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TECHNICAL DOCUMENT

Smart Sensor Gateway Installation Manual



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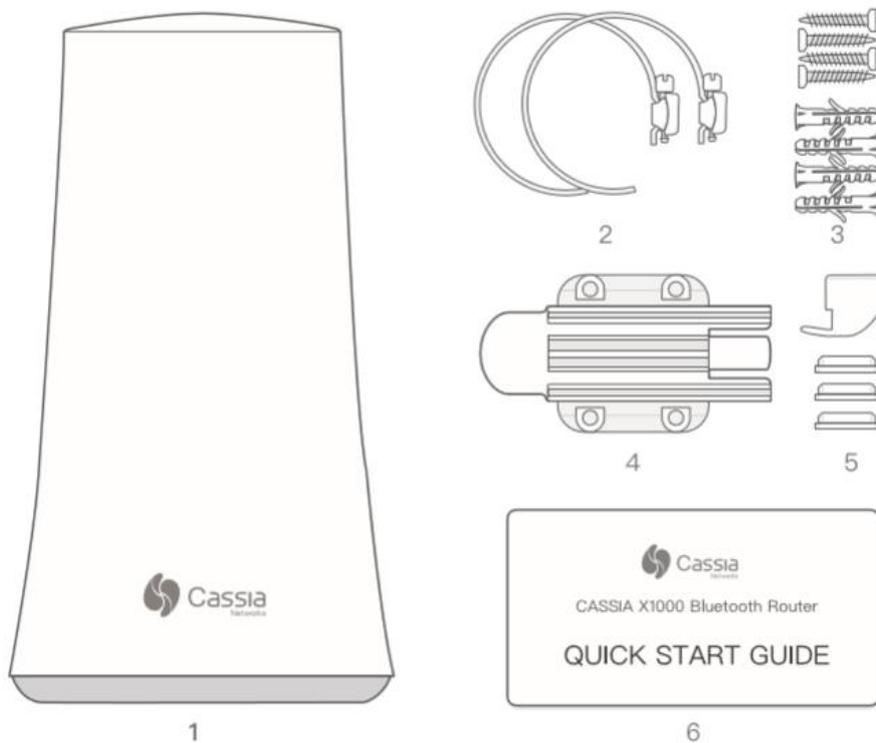
1 General

Smart Sensor Gateway is used to upload the Smart Sensor data automatically to the Smart Sensor Portal. Gateway needs to be configured for internet access before it can start reading the Smart Sensors. Following internet connections are supported:

- PoE (Power over Ethernet) network.
- LAN/Ethernet network together with PoE injector.
- WIFI network.
- Mobile network with specific USB dongle.
- USB port at the bottom of the Gateway can be used as a power supply for devices like a USB WIFI modem.

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

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 needs to be opened:

Type	Port	M/O	Description
UDP	5246, 5247	Mandatory	Default CAPWAP communication between AC and router
UDP	6246, 6247	Optional	Backup CAPWAP communication between AC and router
TCP	8883	Optional	Optional MQTT communication between AC and router
TCP	80	Mandatory	Container/APP download from AC
TCP	443	Optional	Container/APP download from AC
TCP	9999	Mandatory	Remote SSH to container
UDP	53	Mandatory	DNS lookup for AC address

- 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.

2G/3G USB 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 sufficient 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:

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

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

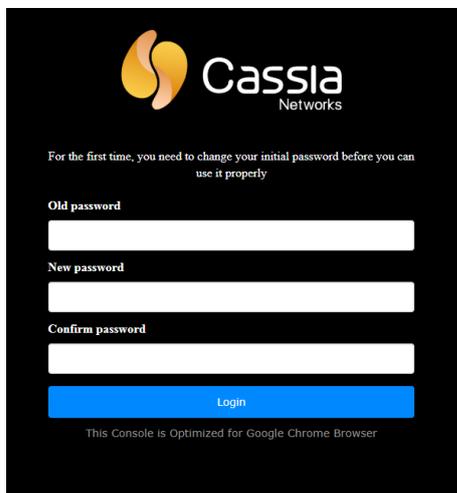
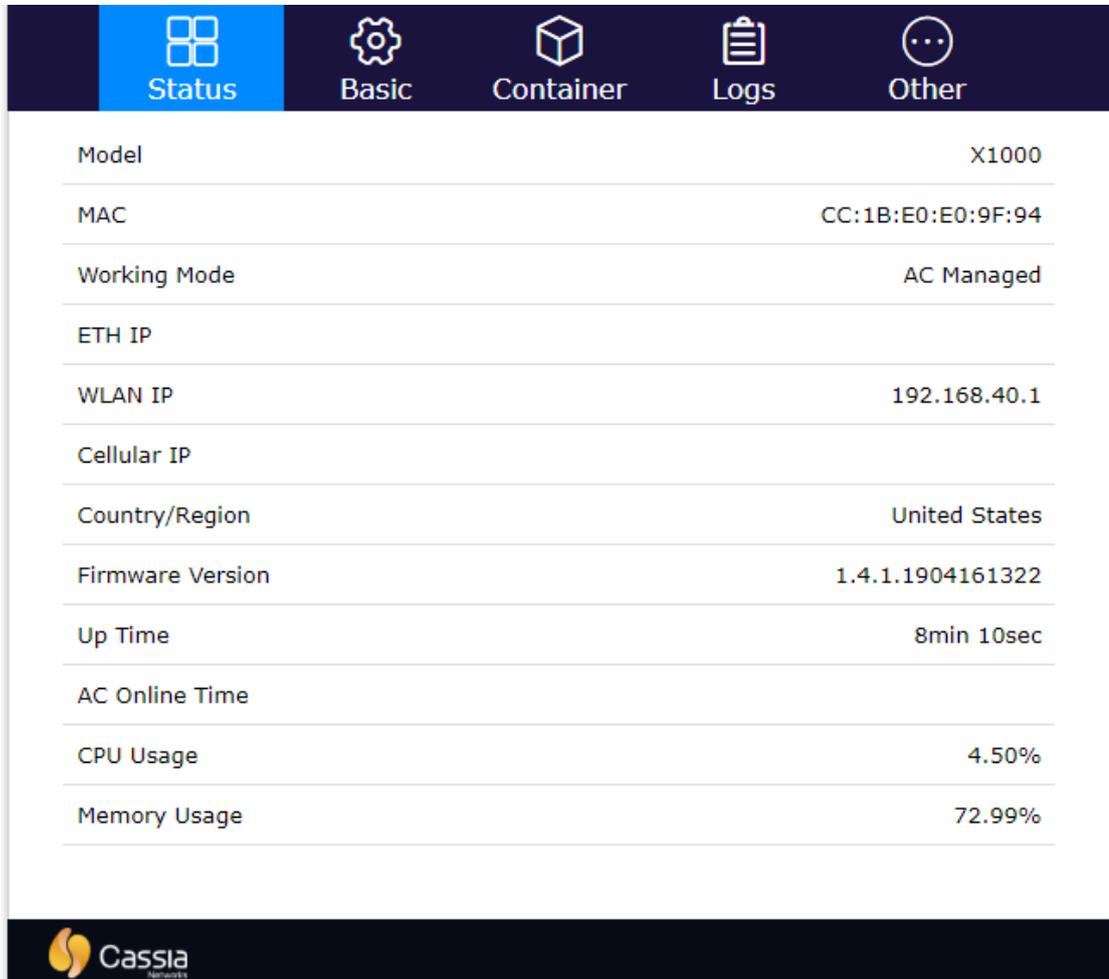


Figure 2 Cassia Login Page

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.



Navigation Menu	
Status	Basic
Container	Logs
Other	

Model	X1000
MAC	CC:1B:E0:E0:9F:94
Working Mode	AC Managed
ETH IP	
WLAN IP	192.168.40.1
Cellular IP	
Country/Region	United States
Firmware Version	1.4.1.1904161322
Up Time	8min 10sec
AC Online Time	
CPU Usage	4.50%
Memory Usage	72.99%

Cassia Networks logo at the bottom left.

Figure 3 Status Page

Basic Page is where the configuration is done. Following values are common for all network configurations (PoE, LAN, WIFI, Mobile):

- ! - **AC Address: abb.cassia.pro**
- 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.

The screenshot displays the 'Basic' configuration page of a Smart Sensor Gateway. The page is organized into 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)
- Wireless (5Ghz WiFi is not supported):** (disabled)
- Operating Mode:** Hotspot(Setup Only)
- SSID:** cassia-E09F94
- Password:** (masked with dots)
- IP:** 192.168.40.1
- Netmask:** 255.255.255.0
- Cellular Dongle:** (disabled)
- USB Dongle Type:** None

An 'Apply' button is located at the bottom of the configuration area. The Cassia logo is visible in the bottom left corner of the interface.

Figure 4 Basic Page

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.

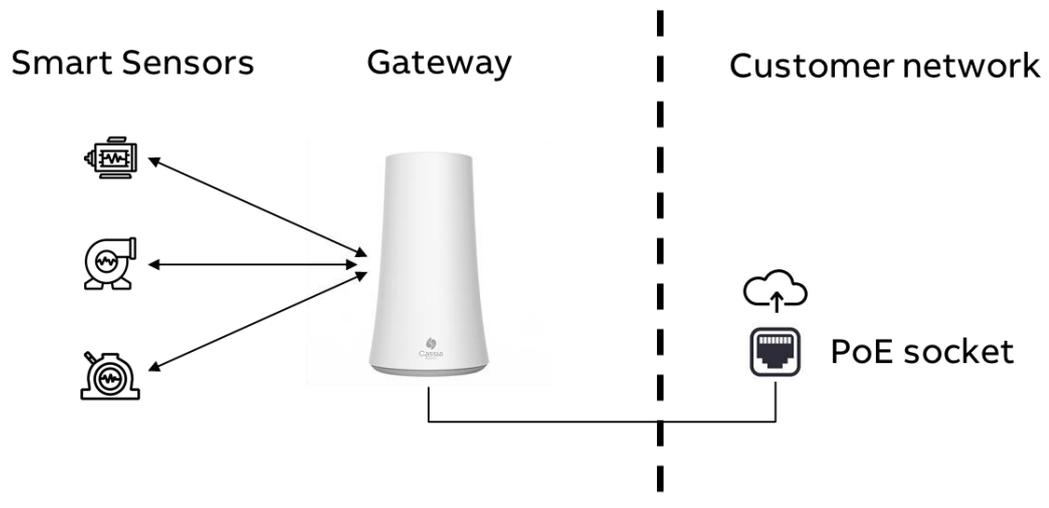


Figure 5 PoE Network Configuration

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.

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.

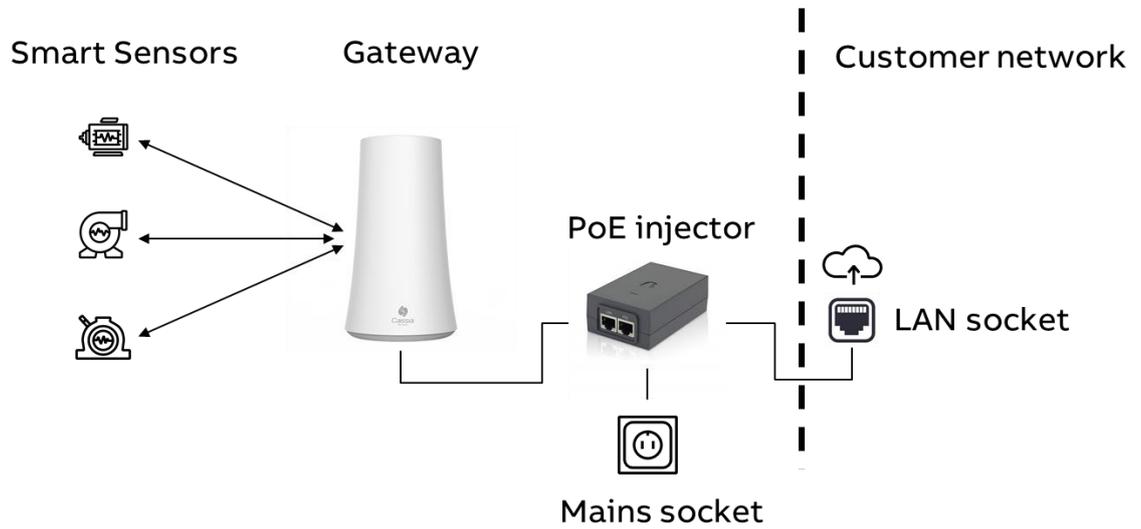


Figure 6 LAN Network Configuration

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.

2.6 WIFI Connection

Gateway can be configured to use an existing WIFI network. Additional PoE injector is needed for power supply. Only 2.4GHz WIFI is supported.

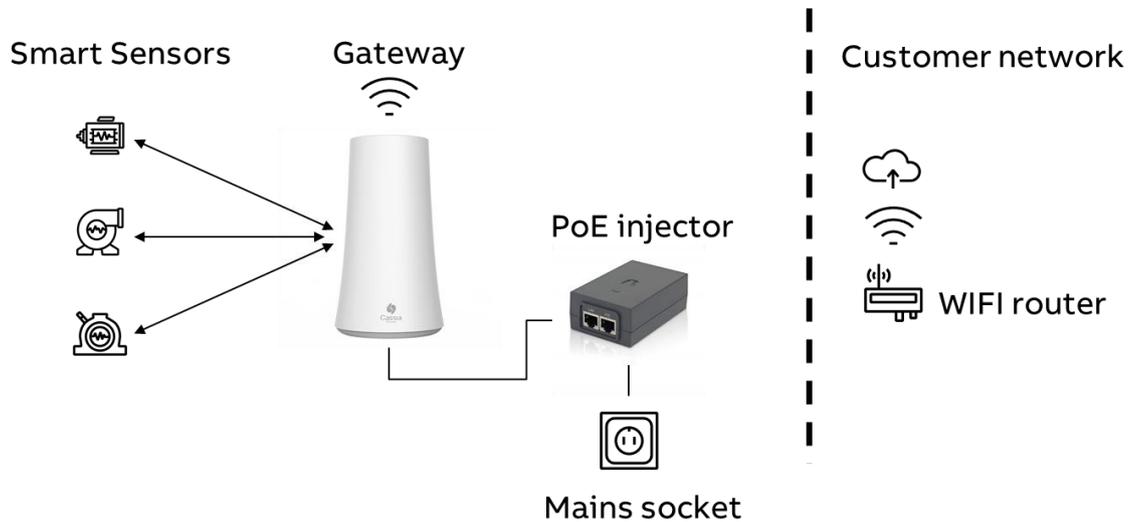


Figure 7 WIFI Network Configuration

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.

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.

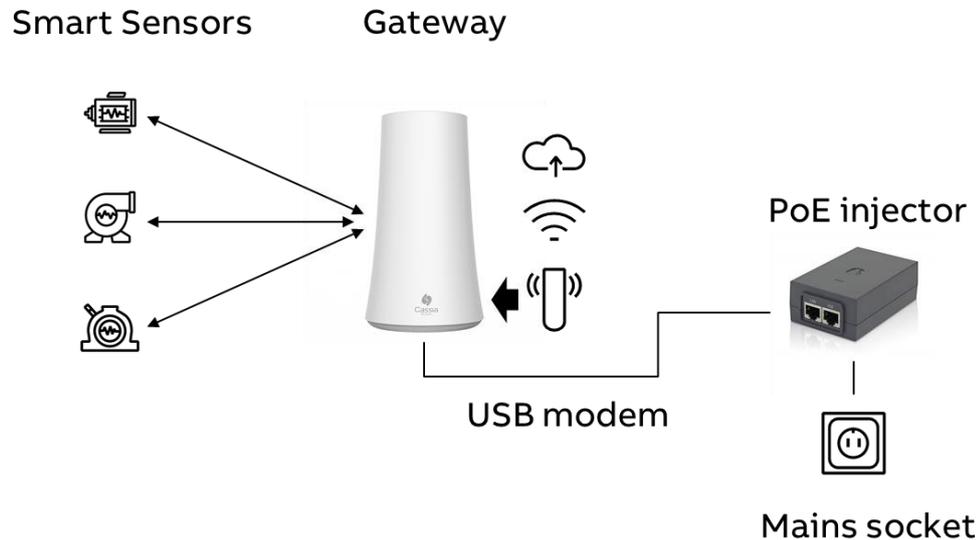


Figure 8 Mobile Network Configuration

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 sufficient network signal available. In case of a 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.

Supported USB dongle modems are:

- Huawei MS2131i-8
- Huawei E3372s-153
- Huawei E8372h-153
- Novotel USB730L
- MultiTech MTCM-LNA3-B03 for Verizon
- MultiTech MTCM-LAT3-B03 for AT&T
- Any USB powered WIFI modem (Gateway connected to modem via WIFI)

2.8 Firewall Configuration

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

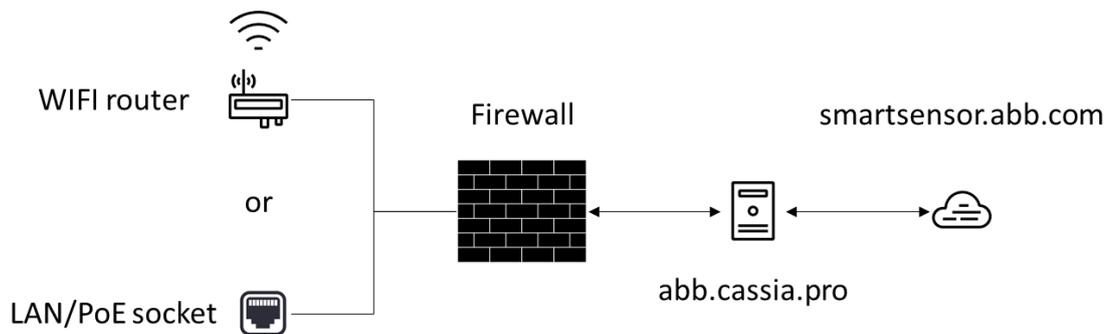


Figure 9 Firewall Configuration

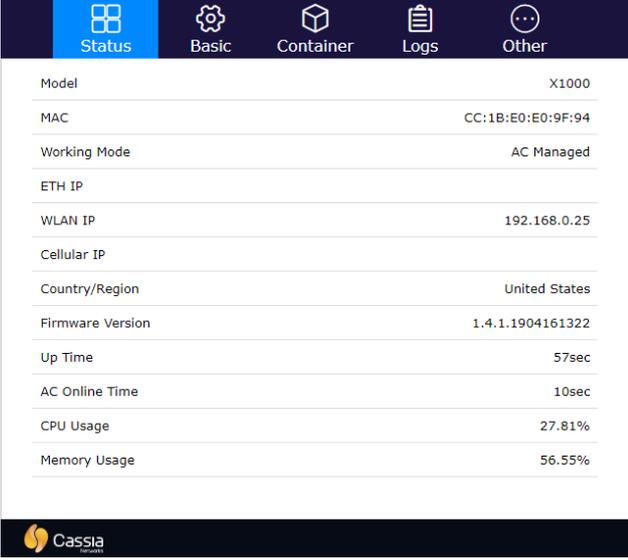
- Firewall needs to have following ports opened

Type	Port	M/O	Description
UDP	5246, 5247	Mandatory	Default CAPWAP communication between AC and router
UDP	6246, 6247	Optional	Backup CAPWAP communication between AC and router
TCP	8883	Optional	Optional MQTT communication between AC and router
TCP	80	Mandatory	Container/APP download from AC
TCP	443	Optional	Container/APP download from AC
TCP	9999	Mandatory	Remote SSH to container
UDP	53	Mandatory	DNS lookup for AC address

- Firewall should allow communication between the Gateway and `abb.cassia.pro`

2.9 Verifying the configuration

Once the configuration is done it can be verified from the status page. When connection is established to `abb.cassia.pro` the AC Online Time is shown.



Status Basic Container Logs Other	
Model	X1000
MAC	CC:1B:E0:E0:9F:94
Working Mode	AC Managed
ETH IP	
WLAN IP	192.168.0.25
Cellular IP	
Country/Region	United States
Firmware Version	1.4.1.1904161322
Up Time	57sec
AC Online Time	10sec
CPU Usage	27.81%
Memory Usage	56.55%

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:

- To check connection to Access Controller select Ping, add Address `abb.cassia.pro`, Time 5s and press Start.
- To verify UDP ports open/close status select NetCat, add Address `abb.cassia.pro`, Protocol UPD, Timeout 2, Port 5246-5247 and press Start.

3 Scanning 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.

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
- 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.



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.

4 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.

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.

For more support, please contact Smart Sensor support:

support.smartsensor@abb.com

