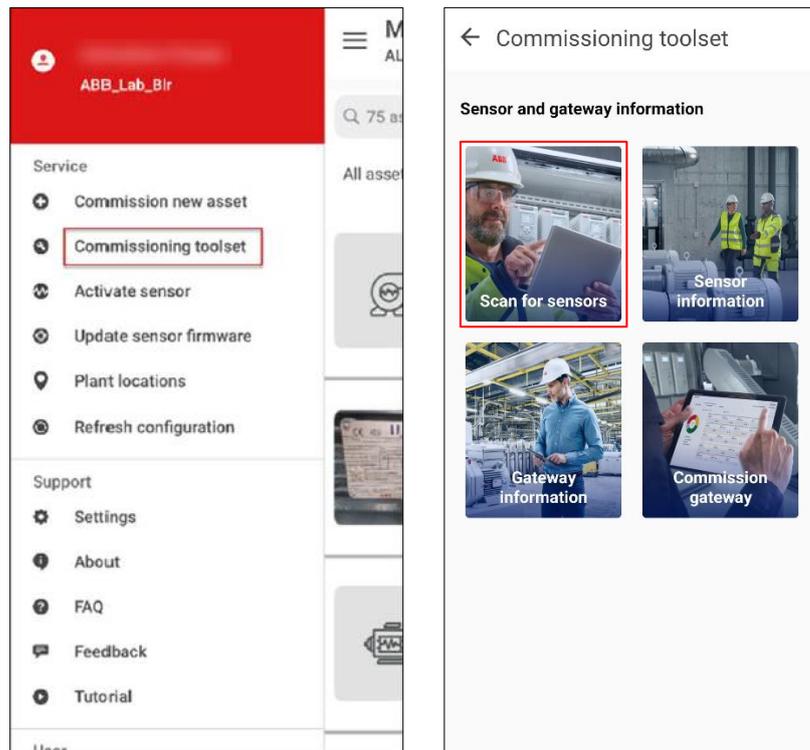


Figure 24 **Commissioning toolset**

- To see the nearby Smart Sensors and their connection quality, select the **Scan for sensors** option, while the Bluetooth of the phone is active and wait for the list to populate. The APP shows both the **signal quality** and commissioning status.

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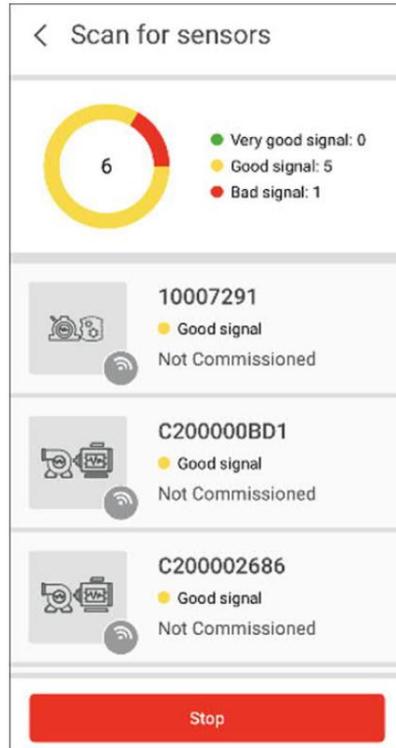


Figure 25 **Scanning** for Smart Sensors

NOTE! If the gateway’s container is displaying the **error** status, resetting the gateway will **NOT** solve this error. To check for the error status, please go into the gateway settings page under the **Container** tab. In case this happens, please contact Smart Sensor support.

For more support, please contact Smart Sensor support:

support.smartsensor@abb.com

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