ABB MOTION SERVICES

ABB Ability™ Smart Sensor Bluetooth® Gateway

Cassia X2000 installation manual

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Table of contents

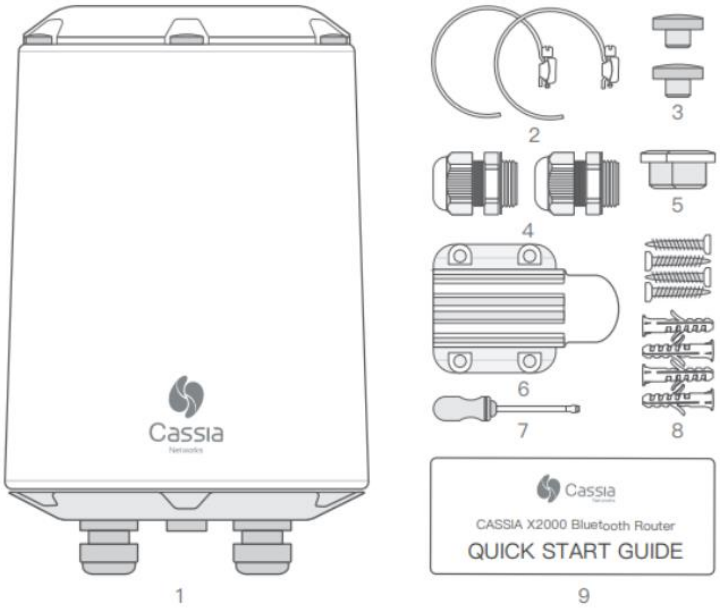
1 General

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. The following Internet connections are supported:

- LAN/Ethernet network
- 2.4GHz/5GHz WIFI network
- 4G Mobile network with specific USB dongle

The sales package includes:

- X2000 Bluetooth router, wall and pole mounting kits and a quick guide.



1. X2000 Router (1)
2. Pole Mounting Straps (2)
3. Extra Top Screw Covers (2)
4. Cable Glands (2)
5. USB Hole Silicone Plug (1)
6. Mounting Bracket (1)
7. Slotted Screwdriver (1)
8. Anchors with Screws (2*4)
9. 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

2 Installation

2.1 Prerequisites for installation

Internet connection:

- The gateway does not operate in networks with a VPN (Virtual Private Network) or Proxy server.
- 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 a firewall is used, the following ports need to be open for **outbound** communication:

Type	Port	M/O	Communication Partner for Gateway	Description
UDP	5246, 5247	Optional	**Access Controller (AC)**	**CAPWAP** communication between AC and router.
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 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.
- 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:

- For PoE powering, in case PoE network is not available, a PoE injector (power supply) is needed.
- PoE Injector must be 802.3af/at compliant.
- **Recommended PoEs**:
  - **Procet PT-PSE104GO-30-5, Indoor PoE Injector**
  - **Procet PT-PSE108GBR-OT, Outdoor PoE Injector**
- Additionally, the gateway can be also powered by a **12V - 2A adapter**.
- See below a **model** for **reference**:
  - **ARTESYN AD2412N3L-V, 24 Watt Power Adapter**

Ethernet cable:

- 1 CAT6 Ethernet cable, with a length of 50 meters maximum, is needed when PoE, WIFI or mobile network is used.
- 2 CAT6 Ethernet cables, with a length of 50 meters maximum, are needed when LAN/Ethernet network is used in addition to a PoE Injector.
- 1 CAT6 Ethernet cable is needed when a 12V adapter is used in a LAN/Ethernet network.

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 to its intended place.

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.

2.3 Gateway configuration

When the gateway is powered on, the multiple Green LEDs on the bottom of the gateway turn 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. The MAC address can be found on the bottom of the gateway. Password for this WIFI hotspot is the exact same as the SSID.

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

- Username: **admin**
- Old password: **admin**

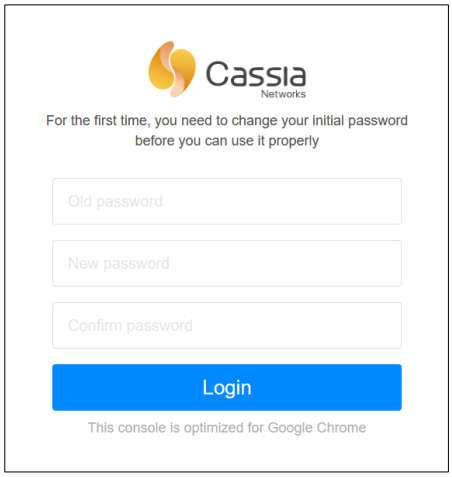


Figure 2 Cassia Login page

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.

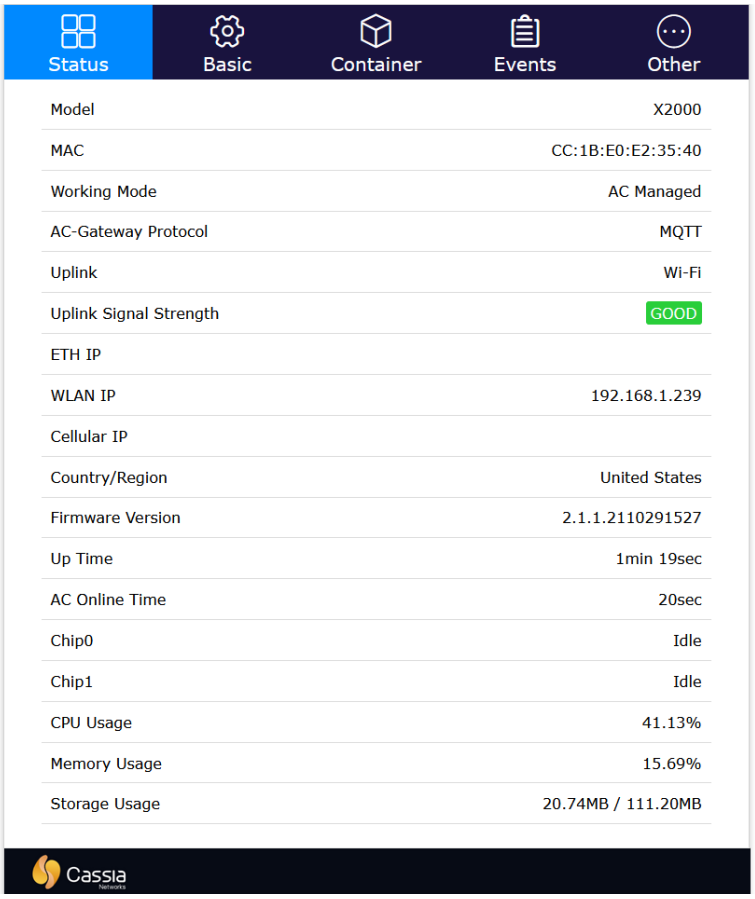


Figure 3 Cassia Status page

Network configuration

The following values must be configured, in the first section of the **Basic** page:

- Gateway Name: ***Organization Name** is recommended but not mandatory
- Gateway Mode: **AC Managed Router**
- Tx Power: **19**
- External Antenna: **None** by default
- Statistics Report Interval: **5 minutes** by default
- AC Server Address:
  - Global AC Address: **gw.smartsensor.abb.com**
  - China AC Address: **gw.smartsensor.abb.com.cn**
- AC-Router Protocol Priority: **MQTT**
- Connection Priority: *see description below*
- Enable OAuth2 Token For Local API: **OFF**
- Remote Assistance: **ON**

Connection Priority:

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

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

This option enables the gateway to do a **power cycle** of the 4G 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.

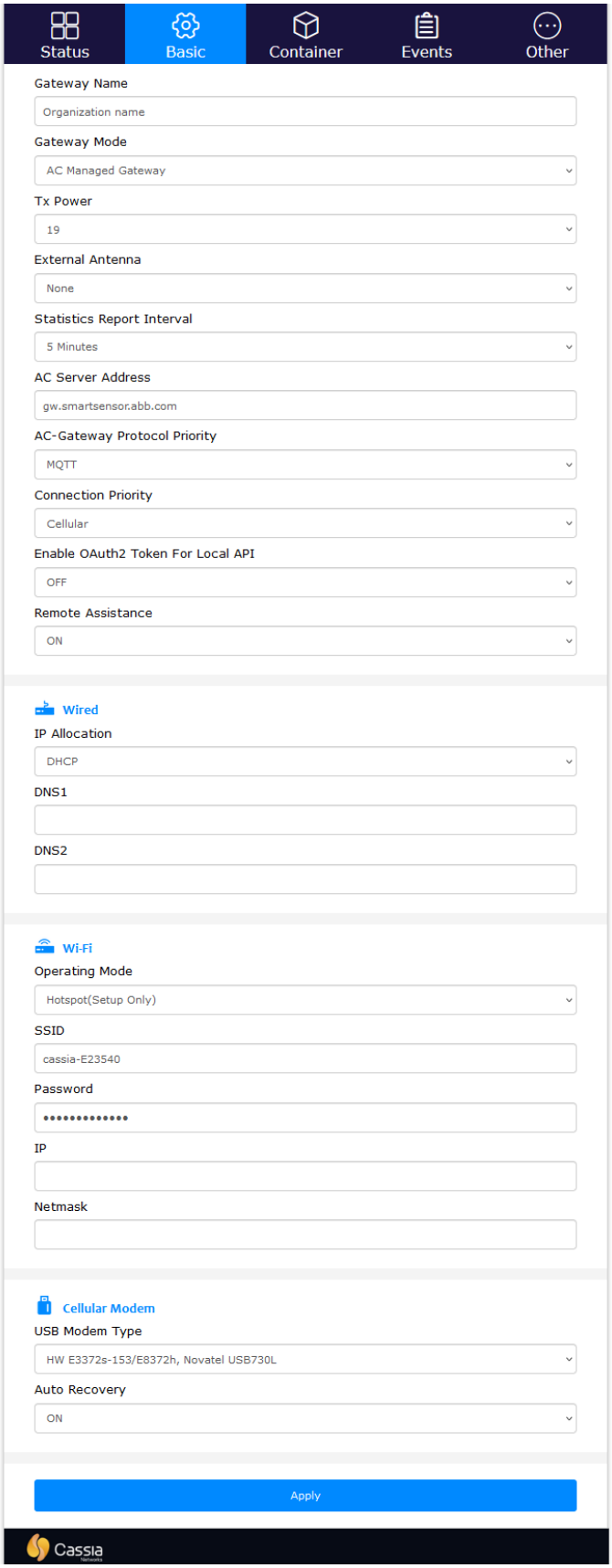


Figure 4 Basic page configuration for **Cellular/4G** connection

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 "Figure 5 **4G only** network mode" 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.

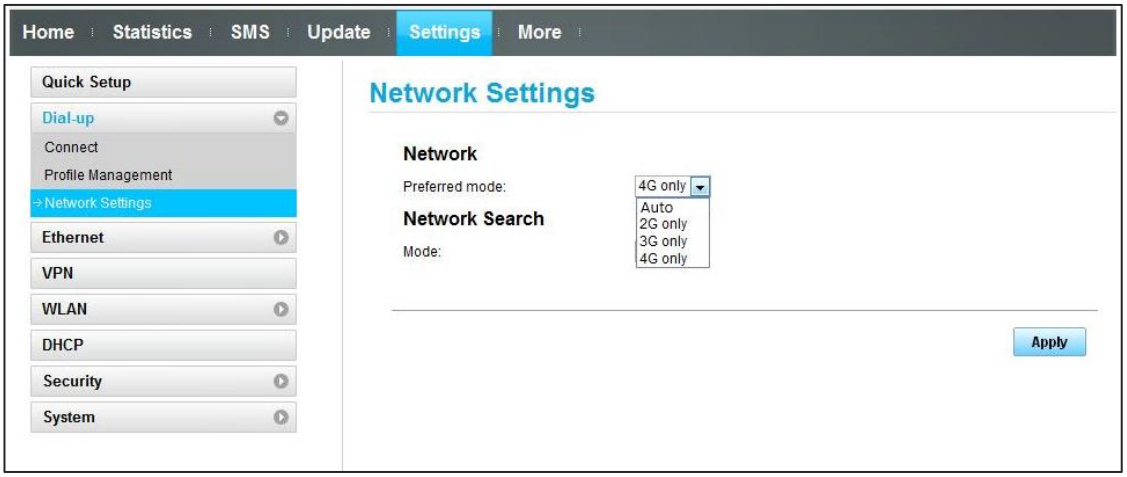


Figure 5 **4G only** network mode

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.

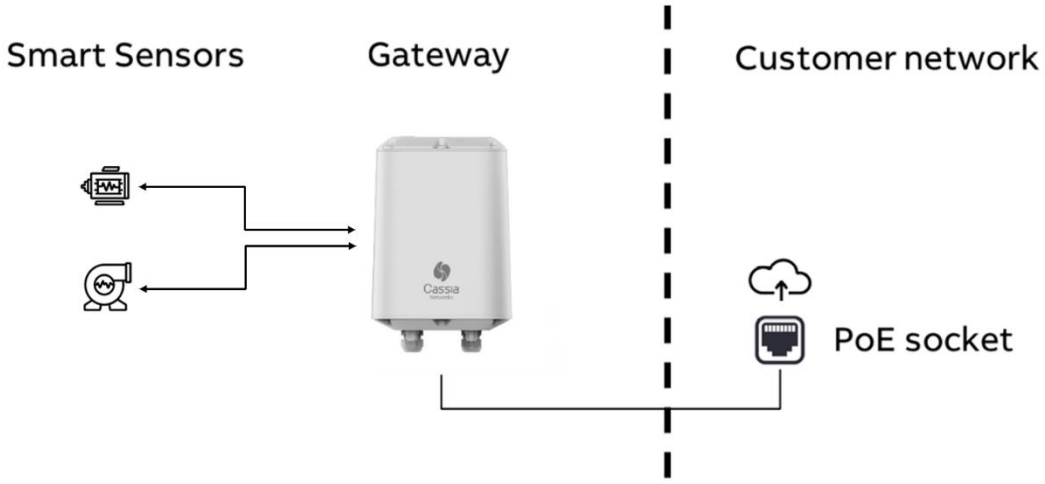


Figure 6 PoE network configuration

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.

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. Make sure to connect the gateway using an ethernet cable to the port labelled as "**PoE**", on the injector.

Or alternatively, a **12V – 2A adapter** (see **2.1 Prerequisites for installation** on page **5**).

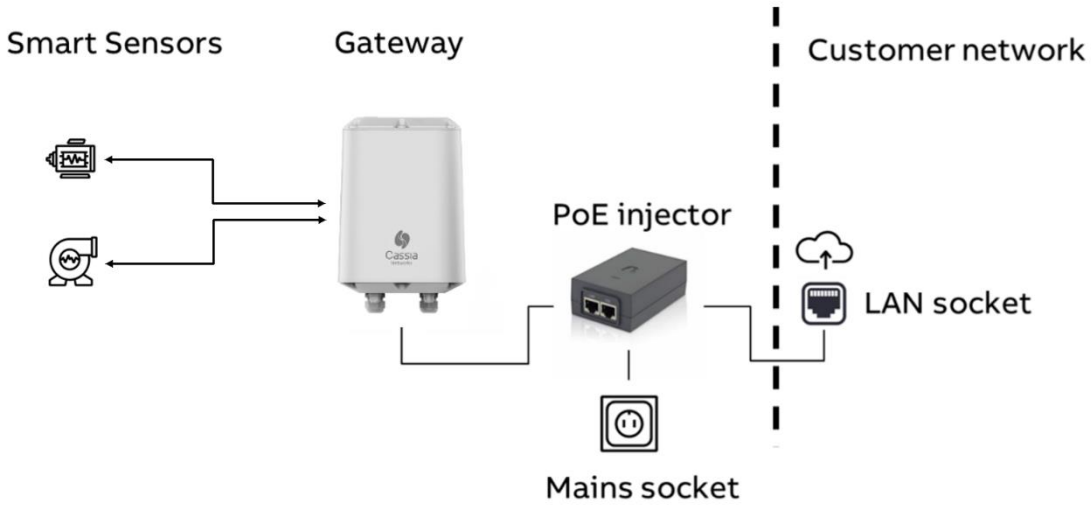


Figure 7 PoE Injector with LAN network configuration

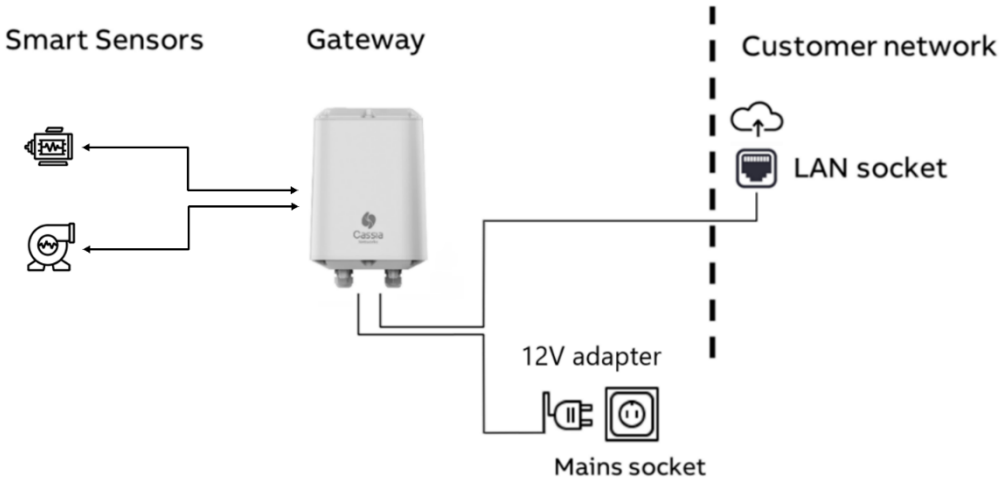


Figure 8 12V adapter with LAN network configuration

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.

2.6 WIFI connection

The gateway can be configured to use an existing WIFI network. An additional **PoE injector** is needed for power supply. Make sure to connect the gateway using an ethernet cable to the port labelled as "**PoE**", on the injector.

Or alternatively, a **12V – 2A adapter** (see **2.1 Prerequisites for installation** on page **5**).

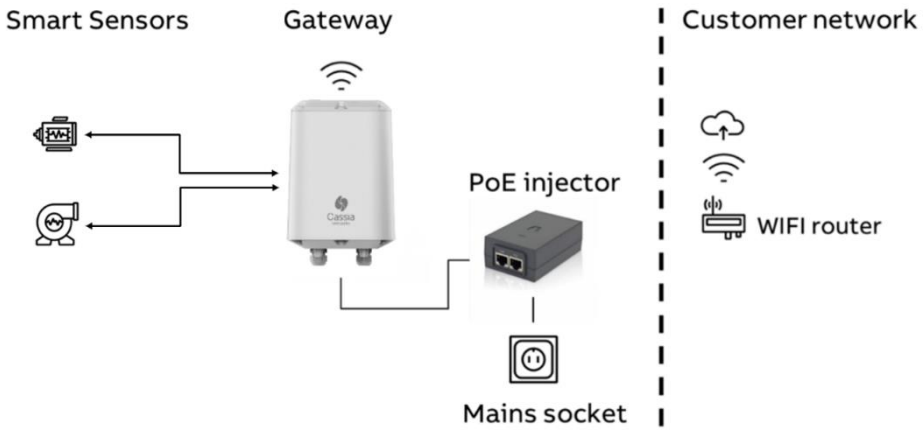


Figure 9 WIFI network configuration for PoE

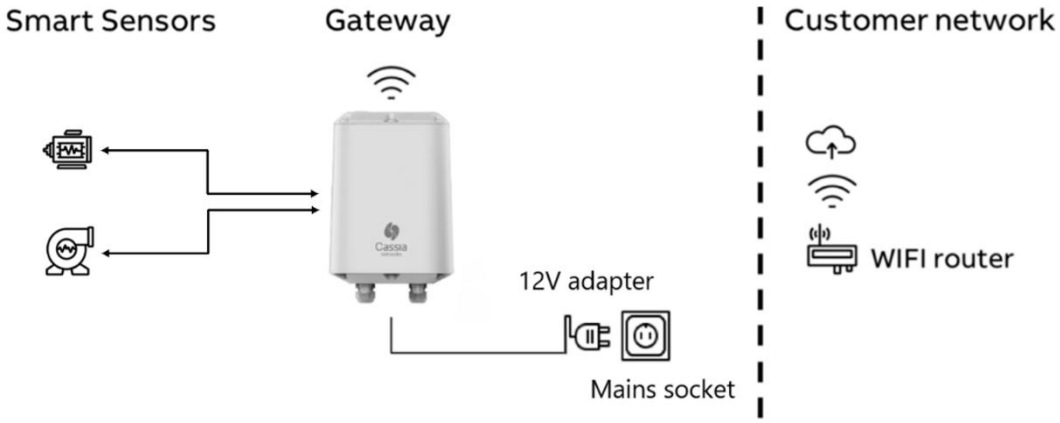


Figure 10 WIFI network configuration for 12V adapter

From the Gateway Basic page select:

- Connection Priority: **Wi-Fi**
- 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.

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. Make sure to connect the gateway using an ethernet cable to the port labelled as "**PoE**", on the injector.

Or alternatively, a **12V – 2A adapter** (see **2.1 Prerequisites for installation** on page **5**).

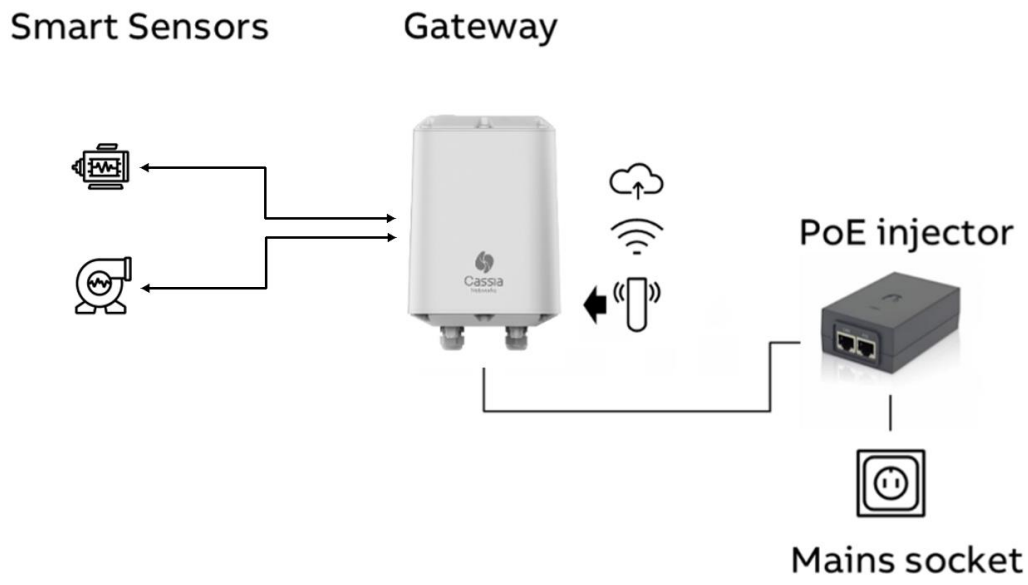


Figure 11 Mobile network configuration for PoE

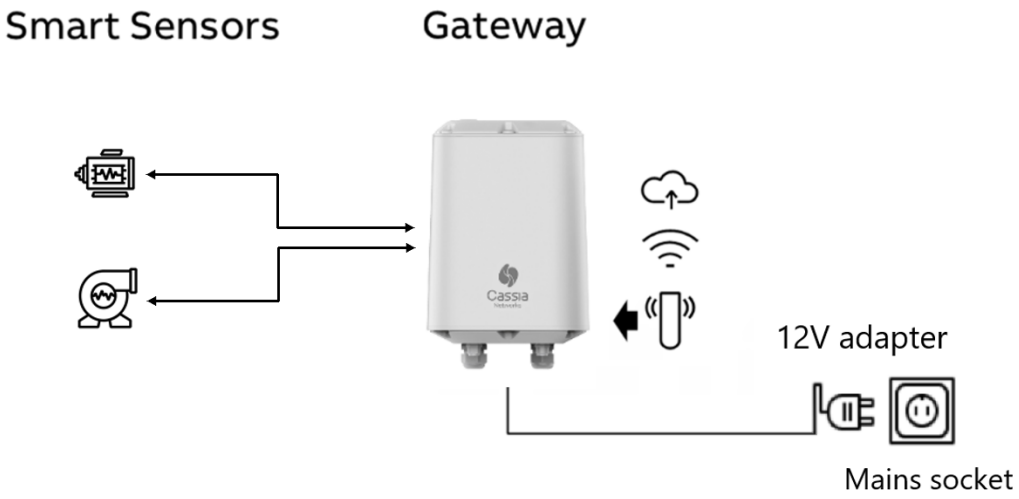


Figure 12 Mobile network configuration for 12V adapter

Insert the USB dongle with SIM card in the USB port at the top of the gateway, by removing the lid. PIN query needs to be disabled from the SIM card.

After dongle installation, make sure to mount back the lid in the correct way by locating the orientation pins on the cavities (see the two red dots on **Figure 13** Correct lid mounting position)**, to ensure proper water protection.**

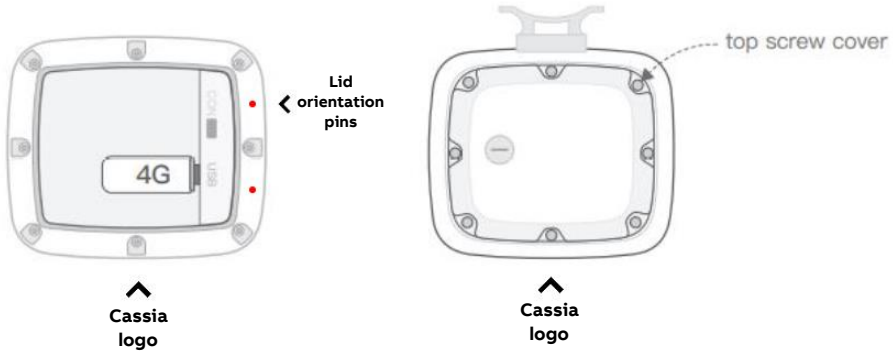


Figure 13 Correct lid mounting position

For more information on the Cassia X2000 gateway, please check the user manual below:

https://www.cassianetworks.com/download/docs/Cassia_User_Manual.pdf

Next, from the Gateway Basic page select:

- Connection Priority: **Cellular**
- USB Dongle Type: select correct **dongle type** used
- Type the A**ccess 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)**

However, the Cassia X2000 supports other dongle types, the list of which can be found in the local configuration, at the bottom of the **Basic** tab, under **Cellular Modem**, **USB Modem Type**.

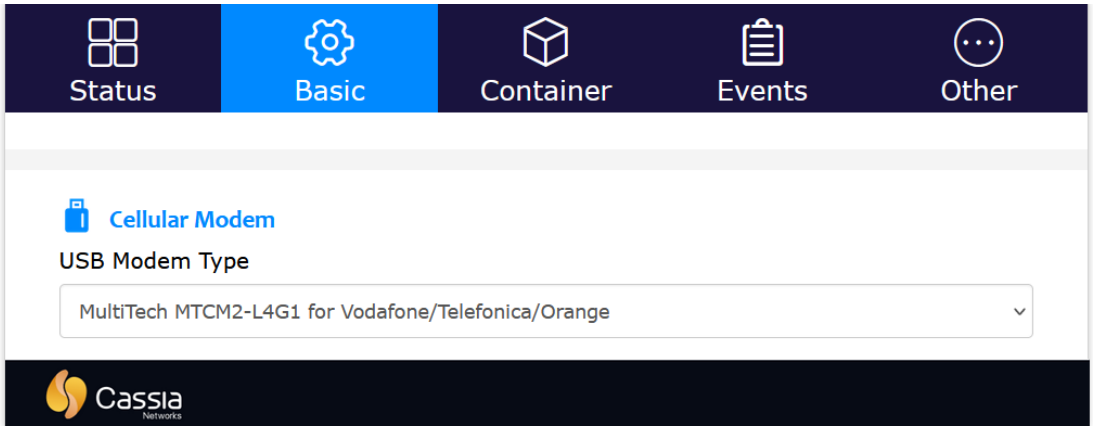


Figure 14 List of supported USB dongles

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.

For supported USB dongle modems, please consult the Cassia User Manual. 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)

2.8 Firewall configuration

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

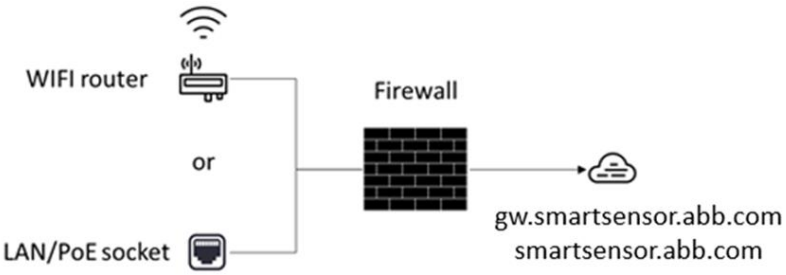


Figure 15 Firewall Configuration for Global

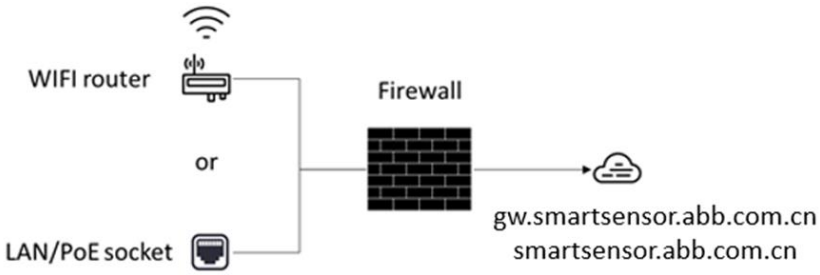


Figure 16 Firewall configuration for China

- 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**).

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.

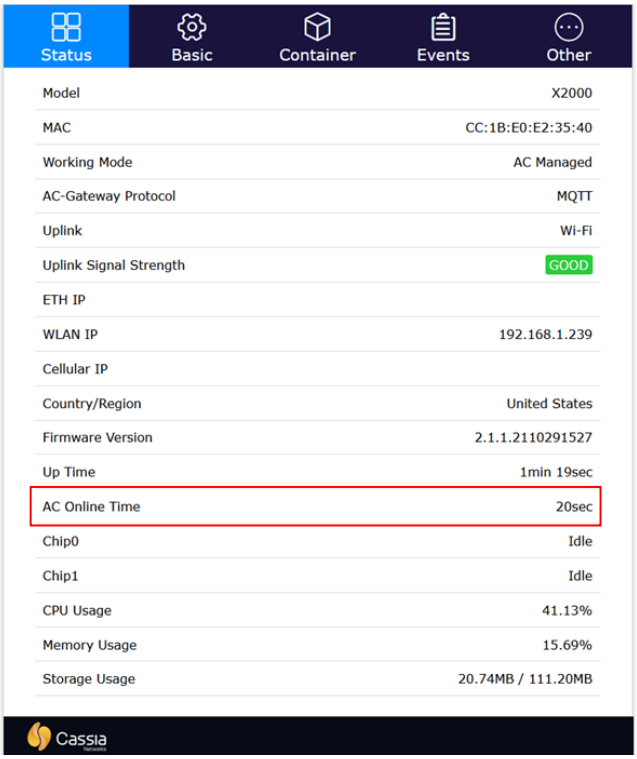


Figure 17 Gateway connected to **gw.smartsensor.abb.com**

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

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

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.

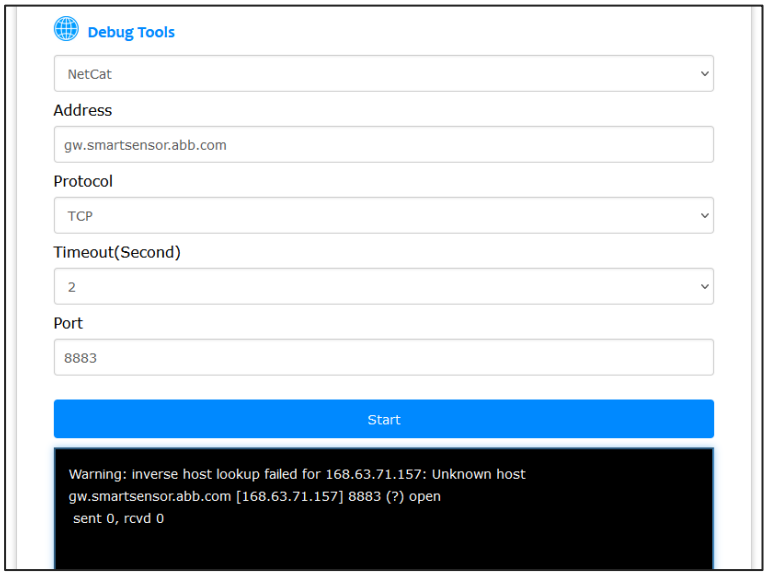


Figure 18 Test connection to Access Controller

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.

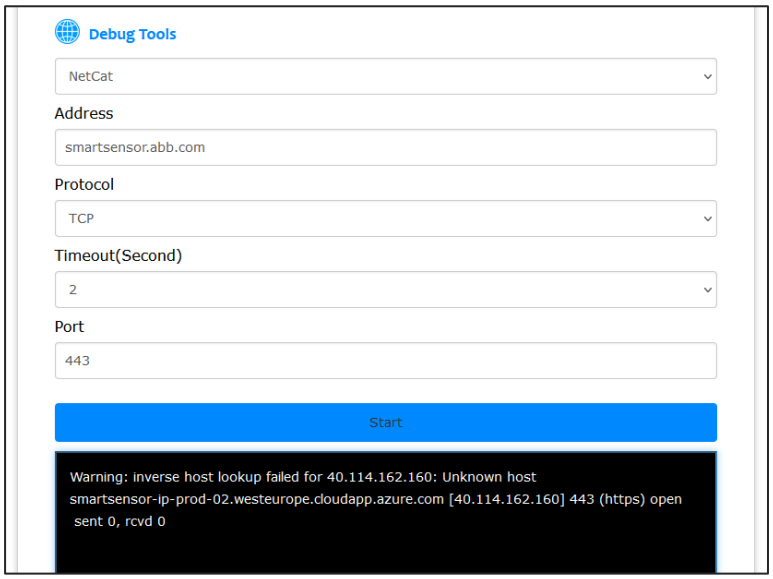


Figure 19 Test connection to Smart Sensor Portal

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.

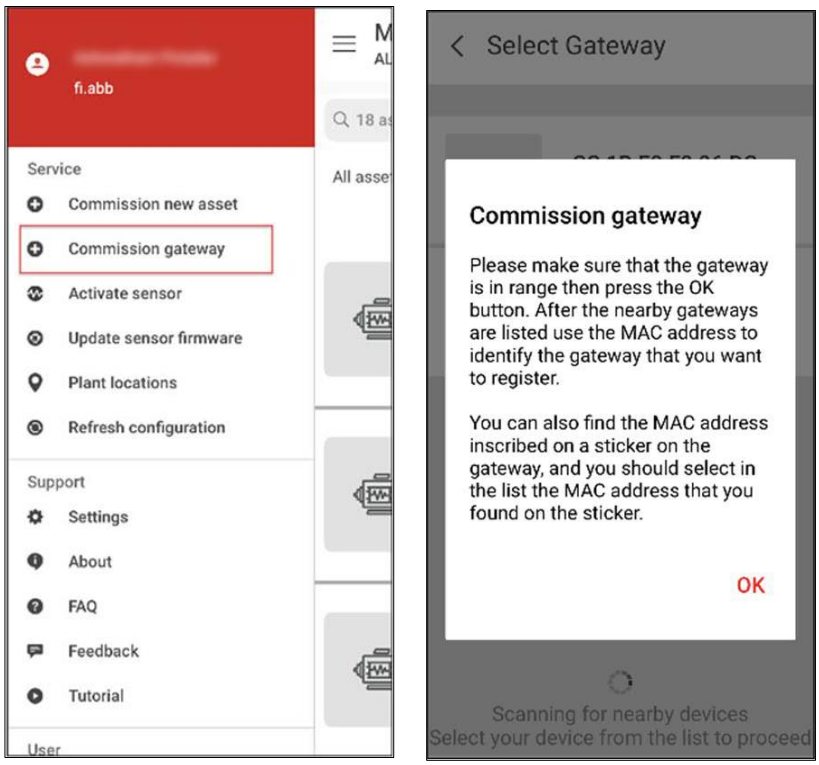


Figure 20 Mobile APP Commission gateway option

- 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.

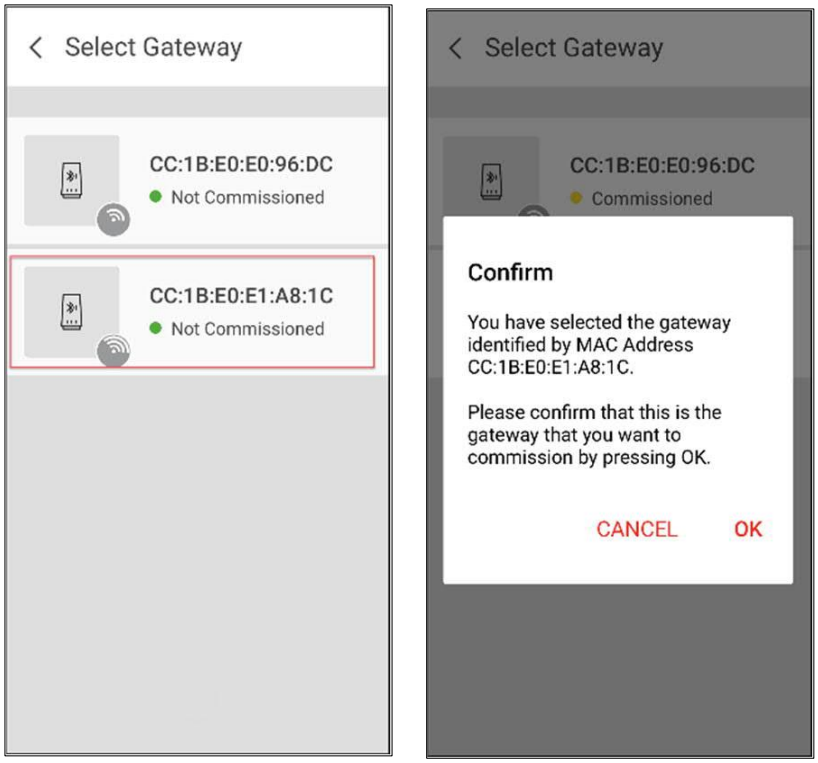


Figure 21 Select gateway for commissioning

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

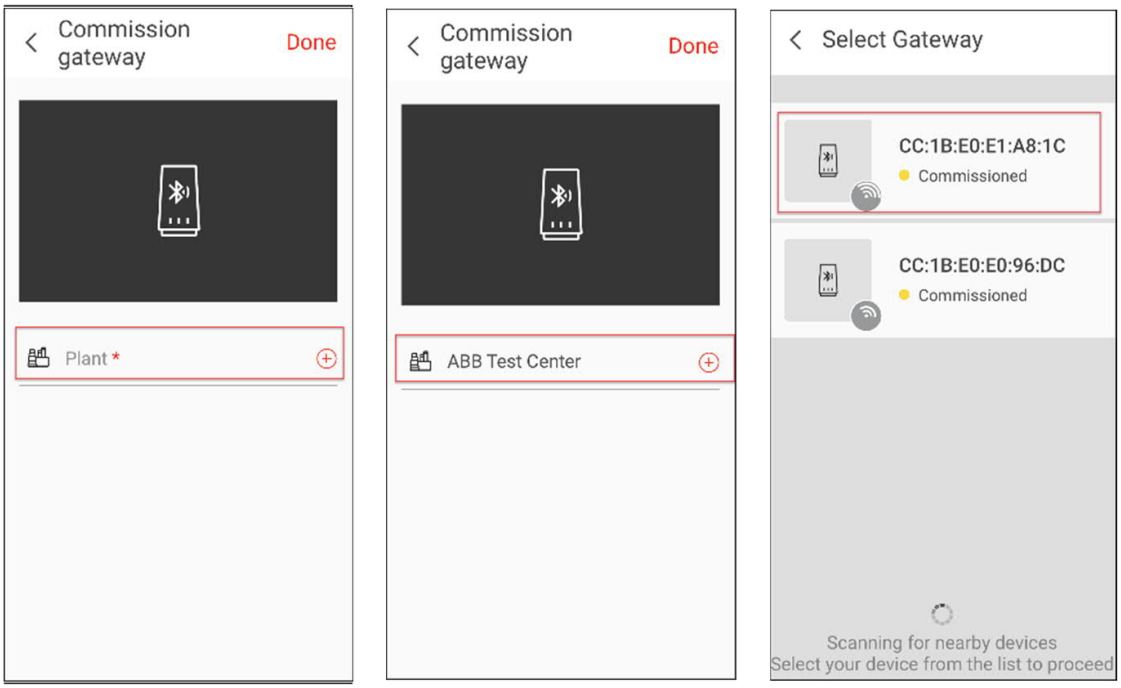


Figure 22 Assign gateway to a plant

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 LEDs are 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).

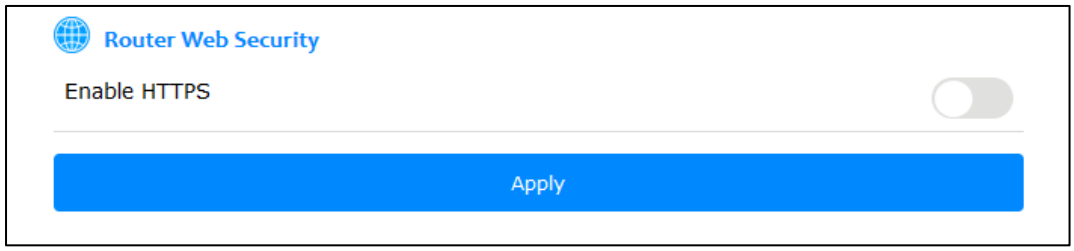


Figure 23 Router web security option

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 a couple of hours to see the first measurements to appear 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 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:

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.

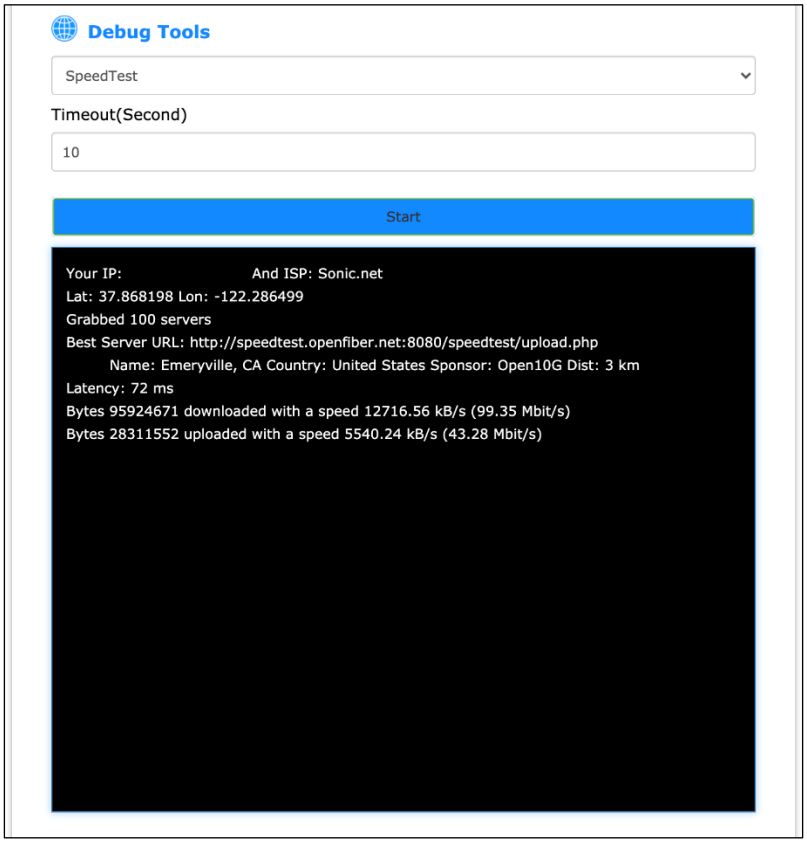


Figure 24 SpeedTest tool

Traceroute tool:

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.

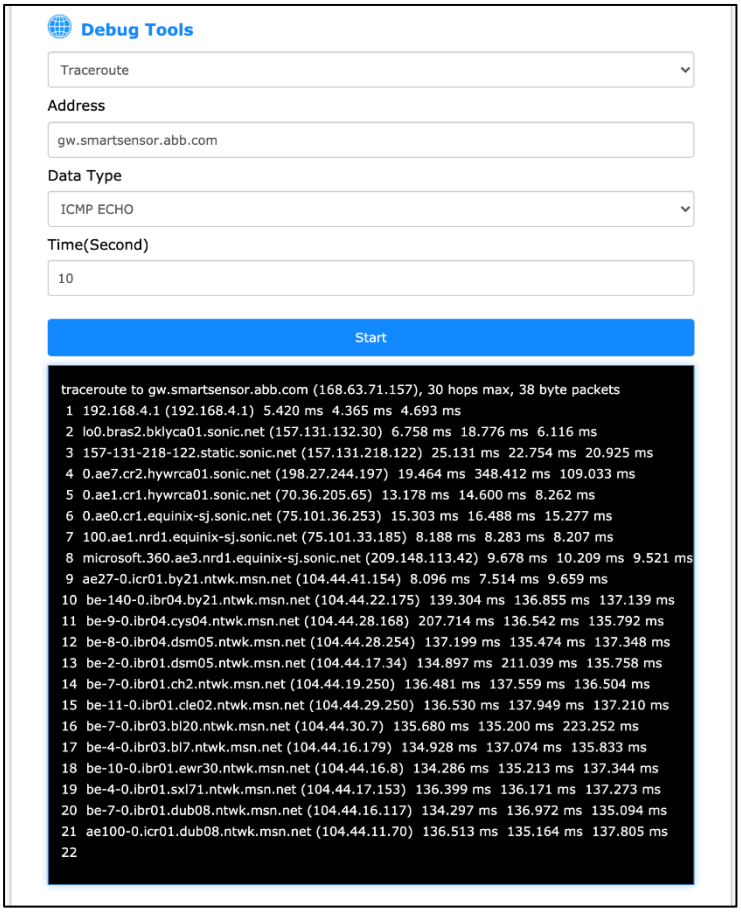


Figure 25 Traceroute tool

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

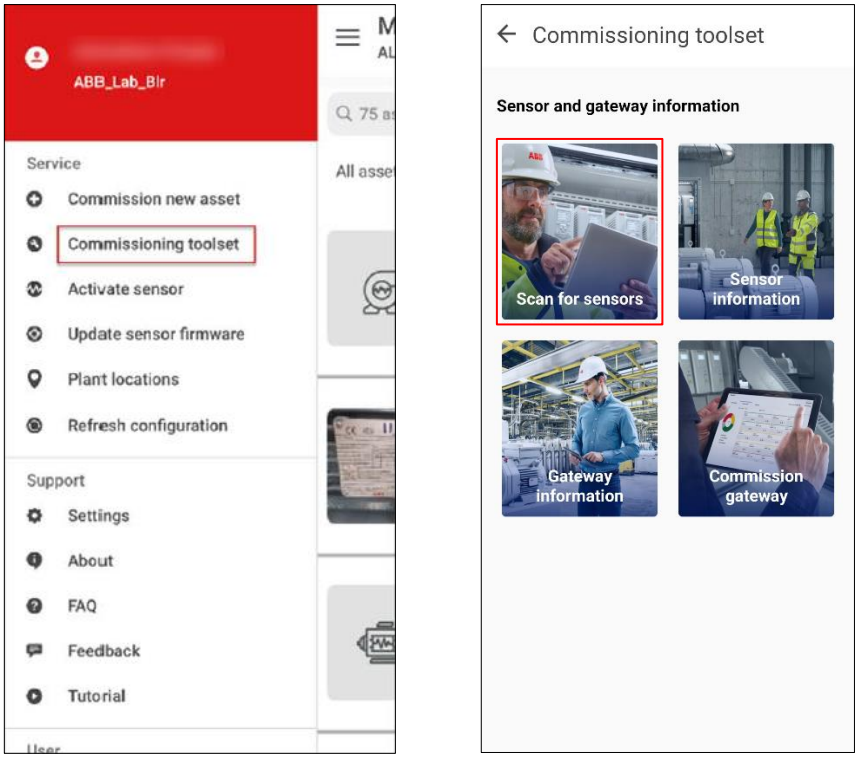


Figure 26 Commissioning toolset

- 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.

Figure 27 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