

TECHNICAL DOCUMENT

ABB Ability™ Smart Sensor gateway

Installation manual



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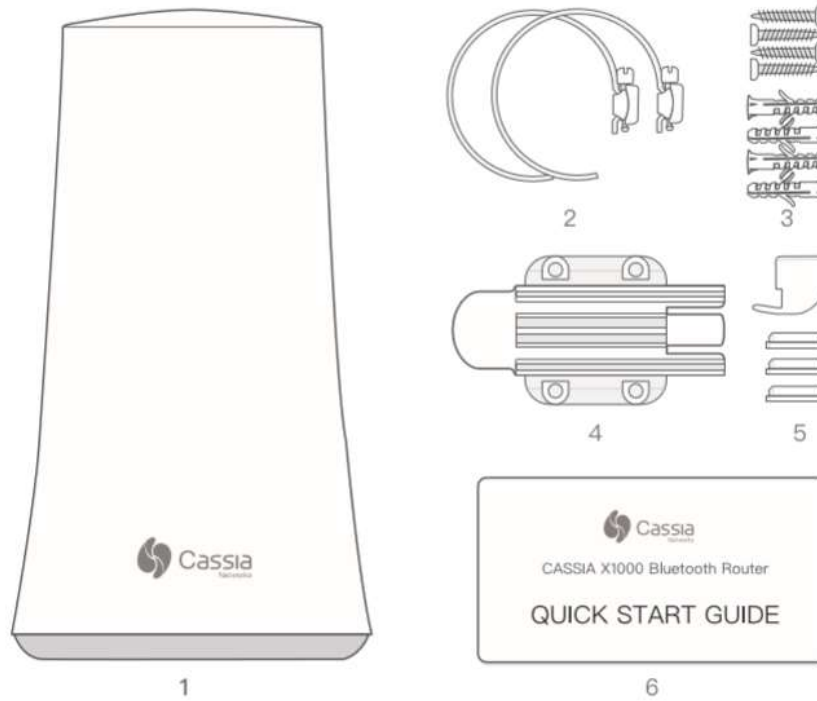
1 General

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 VPN (Virtual Private Network).
- In case there is a firewall used, following ports need to be opened:

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

The above table is considered from gateway perspective, thus all communication with Direction Out is from the gateway to the communication partner. All communication with Direction In is from the communication partner towards the gateway. All communication with In-out is bidirectional.

AC – Access Controller

Global: **abb.cassia.pro**

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

Smart Sensor Platform

Global: **smartensor.abb.com**

China: **smartensor.abb.com.cn**

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

Ethernet cable:

- 1 Ethernet cable is needed when PoE, WIFI or mobile network is used.
- 2 Ethernet cables when LAN/Ethernet network is used.

Computer:

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

USB Cellular Modem / Dongle

- 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.
- SIM card with Internet data plan.
- 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.

2.2 Recommended location

Height:

- Recommended height for the gateway is 3-30 meters from ground level. Lower levels are also acceptable, but 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 is the last 6 digits of the gateway’s MAC address. MAC address can be found from 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

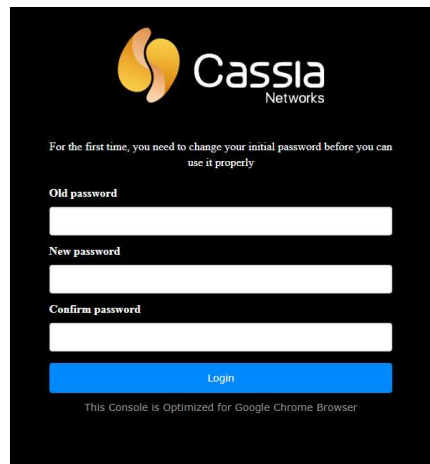
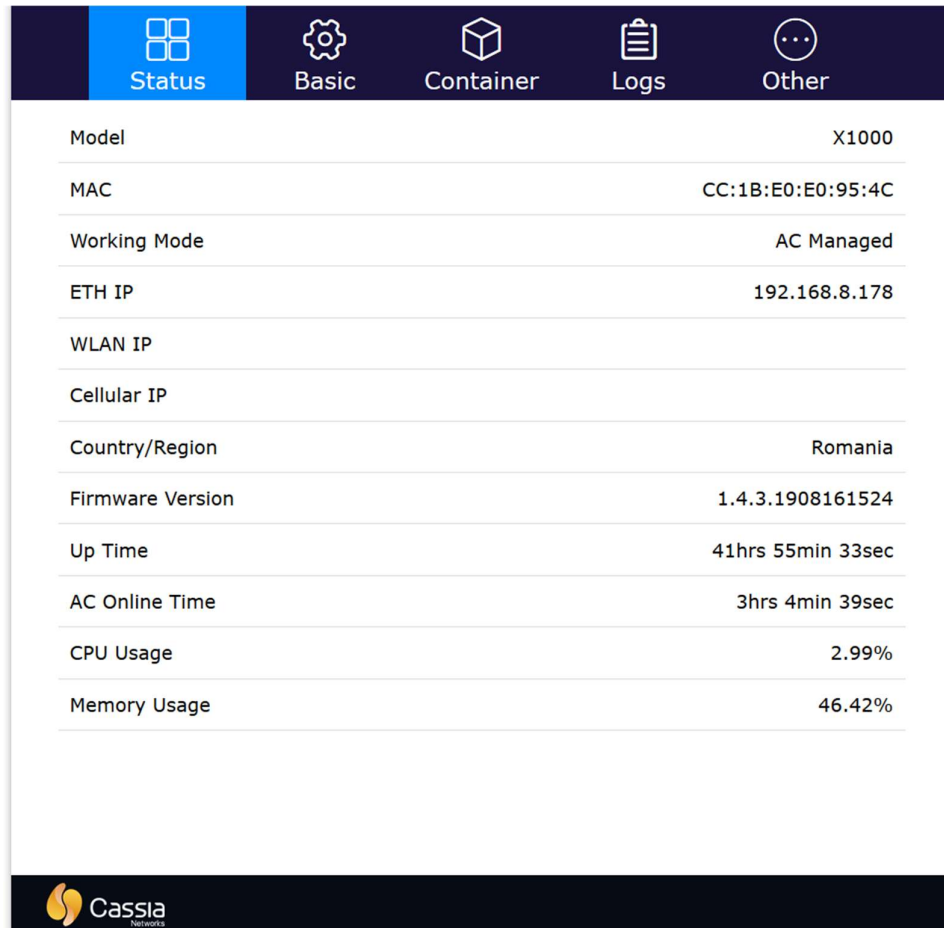


Figure 2 Cassia login page

It is recommended to replace the default credentials.

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. AC server connection is needed for the Smart Sensor data transfer.

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Navigation	
Status	Basic
Container	Logs
Other	

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%

Cassia Networks

Figure 3 Status page

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

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



- **AC Server Address: abb.cassia.pro**
- **AC Server Address for China: gw.smartsensor.abb.com.cn**
- Remote Assistance: **ON**
- Router Mode: **AC Managed Router**
- AC Router Comm. Ports: **5246, 5247**

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.

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- 3G/4G for mobile USB dongle connection.

The screenshot displays the 'Basic' configuration page of the ABB Ability Smart Sensor Gateway. The page is organized into several sections with various settings:

- Router Mode:** AC Managed Router
- Tx Power:** 20
- Statistics Report Interval:** 30 Seconds
- AC Server Address:** abb.cassia.pro
- AC-Router Comm. Ports:** 5246,5247
- Remote Assistance:** ON
- Connection Priority:** Wired
- IP Allocation:** DHCP
- DNS1:** (empty field)
- DNS2:** (empty field)
- Operating Mode:** Hotspot(Setup Only)
- SSID:** cassia-E09F94
- Password:** (masked with dots)
- IP:** 192.168.40.1
- Netmask:** 255.255.255.0
- USB Dongle Type:** None

Additional features shown include 'Wired' and 'Wireless (5Ghz WiFi is not supported)' sections. An 'Apply' button is located at the bottom of the configuration area.

Figure 4 Basic page

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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.

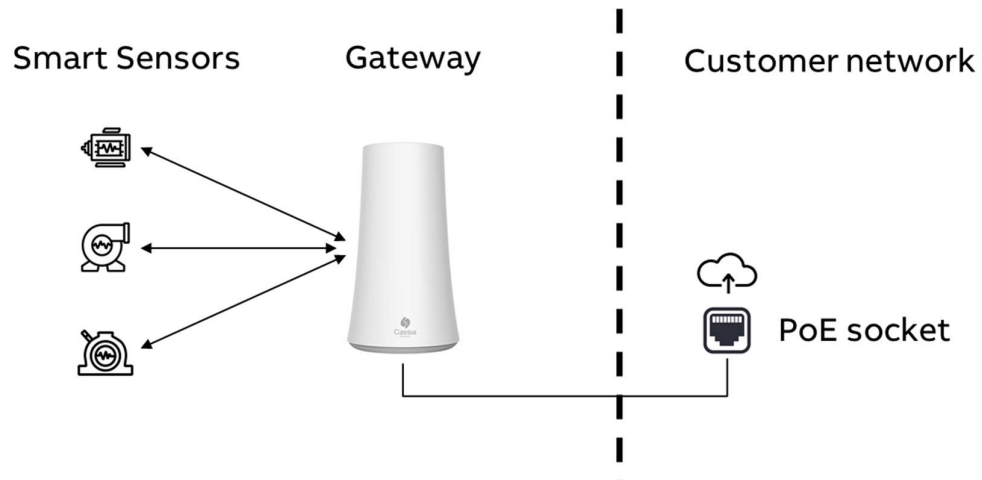


Figure 5 PoE network configuration

From the Gateway Basic Page select:

- Connection Priority: Wired
- IP Allocation: DHCP or Static (in case the IP allocation 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. Additional PoE injector is needed for power supply.

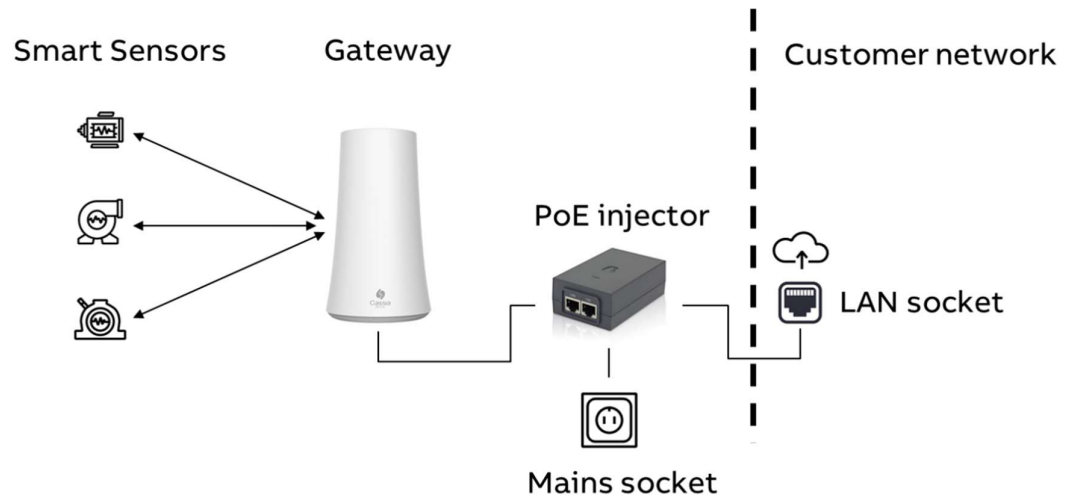


Figure 6 LAN network configuration

From the Gateway Basic Page select:

- Connection Priority: Wired
- IP Allocation: DHCP or Static (in case the IP allocation 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 injector is needed for power supply.



Only 2.4GHz WIFI is supported!

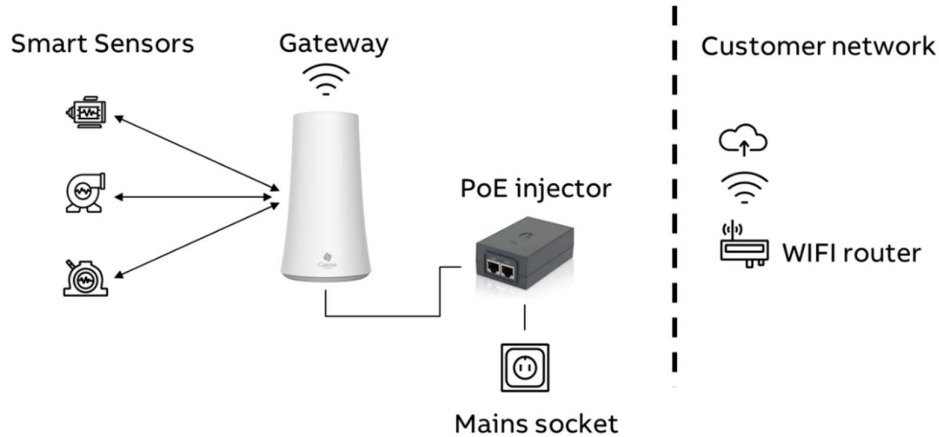


Figure 7 WIFI network configuration

From the Gateway Basic Page select:

- Connection Priority: Wireless
- 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.

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2.7 USB mobile dongle connection

Mobile network can be used with a specific USB dongle. Additional PoE injector (power supply), supported USB dongle and a SIM card are needed.

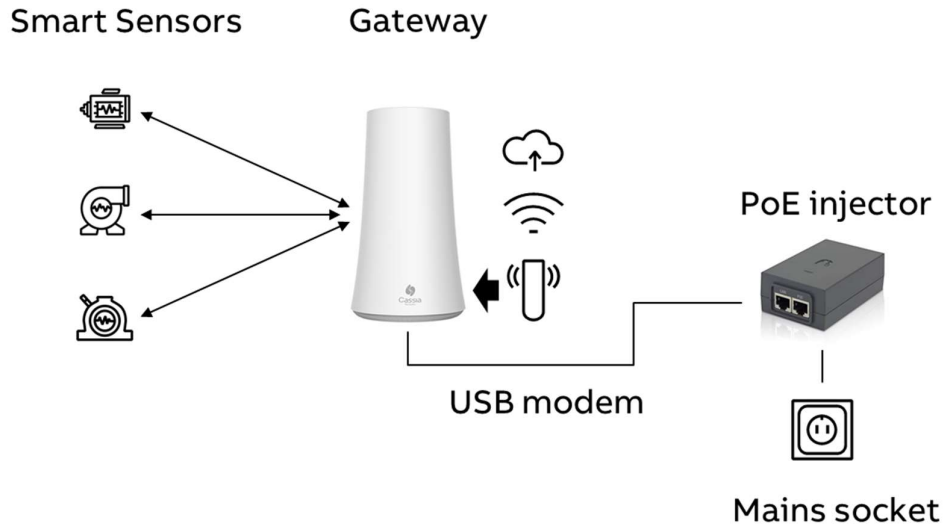


Figure 8 Mobile network configuration

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
- 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.



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.

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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 (ex: 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.

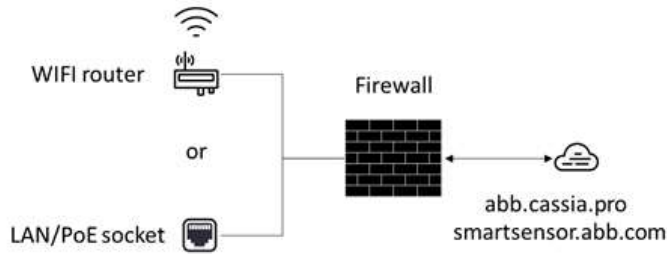


Figure 9 Firewall Configuration for Global

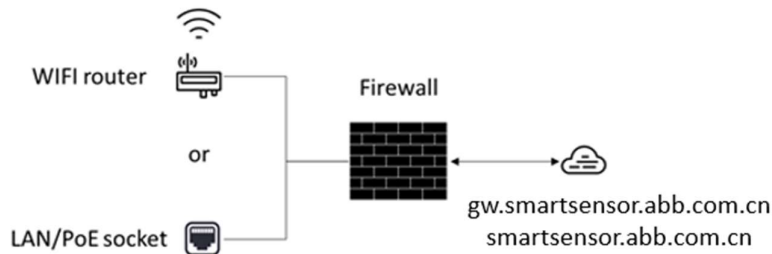


Figure 10 Firewall configuration for China

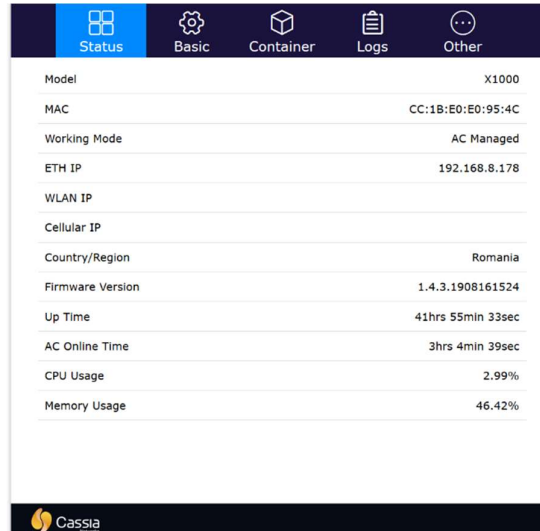


- Firewall should allow communication between the gateway and Access Controller, and gateway and Smart Sensor platform respectively (see required ports in section **2.1 Prerequisites for Installation**).

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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.



Status		Basic	Container	Logs	Other
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 10 Gateway connected to abb.cassia.pro

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 also with Debug Tools in Other tab:

- **abb.cassia.pro**, Time 5s and press Start. To check connection to Access Controller, select Ping, add Address abb.cassia.pro (or gw.smartsensor.abb.com.cn in case of China).
- To verify UDP ports open/close status select netcat, add Address **abb.cassia.pro** (or gw.smartsensor.abb.com.cn in case of China), Protocol UPD, Timeout 2, Port 5246-5247 and press Start.

NOTE! Remember to change the router mode to AC Managed Router mode. If the mode is not changed, the gateway is not establishing a connection to AC server and the data is not read from the Smart Sensors.

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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.

Gateway is not reading the Smart Sensor data:

- Check that the Smart Sensors are within the gateway's range.
- Gateway is reading the data from Smart Sensors in timely manner. 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.

Scanning for Bluetooth devices:

Correct gateway placement can be checked by scanning the Bluetooth devices within the gateway's range. Gateway location or orientation needs to be changed if all desired Smart Sensors are not visible for the gateway or if the Smart Sensor is showing weak signal level.

To enable the scanning, the router mode needs to be changed. This is done in the Basic Page. Change the mode from "AC Managed Router" to "Standalone Router". Gateway will automatically reboot and is operational again within 30 to 60 seconds.

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In computer, tablet or mobile phone, open the following web page while having an Internet access:

<http://www.bluetooth.tech/debugger/>

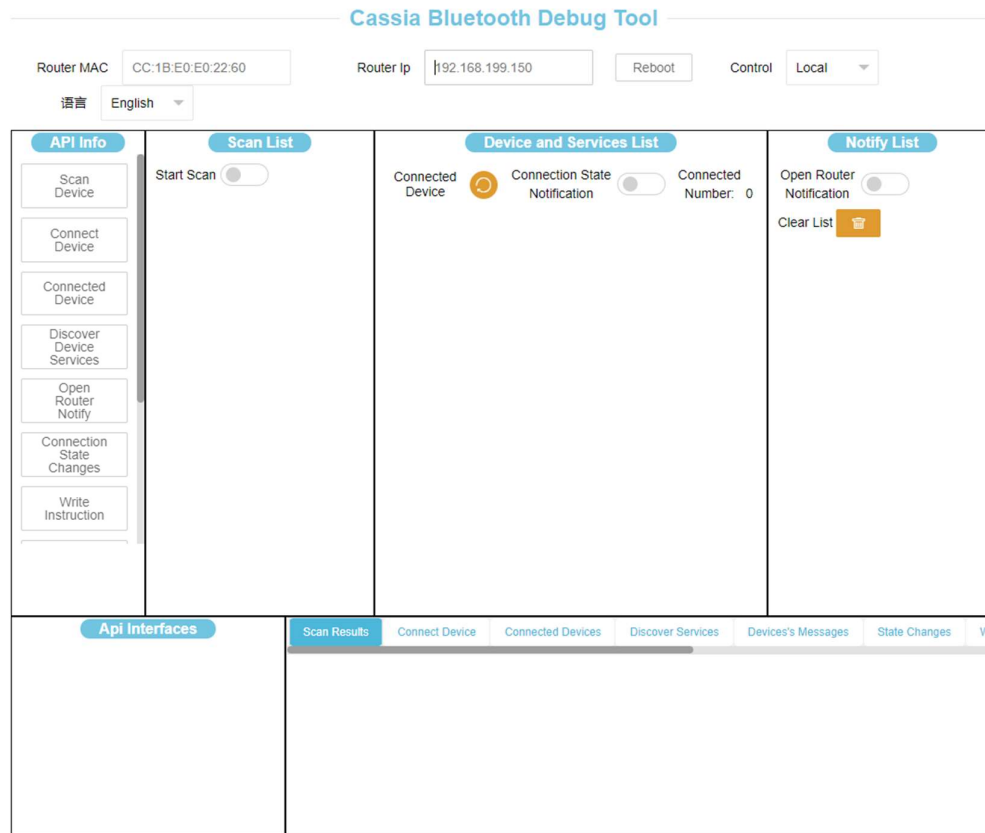


Figure 11 Cassia Bluetooth Debug Tool

Once the debug tool is loaded, connect the device used for configuration (computer, tablet or mobile phone) to the WIFI network generated by the gateway. If the gateway is connected to WIFI, then connect the configuration device to the same WIFI network as the gateway is connected.

Type in the gateway’s MAC and IP addresses to the fields Router MAC and Router IP.

Press Start Scan.

Debug Tool now starts to list all Bluetooth devices within its range. For all scanned devices the tool is showing the MAC address and RSSI value. Sometimes the name is not available, but it is listed if known.

RSSI value can be roughly categorized to the following groups:

- RSSI value between 0 and -70 is OK
- RSSI value between -70 and -80 is weak, sensor might be read time to time

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- RSSI value -80 or less is poor, most probably the sensor cannot be read

If the desired Smart Sensors are showing RSSI values of -70 or less, it is recommended to adjust the gateway's location or orientation.

For more support, please contact Smart Sensor support:

support.smartsensor@abb.com

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