

# Silvair Gateway

## User guide

|                |                  |
|----------------|------------------|
| 2 October 2025 | SGW-102 rev. 5.5 |
|----------------|------------------|



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# 1. Overview

The Silvair Gateway connects Bluetooth mesh networks that have been commissioned using the Silvair Commissioning tools to the Silvair cloud. This allows the scheduling of events and delivery of services based on the data generated by these networks.

## 1.1 Functions

The Silvair Gateway enables the following functions in the Silvair web app:

- Gateway scheduling (available by default)
  - Schedule changes in scenes and lighting control scenarios, such as occupancy sensing or daylight harvesting, for specific times or days.
- Energy and occupancy monitoring (additional paid service)
  - Visualize energy use and occupancy in the Silvair web app.
  - Download energy and occupancy data via the Silvair web app and cloud-based API.
- Remote monitoring and control (additional paid service)
  - Low-latency monitoring of device status in the network via API.
  - Low-latency control of devices in the network via API.
- Remote monitoring of emergency lighting testing (ELT) results (additional paid service)
  - Remotely collect ELT results.
  - Access historical daily ELT reports via the web app to view or download them.
- System diagnostics
  - Monitor the status of Bluetooth mesh networks.
  - Remotely troubleshoot networking issues.

## 1.2 Features

- Linux-based operating system designed for long-term support.
- Simple commissioning using the Silvair Commissioning tools.
- Automatic connection to the Silvair cloud.
- Secure provisioning using secure IDs and encrypted keys.
- Advanced hardware and software protection (secure boot and encrypted file system accessible only through the management platform).
- Automatic security updates.
- Timely OS updates and vulnerability fixes.
- Low-latency transmission of network, luminaire, and sensor status data to the Silvair cloud.
- Schedule caching.
- Automatic remote firmware updates.
- Gateway and network performance metrics available in the Silvair web app.

## 2. Technical specifications

|                                     |                                                                                                                                                                                                                                                                    |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Features and application</b>     | An IoT gateway for the connection, monitoring, and management of Bluetooth mesh networks in commercial building applications via the Internet. Requires networks to have been commissioned using the Silvair Commissioning tools. Uses a LED for status reporting. |
| <b>Capacity and performance</b>     | The hardware configuration allows the Silvair Gateway to process up to approximately 450 Bluetooth mesh network messages per second.<br>The gateway sends each message three times with a TTL of 127.                                                              |
| <b>Project requirements</b>         | A single Silvair Gateway can handle approximately 200 Bluetooth mesh devices.                                                                                                                                                                                      |
| <b>Security</b>                     | Secure boot with encrypted operating system<br>Secure communication with the Silvair Cloud over Internet (TLS)<br>Secure communication with devices over qualified Bluetooth mesh (uses the primary network key to communicate with mesh nodes)                    |
| <b>Power supply</b>                 | 4.5–5.5 V DC, 2 A<br>Power over Ethernet 36–57 V DC (IEEE 802.3af)                                                                                                                                                                                                 |
| <b>Operating system</b>             | Ubuntu Core                                                                                                                                                                                                                                                        |
| <b>Processor</b>                    | i.MX6ULL (Y2), 32-bit ARM 800 MHz                                                                                                                                                                                                                                  |
| <b>Memory</b>                       | 512 MB DDR3L SDRAM<br>8GB eMMC                                                                                                                                                                                                                                     |
| <b>Communication protocols</b>      | Bluetooth mesh (2.4 GHz Bluetooth Low Energy)<br>Wi-Fi 802.11a/b/g/n/ac (2.4/5 GHz)<br>4G LTE Cat 1 with 2G/3G (only for Cascade-500-W and Cascade-500-X gateways)                                                                                                 |
| <b>Ports</b>                        | 1 x RJ45 10/100 Ethernet<br>1 x USB 2.0 Type-A<br>2 x external dipole antenna, 5 dBi (only for Cascade-500-W and Cascade-500-X gateways)                                                                                                                           |
| <b>Required ambient temperature</b> | 0°C to 60°C<br>32°F to 140°F                                                                                                                                                                                                                                       |
| <b>Enclosure dimensions</b>         | 127 mm x 127 mm x 30 mm (5 inch x 5 inch x 1.2 inch)                                                                                                                                                                                                               |
| <b>Mounting position</b>            | Wall or surface mounted. As close as possible to the geometrical center of the lighting network, and as far as possible from any potential sources of interference.                                                                                                |
| <b>Certifications*</b>              |                                                                                                                                                                                                                                                                    |
| <b>Cascade-500</b>                  | FCC / ISED / CE-RED / RCM / MIC (Japan) / WPC / SUTEL / IMDA / NTC / UKCA / NCC (Nigeria) / CRA / NCC (Taiwan) / CMIIT / SIRIM / ICT (Qatar) / NBTC / KCC                                                                                                          |
| <b>Cascade-500-A</b>                | FCC / ISED / CE-RED / UKCA / RCM                                                                                                                                                                                                                                   |
| <b>Cascade-500-W</b>                | FCC / ISED / CE-RED / UKCA / RCM / GCF / PTCRB / AT&T                                                                                                                                                                                                              |
| <b>Cascade-500-X</b>                | FCC / ISED / CE-RED / UKCA / RCM / NOM / IFT / Kvalitet Mark (Serbia) / PTCRB / AT&T                                                                                                                                                                               |

\* Refer to Appendix A for the list of certified countries.

## 3. Requirements

### 3.1 Gateway

- The gateway must be connected to a power supply.
- The gateway must be connected to the internet.
- The gateway must be placed as far away as possible from potential sources of interference (for example, high power electrical equipment, transmitters, or building features that could block the radio signal).
- The gateway must be installed as close as possible to the geometrical center of the network (that is, within radio range of as many nodes as possible).
- The gateway must have a direct connection to at least one device in each area it serves.
- Areas assigned to the gateway must be able to communicate with each other.
- The gateway must be assigned only to one project.

## 3.2 Network

To ensure connectivity, the Silvair Gateway needs a DHCP or static IP address and DNS servers. The local admin must also add the hosts and ports listed below to the allowed list.

 Only the hostnames must be added, not their IP addresses, because IPs can change over time.

 Networks using SSL or TLS Man-in-the-Middle (MiTM) traffic decryption must be configured to NOT DECRYPT traffic to the gateways. Decryption will prevent correct update and gateway management.

| Host                                                                                         | Protocol  | Port    | Notes                                                                                             |
|----------------------------------------------------------------------------------------------|-----------|---------|---------------------------------------------------------------------------------------------------|
| 0.ubuntu.pool.ntp.org                                                                        | UDP       | 123     | Time server                                                                                       |
| ntp.ubuntu.com                                                                               | UDP       | 123     | Time server                                                                                       |
| geoip.ubuntu.com                                                                             | TCP/HTTPS | 443     | Determine local timezone                                                                          |
| login.ubuntu.com                                                                             | TCP/HTTPS | 443     | Software updates                                                                                  |
| api.snapcraft.io                                                                             | TCP/HTTPS | 443     | Software updates                                                                                  |
| dashboard.snapcraft.io                                                                       | TCP/HTTPS | 443     | Software updates                                                                                  |
| storage.snapcraftcontent.com                                                                 | TCP/HTTPS | 443     | Software updates                                                                                  |
| canonical-lgw01.cdn.snapcraftcontent.com                                                     | TCP/HTTPS | 443     | Software updates                                                                                  |
| canonical-lcy01.cdn.snapcraftcontent.com                                                     | TCP/HTTPS | 443     | Software updates                                                                                  |
| canonical-lcy02.cdn.snapcraftcontent.com                                                     | TCP/HTTPS | 443     | Software updates                                                                                  |
| canonical-bos01.cdn.snapcraftcontent.com                                                     | TCP/HTTPS | 443     | Software updates                                                                                  |
| provision.rigado.com                                                                         | TCP/HTTPS | 443     | Provisioning                                                                                      |
| serial-vault.rigado.io                                                                       | TCP/HTTPS | 443     | Provisioning                                                                                      |
| api.azure.rigado.com                                                                         | TCP/HTTPS | 443     | Posting logs                                                                                      |
| api.rigado.com                                                                               | TCP/HTTPS | 443     | Posting logs                                                                                      |
| diagnostics.azure.rigado.com                                                                 | TCP/HTTPS | 443, 80 | Error reporting                                                                                   |
| diagnostics.rigado.com                                                                       | TCP/HTTPS | 443, 80 | Error reporting                                                                                   |
| mqtt.azure.rigado.com                                                                        | TCP/MQTT  | 8883    | Metrics and diagnostics                                                                           |
| a2fy01pewinh1f.iot.us-west-2.amazonaws.com<br>a2fy01pewinh1f-ats.iot.us-west-2.amazonaws.com | TCP/MQTT  | 8883    | Metrics and diagnostics                                                                           |
| api.platform-prod.silvair.com                                                                | TCP/HTTPS | 443     | Silvair Commissioning API communication                                                           |
| silvair.eu.auth0.com                                                                         | TCP/HTTPS | 443     | Silvair Commissioning authentication                                                              |
| gateways-rabbitmq-tls.platform-prod.silvair.com                                              | TCP/AMQPS | 5671    | Energy and occupancy information database<br>Silvair Monitoring API<br>Silvair Remote Control API |

## 3.3 Installation

For information about physically installing the Silvair Gateway, see the [Rigado documentation](#).

## 3.4 Configurations

The gateway supports the following network configurations:

- Cable Ethernet via DHCP (default)
- Cable Ethernet with a static IP address
- Wi-Fi supporting WPA2-PSK via DHCP
- Wi-Fi supporting WPA2-PSK with a static IP address
- 4G LTE Cat 1 with 2G/3G (only for Cascade-500-W and Cascade-500-X gateways).

### 3.4.1 Cable Ethernet with a static IP address

To configure the static IP connection using cable Ethernet, continue as follows.

1. Connect the gateway to the internet via Ethernet DHCP or a specifically configured mobile hotspot (contact Silvair Support for details).
2. Create a [request to Silvair Support](#) with the following information:
  - a. Gateway S/N
  - b. Static IP
  - c. CIDR subnet mask
  - d. Static gateway address
  - e. DNS server address.



If your subnet mask, gateway address, or DNS changes, the connection will stop working. In that case, send us the new information so we can configure the connection on each gateway again.

---

### 3.4.2 Wi-Fi via DHCP

To configure the Wi-Fi connection via DHCP, continue as follows.

1. Connect the gateway to the internet via Ethernet DHCP or a specifically configured mobile hotspot (contact Silvair Support for details).
2. Create a [request to Silvair Support](#) with the following information:
  - a. Gateway S/N
  - b. SSID of your network
  - c. Wi-Fi password for your network
  - d. Wi-Fi region (China, India, Indonesia, Israel, Korea, Taiwan, or Worldwide).



If your SSID or password changes, the connection will stop working. In that case, send us the new information so we can configure the connection on each gateway again.

---

3. After we let you know that your Wi-Fi connection has been configured, disconnect your gateway from Ethernet.

### 3.4.3 Wi-Fi with a static IP address

To configure the Wi-Fi connection with a static IP address, continue as follows.

1. Connect the gateway to the internet via Ethernet DHCP or a specifically configured mobile hotspot (contact Silvair Support for details).
2. Create a [request to Silvair Support](#) with the following information:
  - a. Gateway S/N
  - b. SSID of your network
  - c. Wi-Fi password for your network
  - d. Wi-Fi region (China, India, Indonesia, Israel, Korea, Taiwan, or Worldwide)
  - e. Static IP
  - f. CIDR subnet mask
  - g. Static gateway address
  - h. DNS server address.



If your SSID, password, subnet mask, gateway address, or DNS changes, the connection will stop working. In that case, send us the new information so we can configure the connection on each gateway again.

---

3. After we let you know that your Wi-Fi connection has been configured, disconnect your gateway from Ethernet.

### 3.4.4 4G LTE Cat 1 with 2G/3G

To configure the cellular connection, continue as follows.

1. Prepare a micro-SIM card with access to the internet and no PIN.
2. Make sure that your data plan is sufficient for the number of devices. For example, if the gateway serves 200 devices, a data plan of up to 75 GB per month may be required.
3. Activate your SIM card with your cellular provider.
4. Connect the gateway to the internet via Ethernet or Wi-Fi.
5. Put your SIM card into the slot so that the chip is facing down when the top of the gateway is facing up.
6. Create a [request to Silvair Support](#) with the following information:
  - a. Gateway S/N
  - b. APN assigned to you by your cellular provider.
7. After we let you know that your cellular connection has been configured, disconnect your gateway from Ethernet / Wi-Fi.



You are responsible for any billing charges.

---



Cellular connectivity can be your gateway's primary or backup option. If multiple options are available, the gateway prioritizes Ethernet, Wi-Fi, then cellular.

---

## 4. Operation

### 4.1 Boot sequence (status LED)

After you connect the gateway to a power supply, the status LED follows this sequence:

| Color                                                                             | Activity                  | Meaning                                                   |
|-----------------------------------------------------------------------------------|---------------------------|-----------------------------------------------------------|
|  | Solid yellow              | The gateway is booting.                                   |
|  | One flash per two seconds | The gateway is connecting to the management portal.       |
|  | Two flashes per second    | The gateway is authenticating with the management portal. |
|  | Solid green               | The gateway is connected and authenticated.               |

 The first boot may take up to 5 minutes. If the gateway remains in a flashing yellow state, it may indicate a network issue.

 If the connection to the management portal is lost, the LED flashes yellow quickly.

### 4.2 Gateway status in the web app

The gateway can have the following statuses in the web app:

| Status                                                                              | Description | Meaning                                                                                                                                                              |
|-------------------------------------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | OK          | The gateway is online, configured, up to date, and ready to use.                                                                                                     |
|  | No areas    | There are no areas in the project, or the gateway is not assigned to any areas. To use gateway-enabled services, the gateway must be assigned to at least one area.  |
|  | Configuring | The gateway configuration is in progress. For example, it is being provisioned to the network or assigned to an area.                                                |
|  | Updating    | A gateway software update is in progress.                                                                                                                            |
|  | Removing    | The gateway is being removed from the project. After removal, it can be added to a different project.                                                                |
|  | Offline     | The gateway is not powered, cannot connect to the internet, or required ports are blocked.                                                                           |
|  | Error       | There is an issue with the gateway or backend services while configuring or removing the gateway. To resolve it, follow the <a href="#">troubleshooting</a> section. |

 You can click  to make sure that the gateway status is up to date.

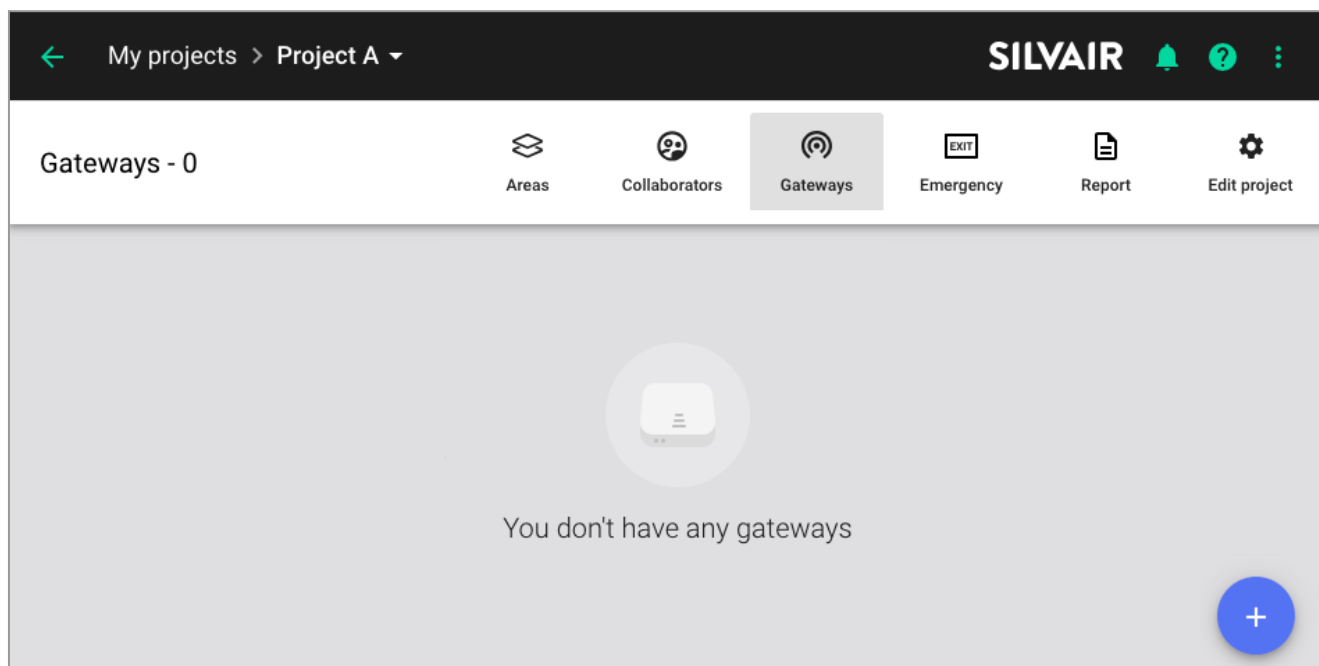
## 4.3 Access level

Access to gateways in the Silvair web app depends on the assigned user role:

- All roles (Installer, Manager, Owner, End user) can see the **Gateways** tab and the list of gateways added to a project.
- Only the Installer, Manager, and Owner can add, remove, or reconfigure a gateway.

## 4.4 Adding a gateway to an existing project

1. Make sure that the gateway status LED is solid green.
2. In the [Silvair web app](#), open the project and click **Gateways**.



3. Click + to add a gateway.
4. If asked, enter the latitude and longitude of your project.



To find the latitude and longitude, use Google Maps or OpenStreetMap.



Enter the values with at least two decimal places.

The more decimal places you use, the more accurate the calculated sunrise and sunset times will be.

5. Enter the serial number (S/N) of the gateway.



Find the serial number on the back of the gateway.

6. Select one or more areas to be handled by this gateway.
7. Click **Add**.

### Add a gateway

Gateway S/N  
C099988877-66554

e.g. C123456789-12345

Areas (max. 31)

☐ Ground Floor

☒ First Floor

☒ Second Floor

CANCEL

ADD

## 4.5 Adding an area to a project with a gateway

1. In the [Silvair web app](#), open the project and click **Gateways**.
2. In the gateway field, click **:** > **Edit**.
3. Select the area and click **Save**.

---

 The gateway status icon changes to yellow to indicate that the gateway configuration is in progress.

---

## 4.6 Removing a gateway from a project

1. Make sure that the gateway status LED is solid green.
2. In the [Silvair web app](#), open the project and click **Gateways**.
3. In the gateway field, click **:** > **Remove**. If the context menu is not available, wait a few minutes until the gateway completes its current process, and click **↺**.
4. If you want to add the gateway to a different project, follow [Adding a gateway to an existing project](#).

---

 To remove an offline gateway from a project, contact [support@silvair.com](mailto:support@silvair.com).

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## 4.7 Troubleshooting

If the gateway status LED is solid green and the gateway status in the web app indicates an error, continue as follows.

1. Make sure that all the [requirements are met](#).
2. In the [Silvair web app](#), open the project and click **Gateways**.
3. In the gateway field, click **:** > **Retry configuration**.
4. If the issue persists:
  - a. [Remove the gateway from the project](#).
  - b. [Add the gateway back to the project](#).
5. If the issue still occurs, contact [support@silvair.com](mailto:support@silvair.com).

## 5. Document revisions

| Revision | Date              | Editor | Changes                                                                                                                                                                                                                                                                                                                  |
|----------|-------------------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 5.5      | 2 October 2025    | GM     | Added a requirement that the gateway must have a direct connection to at least one device in each area it serves.                                                                                                                                                                                                        |
| 5.4      | 22 July 2025      | GM     | Updated the <a href="#">Technical specifications</a> section. Update in <a href="#">Appendix A</a> .                                                                                                                                                                                                                     |
| 5.3      | 9 June 2025       | GM     | Added <a href="#">Appendix A: List of certified countries</a> . Revised the document.                                                                                                                                                                                                                                    |
| 5.2      | 28 January 2025   | GM     | Removed the incorrect terms 'beta' from the APIs.                                                                                                                                                                                                                                                                        |
| 5.1      | 19 December 2024  | GM     | Changed information related to retrieving gateway status.                                                                                                                                                                                                                                                                |
| 5.0      | 16 November 2023  | GM     | Merged with the <i>SGW-101 Silvair Gateway product card</i> document. Added an image of the “Gateways” page. Simplifications and clarifications. Minor edits.                                                                                                                                                            |
| 4.4      | 17 April 2023     | GM     | Added a note about the required LTE data plan for 200 devices.                                                                                                                                                                                                                                                           |
| 4.3      | 4 April 2023      | GM     | Added hosts and ports required by the AWS cloud management. Corrected an external link. Minor edits.                                                                                                                                                                                                                     |
| 4.2      | 17 November 2022  | GM     | Added all supported <a href="#">configurations</a> with configuration procedures.                                                                                                                                                                                                                                        |
| 4.1      | 25 October 2022   | GM     | Added the <a href="#">Cellular connectivity</a> section. Changes in the <a href="#">Configurations</a> section.                                                                                                                                                                                                          |
| 4.0      | 15 September 2022 | ES, GM | Updated <a href="#">Gateway requirements</a> section. Updated the <a href="#">list of hosts and ports</a> . Redrafted the document. Improved procedures. Removed duplicate information. Some corrections. Removed „Silvair Gateway Services” already included in the product card (SGW-101). Implemented Template v.1.2. |
| 3.2      | 27 June 2022      | AS     | Updated <a href="#">Gateway Requirements</a> .                                                                                                                                                                                                                                                                           |
| 3.1      | 26 January 2022   | ES, AS | Updated the <a href="#">Gateway Operations</a> section.                                                                                                                                                                                                                                                                  |
| 3.0      | 5 July 2021       | PF, ZZ | Added new remote host in <a href="#">Network Requirements</a> .                                                                                                                                                                                                                                                          |
| 2.9      | 28 June 2021      | ZZ     | Updated the <a href="#">Gateway Statuses</a> section.                                                                                                                                                                                                                                                                    |
| 2.8      | 11 June 2021      | ZZ     | Added an important note in the Custom Network Configurations section.                                                                                                                                                                                                                                                    |
| 2.7      | 5 May 2021        | ES, ZZ | Added the <a href="#">Document Revision</a> section and made general updates of the document.                                                                                                                                                                                                                            |

# Contact information

---

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# Appendix A: List of certified countries

| Region                       | Cascade-500 | Cascade 500-A | Power supply | Expiration date |
|------------------------------|-------------|---------------|--------------|-----------------|
| United States                | ✓           | ✓             | ✓            | -               |
| Canada                       | ✓           | ✓             | ✓            | -               |
| CE certification (EU region) |             |               |              |                 |
| Anguilla                     | ✓           | ✓             | ✓            | -               |
| Austria                      | ✓           | ✓             | ✓            | -               |
| Belgium                      | ✓           | ✓             | ✓            | -               |
| Bosnia and Herzegovina       | ✓           | ✓             | ✓            | -               |
| Bulgaria                     | ✓           | ✓             | ✓            | -               |
| Comoros                      | ✓           | ✓             | ✓            | -               |
| Croatia                      | ✓           | ✓             | ✓            | -               |
| Cyprus                       | ✓           | ✓             | ✓            | -               |
| Czechia                      | ✓           | ✓             | ✓            | -               |
| Denmark                      | ✓           | ✓             | ✓            | -               |
| Estonia                      | ✓           | ✓             | ✓            | -               |
| Finland                      | ✓           | ✓             | ✓            | -               |
| France                       | ✓           | ✓             | ✓            | -               |
| Georgia                      | ✓           | ✓             | ✓            | -               |
| Germany                      | ✓           | ✓             | ✓            | -               |
| Greece                       | ✓           | ✓             | ✓            | -               |
| Guadeloupe                   | ✓           | ✓             | ✓            | -               |
| Hungary                      | ✓           | ✓             | ✓            | -               |
| Iceland                      | ✓           | ✓             | ✓            | -               |
| Ireland                      | ✓           | ✓             | ✓            | -               |
| Italy                        | ✓           | ✓             | ✓            | -               |
| Kosovo                       | ✓           | ✓             | ✓            | -               |
| Latvia                       | ✓           | ✓             | ✓            | -               |
| Lithuania                    | ✓           | ✓             | ✓            | -               |
| Luxembourg                   | ✓           | ✓             | ✓            | -               |
| Macedonia                    | ✓           | ✓             | ✓            | -               |
| Malta                        | ✓           | ✓             | ✓            | -               |
| Martinique                   | ✓           | ✓             | ✓            | -               |
| Montenegro                   | ✓           | ✓             | ✓            | -               |
| Netherlands                  | ✓           | ✓             | ✓            | -               |
| Norway                       | ✓           | ✓             | ✓            | -               |
| Poland                       | ✓           | ✓             | ✓            | -               |
| Portugal                     | ✓           | ✓             | ✓            | -               |
| Romania                      | ✓           | ✓             | ✓            | -               |
| Saint Barthelemy             | ✓           | ✓             | ✓            | -               |
| Saint Martin                 | ✓           | ✓             | ✓            | -               |

| Region                  | Cascade-500    | Cascade 500-A | Power supply   | Expiration date                                             |
|-------------------------|----------------|---------------|----------------|-------------------------------------------------------------|
| <i>Slovakia</i>         | ✓              | ✓             | ✓              | -                                                           |
| <i>Slovenia</i>         | ✓              | ✓             | ✓              | -                                                           |
| <i>Spain</i>            | ✓              | ✓             | ✓              | -                                                           |
| <i>Sweden</i>           | ✓              | ✓             | ✓              | -                                                           |
| <i>Switzerland</i>      | ✓              | ✓             | ✓              | -                                                           |
| <i>Turks and Caicos</i> | ✓              | ✓             | ✓              | -                                                           |
| Australia               | ✓              | ✓             | ✗              | -                                                           |
| China                   | ✓ <sup>1</sup> | ✗             | ✓ <sup>2</sup> | <sup>1</sup> 21 December 2026<br><sup>2</sup> 10 March 2026 |
| Costa Rica              | ✓              | ✗             | Not applicable | -                                                           |
| Hong Kong               | ✓              | ✓             | ✓              | -                                                           |
| Japan                   | ✓              | ✗             | ✗              | -                                                           |
| Malaysia                | ✓ <sup>1</sup> | ✓             | ✗              | <sup>1</sup> 9 June 2026                                    |
| Myanmar                 | ✓              | ✗             | ✓              | -                                                           |
| New Zealand             | ✓              | ✓             | ✗              | -                                                           |
| Nigeria                 | ✓              | ✗             | Not applicable | -                                                           |
| Philippines             | ✓              | ✗             | Not applicable | -                                                           |
| Qatar                   | ✓              | ✗             | Not applicable | -                                                           |
| Singapore               | ✓ <sup>1</sup> | ✗             | ✗              | <sup>1</sup> 21 March 2026                                  |
| South Korea             | ✓              | ✗             | ✓              | -                                                           |
| Thailand                | ✓              | ✗             | Not applicable | -                                                           |
| Turkey                  | ✓              | ✓             | ✓              | -                                                           |
| United Kingdom          | ✓              | ✓             | ✓              | -                                                           |