

Dell Edge Gateway

3000 Series

Technical Guidebook



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2018 - 03

Rev. A04

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Overview

The Edge Gateway 3000 Series is an Internet-of-Things (IoT) device. It is mounted at the edge of a network, enabling you to collect, secure, analyze, and act on data from multiple devices and sensors. It enables you to connect with devices used in transportation, building automation, manufacturing, and other applications. The Edge Gateway has a low-power architecture, which is capable of supporting industrial automation workloads while remaining fanless to satisfy environmental and reliability requirements. It supports Windows 10 IoT Enterprise LTSC 2016 and Ubuntu Core 16 operating systems.



System views

Top view

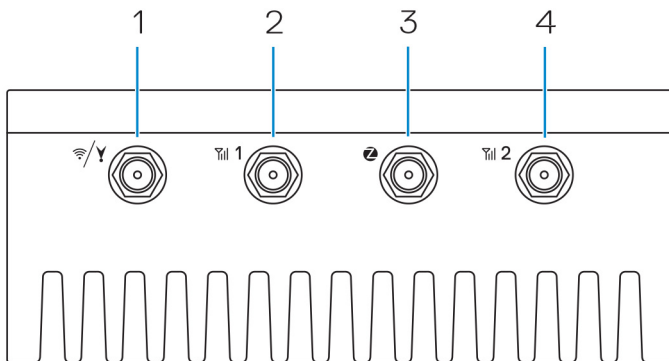


Table 1. Top view

Features		
1	WLAN, Bluetooth, or GPS connector	Connect the antenna to increase the range and strength of wireless, Bluetooth, or satellite signals.
2	Mobile broadband antenna-connector one (3G/LTE)	Connect the mobile broadband antenna to increase the range and strength of mobile broadband signals.
3	ZigBee antenna connector	Connect the ZigBee antenna for intermittent data transmissions from a ZigBee-compliant sensor or input device.
4	Mobile broadband antenna-connector two (LTE Auxiliary only)	Connect the mobile broadband antenna to increase the range and strength of mobile broadband signals.



NOTE: Depending on the configuration ordered, some of the antenna connectors may not be present or may be capped. For more information about connecting antennas to the Edge Gateway, see the documentation that is shipped with the antenna. Antennas are available in the accessory box shipped with the Edge Gateway.

Bottom view

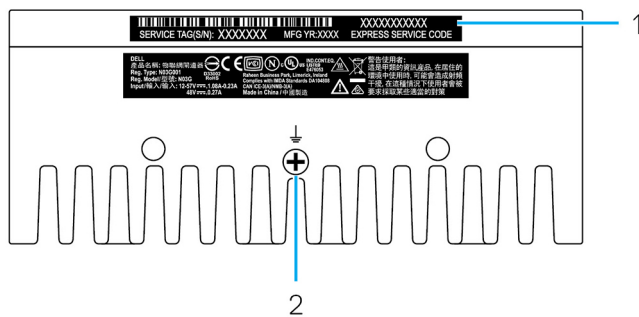


Table 2. Bottom view

Features		
1	Service Tag label	The Service Tag is a unique alphanumeric identifier that enables the Dell service technicians to identify the hardware components in your Edge Gateway and access warranty information.
2	Earth ground	A large conductor attached to one side of the power supply, which serves as the common return path for current from many different components in the circuit.

Left view

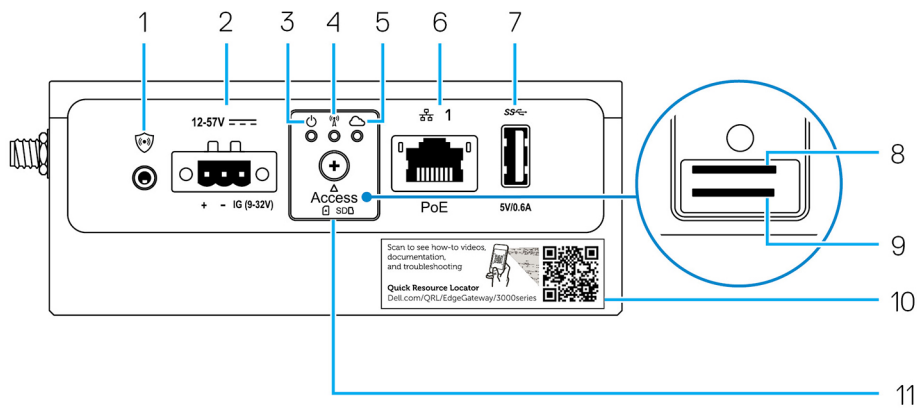









Table 3. Left view

Features		
1	Intrusion switch	An intrusion event is triggered when the enclosure (in which the Edge Gateway is installed) is opened.

 **NOTE: External enclosure is sold separately.**



Features

		 NOTE: An intrusion event is triggered by a third-party enclosure to the Edge Gateway through a sensor. The sensor should have a cable that is compatible with the intrusion switch connector on the Edge Gateway.
2	Power or ignition port	<p>Connect a 12-57 VDC (1.08-0.23 A) power cable to supply power to the Edge Gateway.</p> <p>  NOTE: Power cable is sold separately. </p> <p>  NOTE: For marine applications, limit input voltage to 12-48 VDC. The cable length for rail applications must not exceed 30 meters. </p>
3	Power and System status light	Indicates the power status and system status.
4	WLAN or Bluetooth status light	Indicates if WLAN or Bluetooth is ON or OFF.
5	Cloud-connection status light	Indicates the cloud connection status.
6	Ethernet port one (with Power over Ethernet support)	<p>Connect an Ethernet (RJ45) cable to gain network access. Provides data transfer speeds up to 10/100 Mbps and supports Alternative A of the IEEE 802.3af standard.</p> <p>  NOTE: The Edge Gateway is an IEEE 802.3af Alternative A compliant Powered Device (PD). For a list of tested and approved PoE switches and injectors see Appendix: Approved PoE injectors and switches. </p> <p>  NOTE: To comply with EU Declaration of Conformity (DoC), ensure cable length from the system to the device does not exceed 30 meters. </p> <p>  NOTE: To comply with regulatory requirements in Brazil, ensure cable length from the system to the device does not exceed 10 meters. </p>
7	USB 3.0 port ¹	Connect a USB enabled device. Provides data transfer speeds up to 5 Gbps.
8	SIM card slot (optional)	Insert a micro-SIM card into the slot.
9	SD card slot (optional)	Insert a micro-SD card into the slot.
		 NOTE: Remove the SD card slot filler before inserting a micro-SD card.
10	Quick Resource Locator label	Scan with a QR reader to access documentation and other system information.
11	micro-SIM or micro-SD card access door	Open the access door to access the micro-SIM or micro-SD card.

¹ USB power is limited to 0.6 A/3 W.

Table 4. Status-light indicators

Function	Indicator	Color	Control	Status
System	Power status and System status	Green or Amber	BIOS	<p>Off: System off</p> <p>On (Solid Green): System on or Boot successful</p> <p>On (Solid Amber): Power up or boot fail</p> <p>Blinking Amber: Fault or error</p>

Function	Indicator	Color	Control	Status
	WLAN or Bluetooth	Green	Hardware	Off: WLAN or Bluetooth module is off On: WLAN or Bluetooth module is on
	Cloud	Green	Software	Off: No connection to the cloud device or service On: Edge Gateway connected to a cloud device or service Blinking Green: Activity to a cloud device or service
	LAN (RJ-45)	Green/Amber	Driver (LAN)	Off: No network link or cable is not connected On (Green): High-speed connection (100 Mbps) On (Amber): Low-speed connection (10 Mbps)
	Activity	Green	Driver (LAN)	Off: No activity on link Blinking Green: LAN activity. The blink rate is related to packet density.

NOTE: The power and system status light may operate differently during different boot-up scenarios, for example, when a USB script file is run during boot-up.

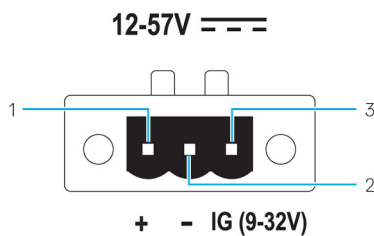


Table 5. Power connector pin definition details

Pin	Signal	Function
1	DC+	12–57 VDC power
2	DC–	Ground
3	IG	9–32 VDC ignition

NOTE: Pin 3 (IG) is connected to the vehicle's ignition status indicator (optional) or a wake pin. A voltage of more than 9 V on the signal indicates that the vehicle's engine is running. The Ignition or Wake pin is used to prevent the draining of the vehicle battery when the vehicle is turned off for an extended amount of time.

NOTE: The IG signal can be used to gracefully shutdown or enter low-power state when the vehicle is turned off (battery powered). It can also be used for powering on the Edge Gateway when the vehicle starts.

Right view

Right view—3001

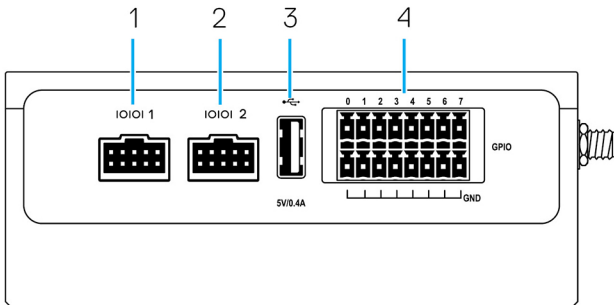


Table 6. Right view—3001

Features		
1	RS-232/RS-422/RS-485 port one	Connect a RS-232/RS-422/RS-485 cable to the Edge Gateway. Provides data transfer speeds up to 1 Mbps in RS-232 mode and 12 Mbps in RS-422/RS-485 mode. The serial port mode is configurable in the BIOS.
2	RS-232/RS-422/RS-485 port two	Connect a RS-232/RS-422/RS-485 cable to the Edge Gateway. Provides data transfer speeds up to 1 Mbps in RS-232 mode and 12 Mbps in RS-422/RS-485 mode. The serial port mode is configurable in the BIOS.
3	USB 2.0 port ¹	Connect a USB enabled device. Provides data transfer speeds up to 480 Mbps.
4	GPIO port	Connect a GPIO enabled device or dongles.

CAUTION: This port is ESD-sensitive. An insulated GPIO connector that prevents direct ESD exposure to the I/O pins is recommended.

¹ USB power is limited to 0.4 A/2 W.

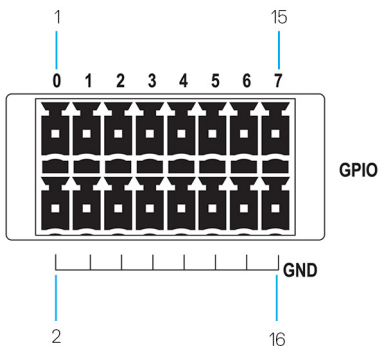


Table 7. GPIO-port pin definition details

Pin	1	3	5	7	9	11	13	15
Signal	GPIO0	GPIO1	GPIO2	GPIO3	GPIO4	GPIO5	GPIO6	GPIO7
Pin	2	4	6	8	10	12	14	16
Signal	GND	GND	GND	GND	GND	GND	GND	GND

 **NOTE:** GPIO0 to the GPIO7 pins are 0-5 V input/output and digital/analog configurable pins.

 **NOTE:** The GPIO port is powered by analog devices' AD5593R.

 **NOTE:** Each pin has a 1K series resistor between the connector and the AD5593R.

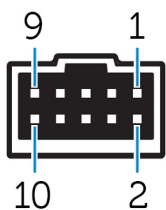


Table 8. RS-232 pin definition details

Pin	Signal	Characteristics
1	DCD	Data Carrier Detect
2	RXD	Received Data
3	TXD	Transmitted Data
4	DTR	Data Terminal Ready
5	GND	Ground
6	DSR	Data Set Ready
7	RTS	Request To Send
8	CTS	Clear To Send
9	RI	Ring Indicator
10	GND	Ground

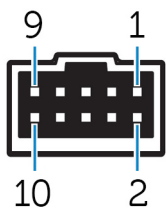


Table 9. RS-485/RS-422 full duplex pin definition details

Pin	Signal	Characteristics
1	TXD-	Transmit Data A
2	TXD+	Transmit Data B
3	RXD+	Receive Data B
4	RXD-	Receive Data A

Pin	Signal	Characteristics
5	GND	Ground
6	Not applicable	Not applicable
7	Not applicable	Not applicable
8	Not applicable	Not applicable
9	Not applicable	Not applicable
10	GND	Ground

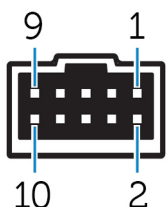


Table 10. RS-485 half-duplex pin definition details

Pin	Signal	Characteristics
1	Data-	(-) TX/RX data
2	Data+	(+) TX/RX data
3	Not applicable	Not applicable
4	Not applicable	Not applicable
5	GND	Ground
6	Not applicable	Not applicable
7	Not applicable	Not applicable
8	Not applicable	Not applicable
9	Not applicable	Not applicable
10	GND	Ground

Right view—3002

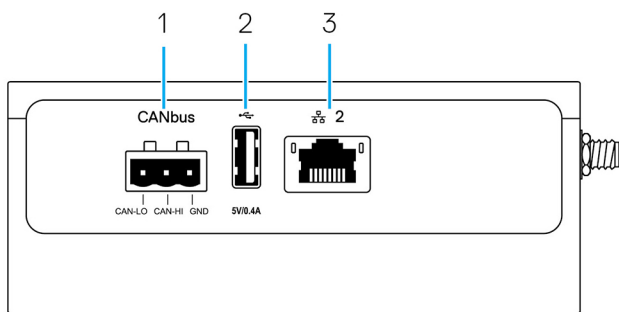


Table 11. Right view—3002

Features		
1	CANbus port	Enables the CANbus connection.
2	USB 2.0 port ¹	Connect a USB enabled device. Provides data transfer speeds up to 480 Mbps.
3	Ethernet port two (Non-PoE)	Connect an Ethernet (RJ45) cable for network access. Provides data transfer speeds up to 10/100 Mbps.

¹ USB power is limited to 0.4 A/2 W.

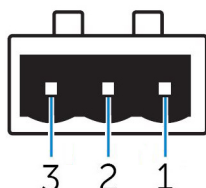


Table 12. CANbus-port pin definition details

Features		
1	GND	Ground
2	CAN-H	High-level CANbus line
3	CAN-L	Low-level CANbus line

Right view—3003

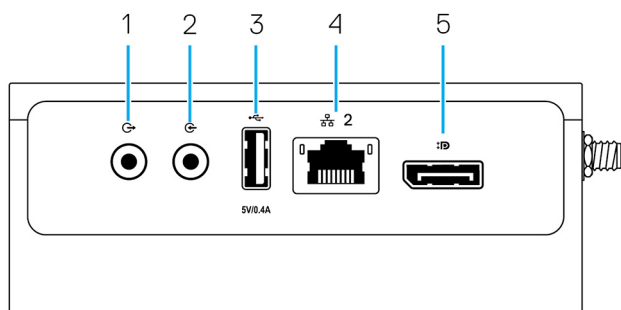


Table 13. Right view—3003










Features		
1	Audio line-out (GREEN)	Connect audio-output devices such as speakers and amplifiers.
2	Audio line-in (BLUE)	Connect recording or playback devices.
3	USB 2.0 port ¹	Connect a USB enabled device. Provides data transfer speeds up to 480 Mbps.
4	Ethernet port two (Non-PoE)	Connect an Ethernet (RJ45) cable for network access. Provides data transfer speeds up to 10/100 Mbps.
5	DisplayPort connector	Connect a monitor or another DisplayPort-enabled device. Provides video and audio output.

¹ USB power is limited to 0.4 A/2 W.

Installing your Edge Gateway

 **WARNING:** Before you begin any of the procedures in this section, read the [safety and regulatory information](#) that is shipped with your system. For additional best practices information, go to www.dell.com/regulatory_compliance.

Safety and regulatory information

-  **WARNING:** The Edge Gateway must be installed by knowledgeable, skilled persons familiar with local and/or international electrical codes and regulations.
-  **WARNING:** The Edge Gateway is not designed for use in wet environments. If the Edge Gateway is to be installed in a wet environment, depending on the location and environment, it must be installed in a panel box or enclosure with an Ingress Protection (IP) rating of IP54, IP65, or higher.
-  **WARNING:** To reduce the risk of electric shock, power to the DC+ and DC- terminals must be provided by a power supply or transformer/rectifier circuit that is designed with double-insulation. The power supply or power circuit source must comply with local codes and regulations; for example, in the USA, NEC Class 2 (SELV/limited energy circuit, or LPS circuitry). If powered by a battery, double-insulation is not required.
-  **WARNING:** When installing the Edge Gateway, the responsible party or integrator shall use the 12-57 VDC or Power over Ethernet (PoE) power source 37-57 VDC, with a minimum of 13 W power already present as part of the client's installation.
-  **WARNING:** Ensure that the power source providing power to the Edge Gateway is reliably grounded and filtered such that the peak-to-peak ripple component is less than 10 percent of the input DC voltage.
-  **WARNING:** When installing the Edge Gateway 3001 and 3002, use a cable appropriate for the load currents: 3-core cable rated 5 A at 90°C (194°F) minimum, which conform to either IEC 60227 or IEC 60245. The system accepts cables from 0.8 mm to 2 mm. The maximum operating temperature of the Edge Gateway is 70°C (158°F). Do not exceed this maximum temperature while operating the Edge Gateway inside an enclosure. Internal heating of the Edge Gateway electronics, other electronics, and the lack of ventilation inside an enclosure can cause the operating temperature of the Edge Gateway to be greater than the outside ambient temperature. Continuous operation of the Edge Gateway at temperatures greater than 70°C (158°F) may result in an increased failure rate and a reduction of the product life. Ensure that the maximum operating temperature of the Edge Gateway when placed inside an enclosure is 70°C (158°F) or less.
-  **WARNING:** When installing the Edge Gateway 3003, use a cable appropriate for the load currents: 3-core cable rated 5 A at 90°C (194°F) minimum, which conform to either IEC 60227 or IEC 60245. The system accepts cables from 0.8 mm to 2 mm. The maximum operating temperature of the Edge Gateway is 60°C (140°F). Do not exceed this maximum temperature while operating the Edge Gateway inside an enclosure. Internal heating of the Edge Gateway electronics, other electronics, and the lack of ventilation inside an enclosure can cause the operating temperature of the Edge Gateway to be greater than the outside ambient temperature. Continuous operation of the Edge Gateway at temperatures greater than 60°C (140°F) may result in an increased failure rate and a reduction of the product life. Ensure that the maximum operating temperature of the Edge Gateway when placed inside an enclosure is 60°C (140°F) or less.
-  **WARNING:** Always ensure that the available power source matches the required input power of the Edge Gateway. Check the input power markings next to power connector(s) before making connections. The 12-57 VDC (1.08-0.23 A) or the PoE power source must be compliant with local Electrical Codes and Regulations.
-  **WARNING:** To ensure the protection provided by the Edge Gateway is not impaired, do not use or install the system in any manner other than what is specified in this manual.



WARNING: If a battery is included as part of the system or network, the battery must be installed within an appropriate enclosure in accordance with local fire and electrical codes and laws.



WARNING: The system is for installation in a suitable industrial enclosure (provides electrical, mechanical, and fire hazard protection).



WARNING: The core module only can be wall-mounted (without the need for an additional enclosure).

Professional installation instructions

Installation personnel

This product is designed for specific applications and needs to be installed by qualified personnel with RF and regulatory-related knowledge. The general user shall not attempt to install or change the setting.

Installation location

The product shall be installed at a location where the radiating antenna is kept 20 cm from nearby persons in its normal operation condition in order to meet regulatory RF exposure requirements.

External antenna

Use only approved antenna(s). Non-approved antenna(s) may produce spurious or excessive RF transmitting power which may lead to a violation of FCC/IC limits.

Installation procedure

Refer to user's manual for installation instructions.



WARNING: Carefully select the installation position and make sure that the final output power does not exceed the limits described in the product's documentation. The violation of these rules could lead to serious federal penalties.

Instructions d'installation professionnelles

Le personnel d'installation

Ce produit est conçu pour des applications spécifiques et doit être installé par un personnel qualifié avec RF et connaissances connexes réglementaire. L'utilisateur ne doit pas tenter générale d'installer ou de modifier le réglage.

Lieu d'installation

Le produit doit être installé à un endroit où l'antenne de rayonnement est maintenue à 20 cm de personnes à proximité dans son état de fonctionnement normal, afin de répondre aux exigences réglementaires d'exposition aux radiofréquences.

Antenne externe

Utilisez uniquement l'antenne(s) qui ont été approuvés par le demandeur. Antenne (s) peuvent produire de l'énergie RF parasite indésirable ou excessive transmission qui peut conduire à une violation des normes de la FCC / IC est interdite et non-approuvé.

Procédure d'installation

ATTENTION: S'il vous plaît choisir avec soin la position d'installation et assurez-vous que la puissance de sortie final ne dépasse pas les limites fixées dans les règles pertinentes. La violation de ces règles pourrait conduire à des sanctions fédérales graves.



Federal Communication Commission interference statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC caution:

- Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.
- This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Radiation exposure statement:

This equipment complies with FCC radiation exposure limits for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20 cm between the active transceiver and your body.

 **NOTE: The country code selection is for a non-US model only and is not available to all US model. Per FCC regulation, all WiFi products marketed in the US must be fixed to US operation channels only.**

Industry Canada statement

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

1. this device may not cause interference, and
2. this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage, et
2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Under Industry Canada regulations, the radio transmitter(s) may only operate using an antenna(s) of a type and maximum (or lesser) gain approved for the transmitter(s). To reduce potential radio interference to other users, the antenna type(s) and gain(s) should be chosen so that the Equivalent Isotropic Radiated Power (E.I.R.P.) is not more than what was approved for the transmitter(s).

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

This device complies with RSS-210 of Industry Canada. Operation is subject to the condition that this device does not cause harmful interference.

Cet appareil est conforme à la norme RSS-210 d'Industrie Canada. L'opération est soumise à la condition que cet appareil ne provoque aucune interférence nuisible.

This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter, except tested built-in radios.

Cet appareil et son antenne ne doivent pas être situés ou fonctionner en conjonction avec une autre antenne ou un autre émetteur, exception faites des radios intégrées qui ont été testées.




The County Code Selection feature is disabled for products marketed in the US/Canada.

La fonction de sélection de l'indicatif du pays est désactivée pour les produits commercialisés aux États-Unis et au Canada.

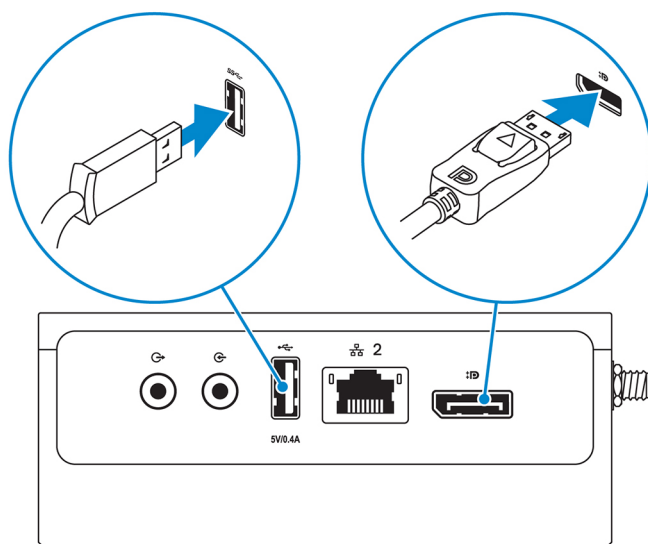
Radiation Exposure Statement: This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the active transceiver and your body.


Déclaration d'exposition aux radiations: Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

Setting up your Edge Gateway

-  **NOTE:** Edge Gateway mounting options are sold separately.
-  **NOTE:** Mounting can be done before or after configuring your Edge Gateway. For more information about mounting your Edge Gateway, see [Mounting your Edge Gateway](#).
-  **NOTE:** In some environments where the Edge Gateway may be installed, a more robust mounting method is required. For example, for mounting in marine applications, it is recommended to use only the standard— mount bracket. The recommendation is due to the presence of vibrations unique to the marine environment.

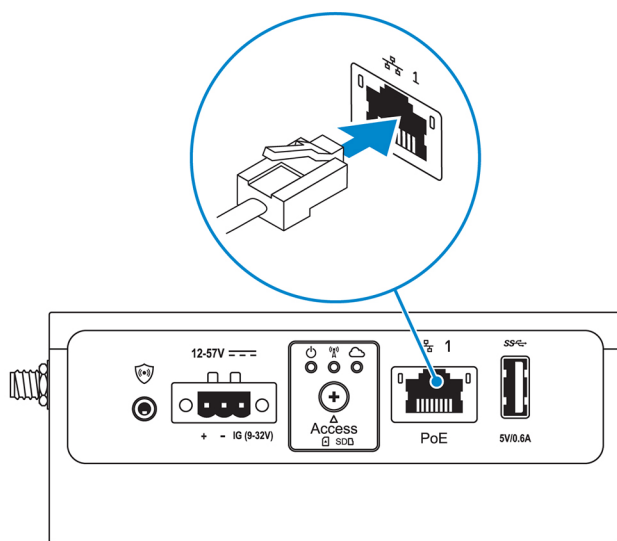
1. Use USB cables to connect a display, keyboard, and mouse.



-  **NOTE:** USB power is limited to 0.6 A/3 W for USB 3.0 port and 0.4 A/2 W for USB 2.0 port to ensure that the Edge Gateway is within the allowed 13 W PoE Class 0 range.

2. Connect an Ethernet cable to Ethernet port one.


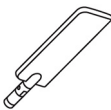










3. Connect the antennas depending on the configuration ordered (optional).

NOTE: The antennas supported in the Edge Gateway vary depending on the configuration ordered. Antennas are available in the accessory box shipped with the Edge Gateway.

Table 14. Antennas supported in Edge Gateway 3000 Series

Antennas supported				
Signals				
3001	Yes	Yes	Yes	Not applicable
3002	Yes	Yes	Yes	Yes
3003	Yes	Yes	Yes	Yes

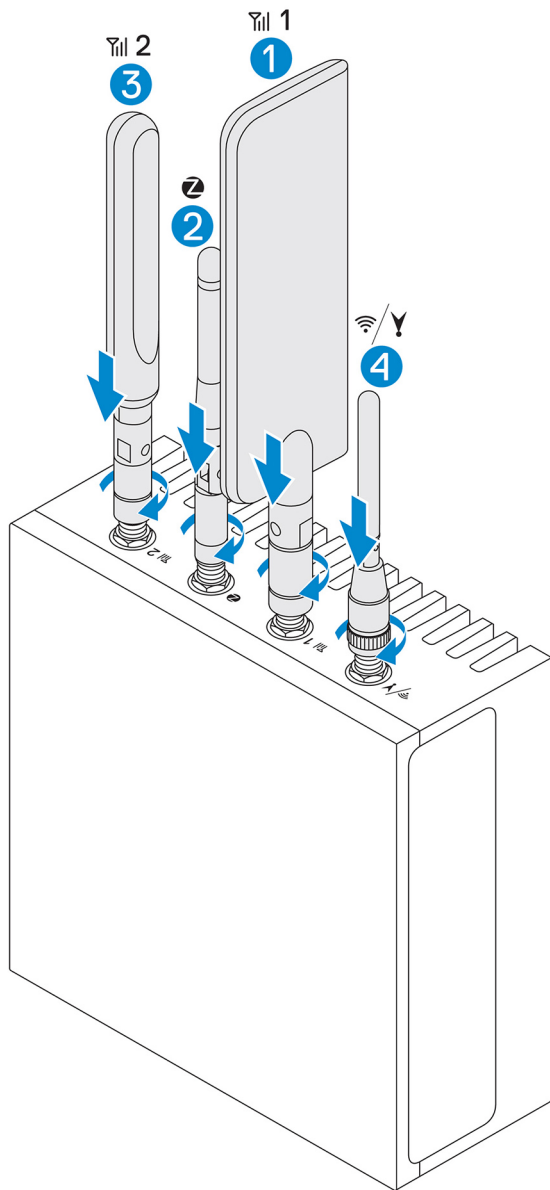
NOTE: Use only the supplied antennas or third-party antennas that meet the [minimum specifications](#).

NOTE: Depending on the configuration ordered, some of the antenna connectors may not be present or may be capped.

NOTE: Mobile broadband antenna connector two is for LTE Auxiliary only; it does not support 3G.

4. Insert the antenna into the connector.

NOTE: If you are installing multiple antennas, follow the sequence indicated in the following image.



5. Secure the antenna by tightening the rotating head of the connector until it firmly holds the antenna in the preferred position (upright or straight).

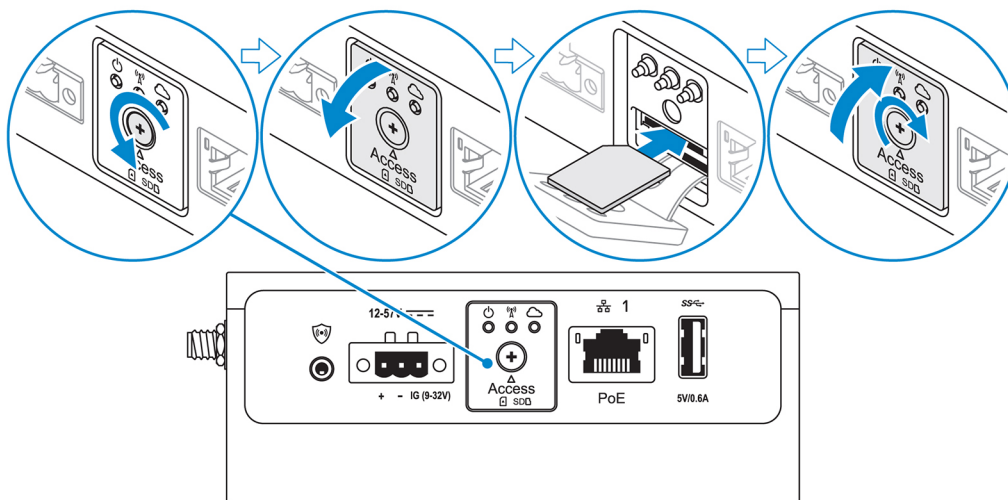
 **NOTE:** Antenna images are for illustrative purposes only. Actual appearance may differ from the images provided.

6. Connect all desired cables to the appropriate I/O ports on the Edge Gateway.
7. Open the micro-SIM or micro-SD card access door.
8. Insert a micro-SIM card into the top micro-SIM card slot and [activate your mobile broadband service](#).

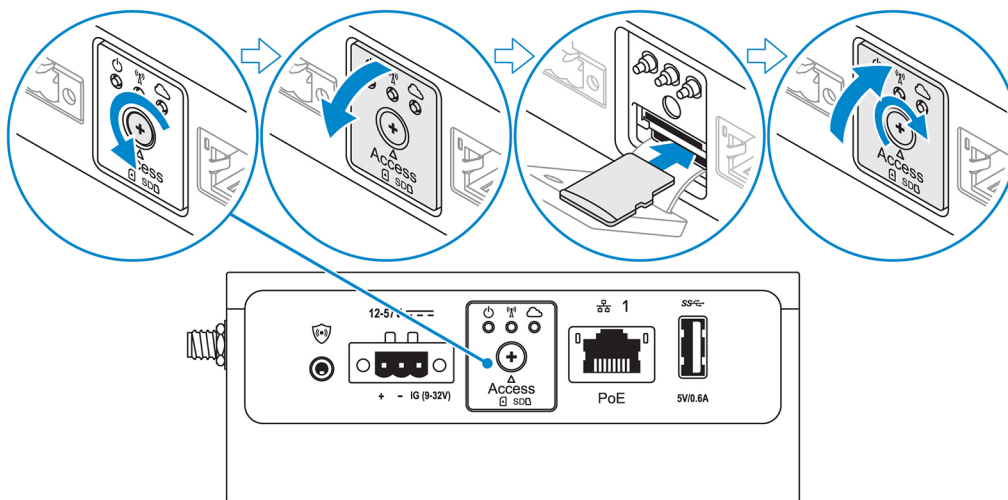
 **CAUTION:** Dell recommends that you insert the micro-SIM card before turning on the Edge Gateway.

 **NOTE:** Ensure that you firmly screw back the access door after closing.

 **NOTE:** Contact your service provider to activate your micro-SIM card.



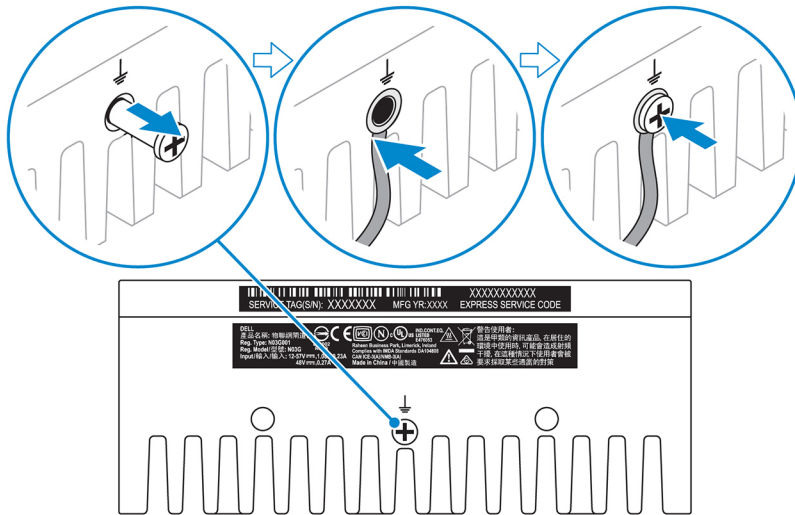
9. Insert a micro-SD card into the bottom micro-SD card slot.



NOTE: Remove the SD card slot filler before inserting a micro-SD card.

NOTE: Ensure that you firmly screw back the access door after closing.

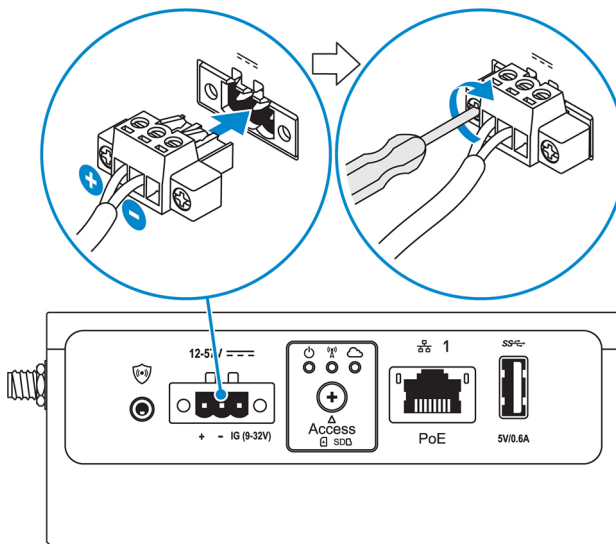
10. Connect a grounding cable between the Edge Gateway and the secondary enclosure.



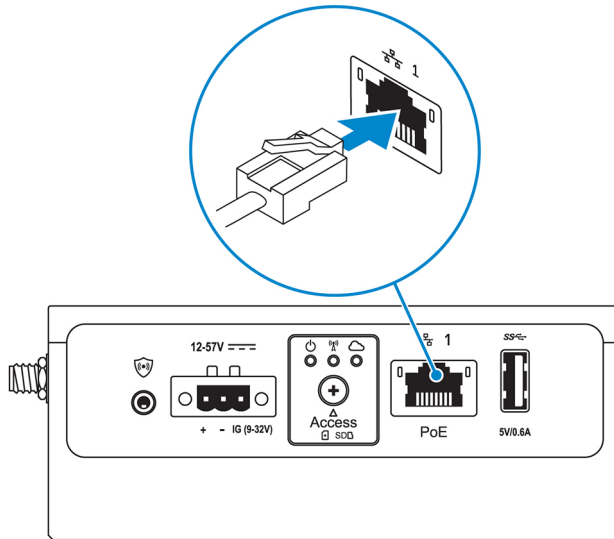
NOTE: Secondary enclosures are sold separately.

11. Connect the Edge Gateway to one of the following power sources:

- **DC-IN**



- **PoE**



NOTE: Shut down your system before you change the power sources.

12. Replace the dust caps on any unused ports.
13. When setting up the Edge Gateway for the first time, complete the operating system setup.
For more information, see [Setting up your operating system](#).

NOTE: MAC addresses and the IMEI number are available on the label at the front of the Edge Gateway. Remove the label at install.

NOTE: The Edge Gateway is shipped with either Windows 10 IoT Enterprise LTSC 2016 or Ubuntu Core 16 operating system.

NOTE: The default user name and password for Windows 10 IoT Enterprise LTSC 2016 is *admin*.

NOTE: The default user name and password for Ubuntu Core 16 is *admin*.

14. On Edge Gateway 3003, access the BIOS by pressing F2 to enter the BIOS setup or F12 to enter the BIOS boot menu. On Edge Gateway 3001 and 3002, access the BIOS by connecting remotely with the Dell Command | Configure application.

Windows 10 IOT Enterprise LTSC 2016

Click **Start** → **All Programs** → **Dell** → **Command Configure** → **Dell Command | Configure Wizard**.

Ubuntu Core 16

Use the `dcc.cctk` command to access the Dell Command | Configure application.

NOTE: For more information about using the Dell Command | Configure application, see the Dell Command | Configure *Installation Guide* and *User's Guide* at www.dell.com/dellclientcommandssuite/manuals.

NOTE: For more information about BIOS settings on the Edge Gateway, see [Default BIOS settings](#).

15. Install the Edge Gateway using one of the following mounting options:

NOTE: An open space of 63.50 mm (2.50 in) is recommended around the Edge Gateway for optimal air circulation.

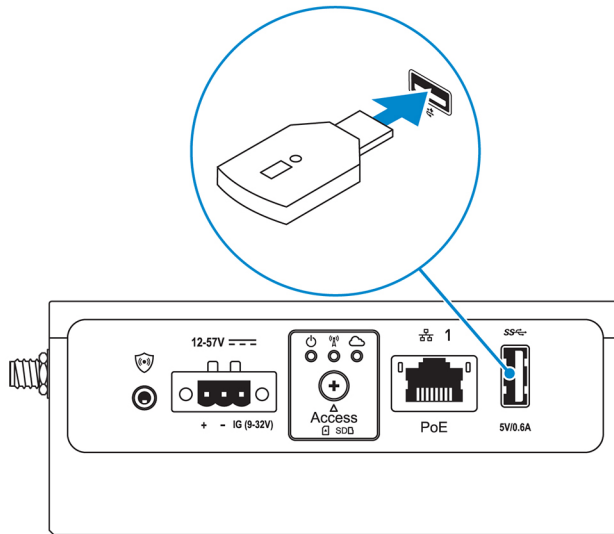
- [Standard mount](#)
- [DIN rail mount](#)
- [Quick mount](#)
- [Perpendicular mount](#)

- [Cable control bar](#)
- [VESA mount](#)

Setting up the ZigBee dongle

CAUTION: Do not connect the ZigBee dongle if the Edge Gateway is installed inside the enclosure.

1. Power off your Edge Gateway.
2. Connect the ZigBee dongle to any external USB port on your Edge Gateway.



3. Power on your Edge Gateway and complete the setup.

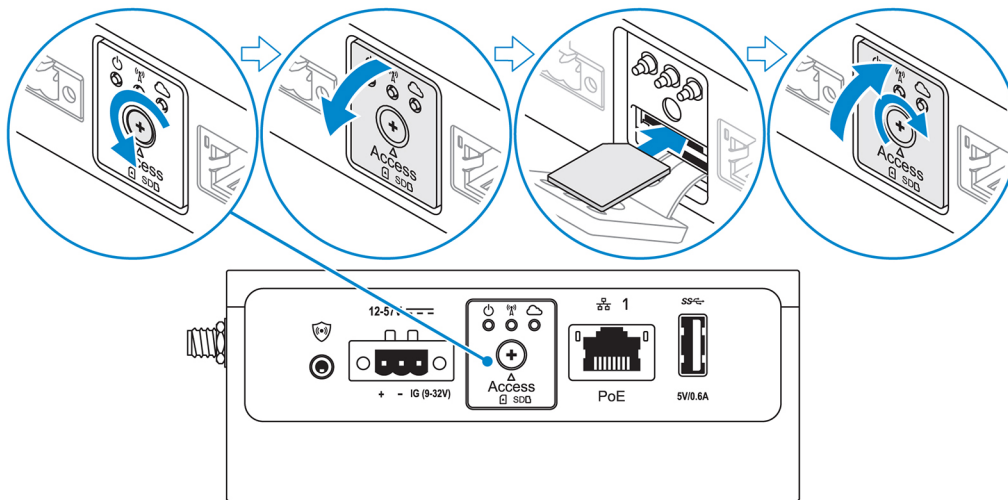
NOTE: For more information about the ZigBee development, see www.silabs.com.

Activating your mobile broadband service

CAUTION: Before you power on the Edge Gateway, insert a micro-SIM card.

NOTE: Ensure that the service provider has already activated the micro-SIM card before you use it in the Edge Gateway.

1. Remove the screw to open the micro-SIM card access door.
2. Insert a micro-SIM card into the top micro-SIM card slot.



3. Replace the screw, and close the micro-SIM card access door.
4. Power on the Edge Gateway.
5. Connect to a mobile network.

Windows operating system

- a. Click the network icon from the taskbar, and then click **Cellular**.
- b. Select **Mobile Broadband Carrier** → **Advanced Options**.
- c. Make a note of the **International Mobile Equipment Identity (IMEI)** and **Integrated Circuit Card Identifier (ICCID)**.
- d. Enter your APN number and any other credentials that your service provider requires.

Ubuntu operating system

- a. Open the **Terminal** window.
- b. Enter `$sudo su -` to access super user mode.
- c. Configure the Mobile Broadband connection profile:

Command line:

```
network-manager.nmcli con add type <type> ifname <ifname> con-name <connection-name>
apn <apn>
```

Example (Verizon):

```
network-manager.nmcli con add type gsm ifname cdc-wdm0 con-name VZ_GSMDEMO apn
vzwinternet
```

Example (AT&T):

```
network-manager.nmcli con add type gsm ifname cdc-wdm0 con-name ATT_GSMDEMO apn
broadband
```

Example (3G):

```
network-manager.nmcli con add type gsm ifname cdc-wdm0 con-name 3G_GSMDEMO apn
internet
```

- d. Connect to the mobile network:
- Command line:

```
network-manager.nmcli con up <connection-name>
```

Example (Verizon):

```
network-manager.nmcli con up VZ_GSMDEMO
```

Example (AT&T):

```
network-manager.nmcli con up ATT_GSMDEMO
```

Example (3G):

```
network-manager.nmcli con up 3G_GSMDEMO
```

To disconnect from the mobile network:

Command line: `network-manager.nmcli con down <connection-name>`

Example (Verizon):

```
network-manager.nmcli con down VZ_GSMDEMO
```




Example (AT&T):

```
network-manager.nmcli con down ATT_GSMDEMO
```

Example (3G):

```
network-manager.nmcli con down 3G_GSMDEMO
```

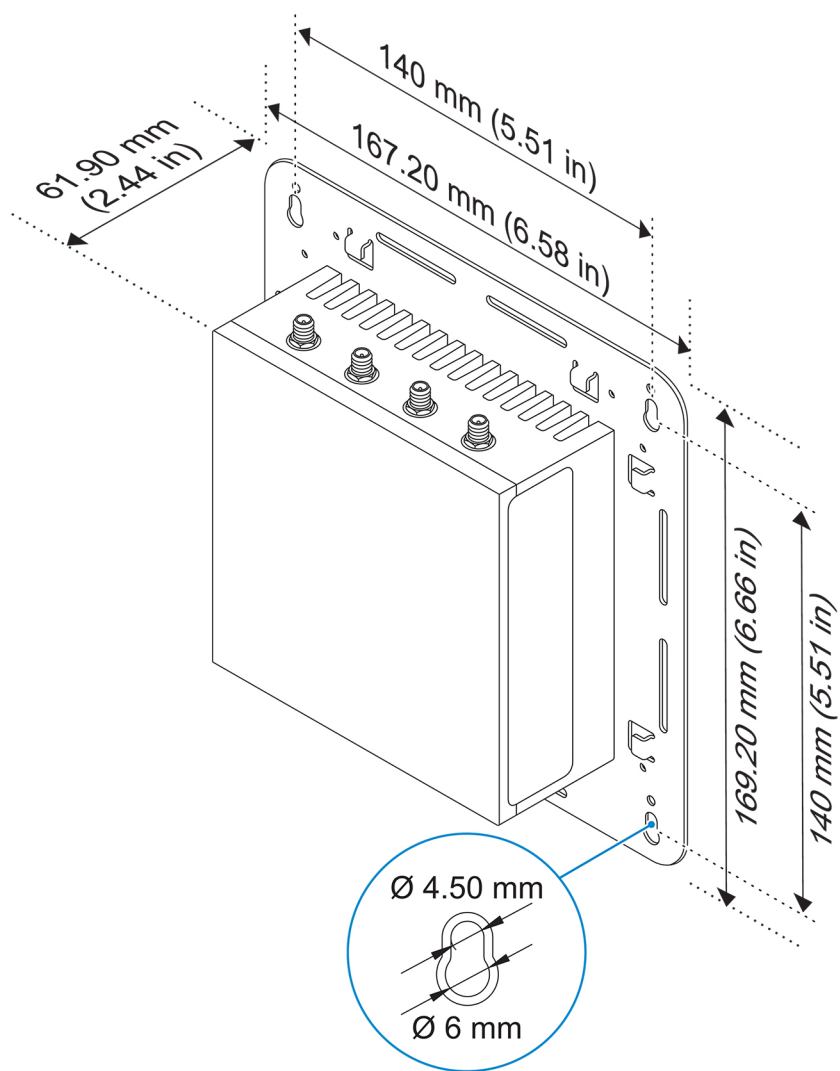
Mounting your Edge Gateway

-  **NOTE:** Mounting can be completed before or after configuring your Edge Gateway.
-  **NOTE:** Mounting options are sold separately. Mounting instructions are available in the documentation shipped with the mounting device.
-  **NOTE:** In some environments where the Edge Gateway is installed, a more robust mounting method is required. For example, in marine applications, due to vibrations unique to that environment, only standard-mount bracket should be used.

Mounting the Edge Gateway using the standard-mount bracket

Mounting dimensions

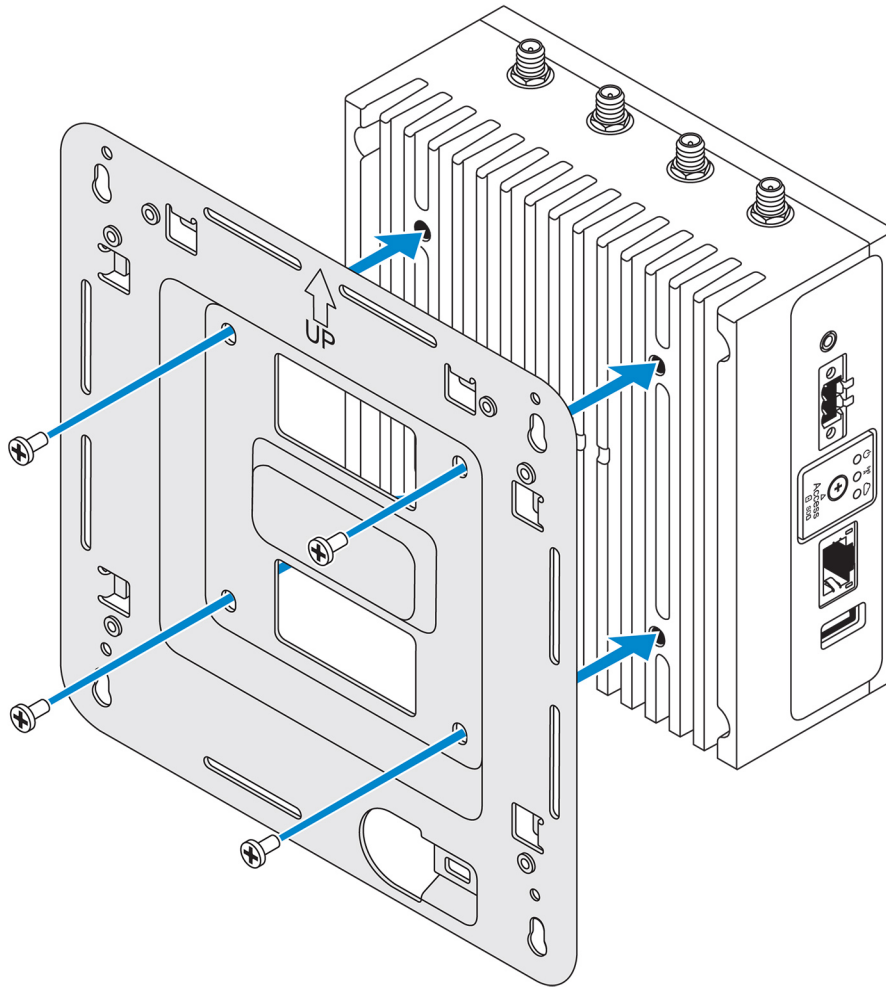




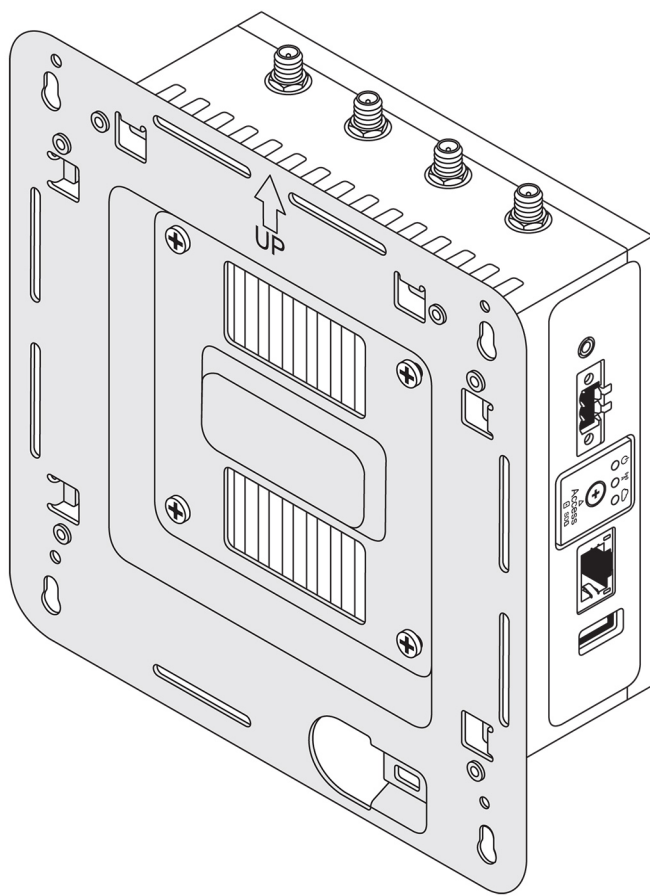
 **NOTE:** The mounting brackets are shipped with only those screws that are required for securing the mounting brackets to the Edge Gateway.

1. Secure the standard-mount bracket to the back of the Edge Gateway using the four M4x4.5 screws.

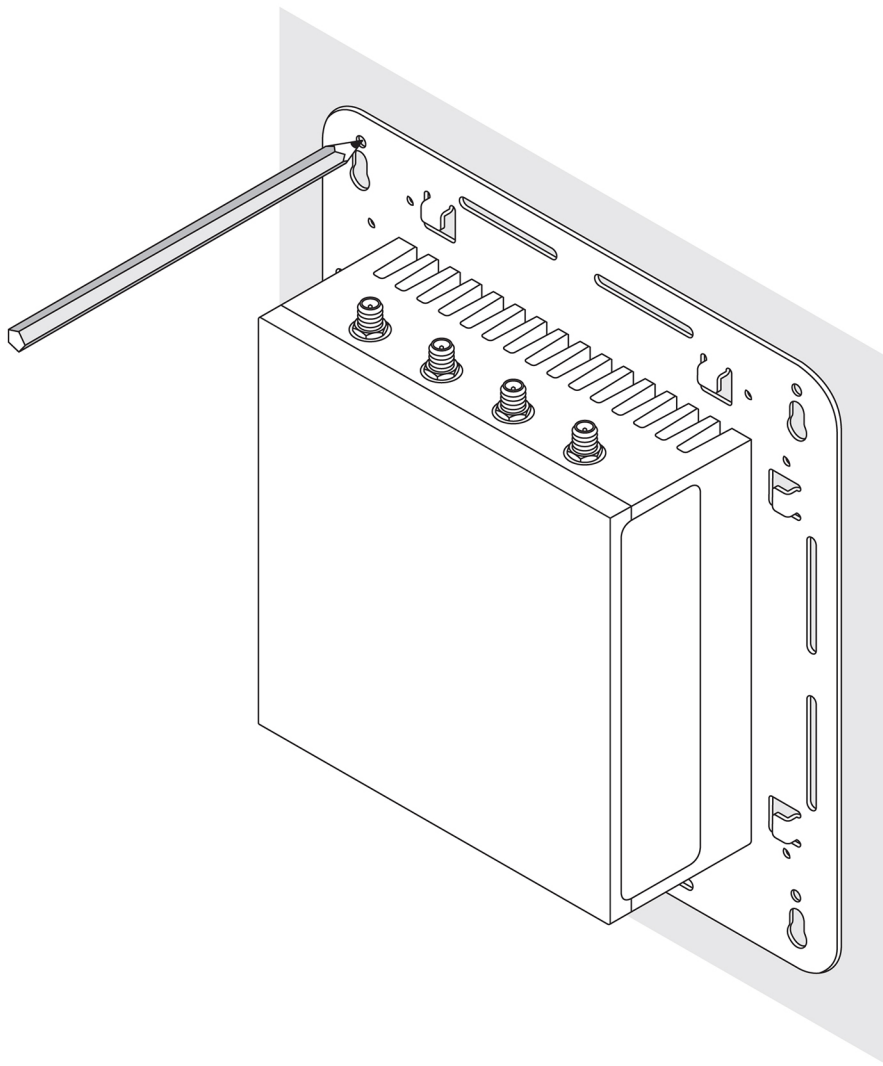
 **NOTE:** Torque the screws at 8 ± 0.5 kilograms-centimeter (17.64 ± 1.1 pounds-inch).



2. Place the Edge Gateway against the wall, and align the holes in the standard-mount bracket with the holes on the wall. Screw holes on the bracket have a diameter of 3 mm (0.12 in).

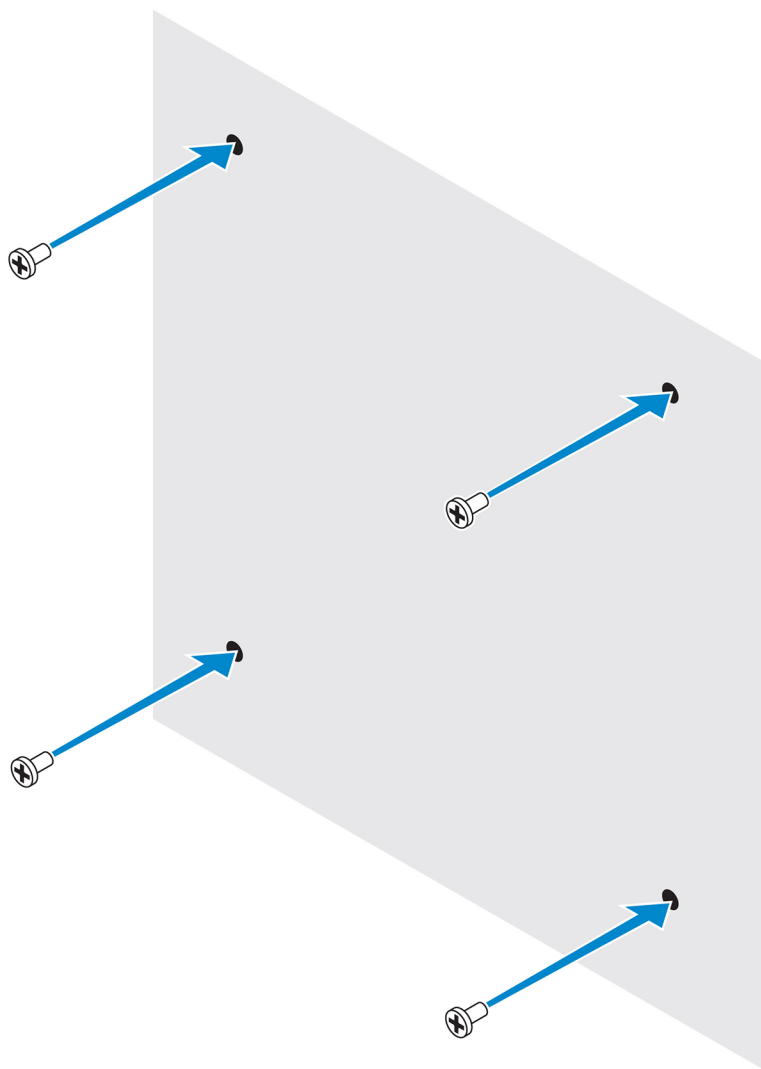


3. Place the standard-mount bracket on the wall, and using the holes above the screw holes on the bracket, mark the positions to drill the four holes.

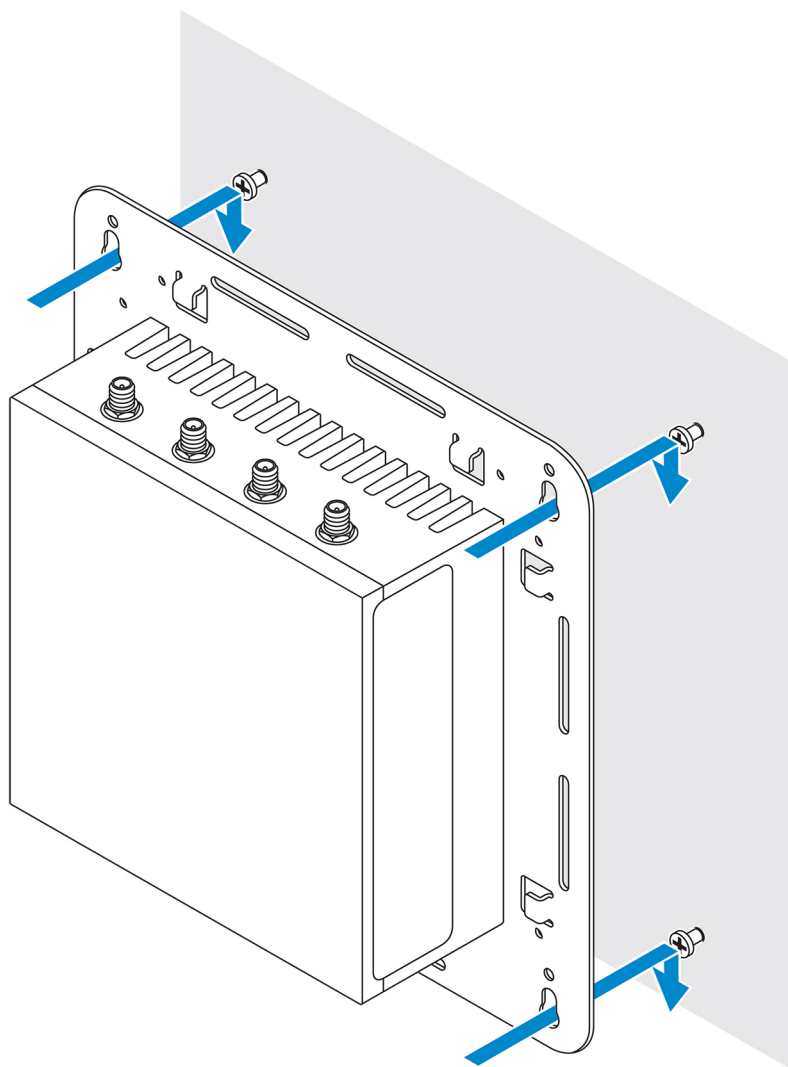


4. Drill four holes in the wall as marked.
5. Insert and tighten four screws (not supplied) to the wall.

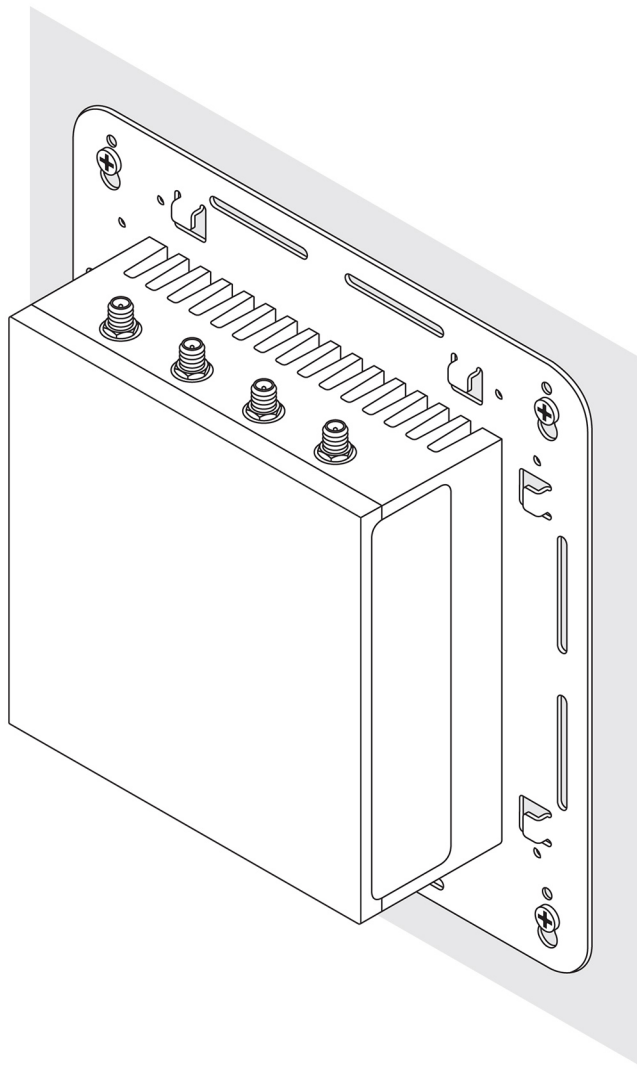
 **NOTE: Purchase screws that fit the diameter of the screw holes.**



6. Align the screw holes on the standard-mount bracket with the screws and place the Edge Gateway onto the wall.



7. Tighten the screws to secure the assembly to the wall.



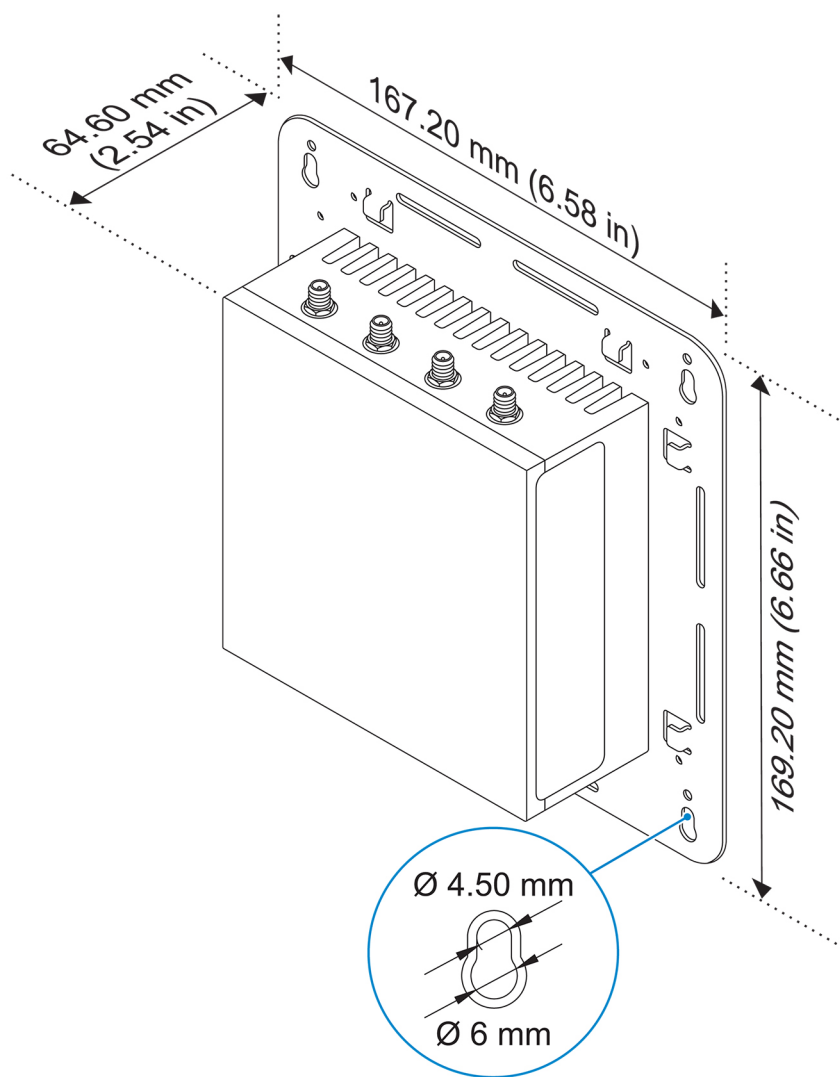
Mounting the Edge Gateway using quick-mount bracket

The quick-mount bracket is a combination of the standard-mount bracket and the DIN-rail bracket. It enables you to easily mount and demount the Edge Gateway.



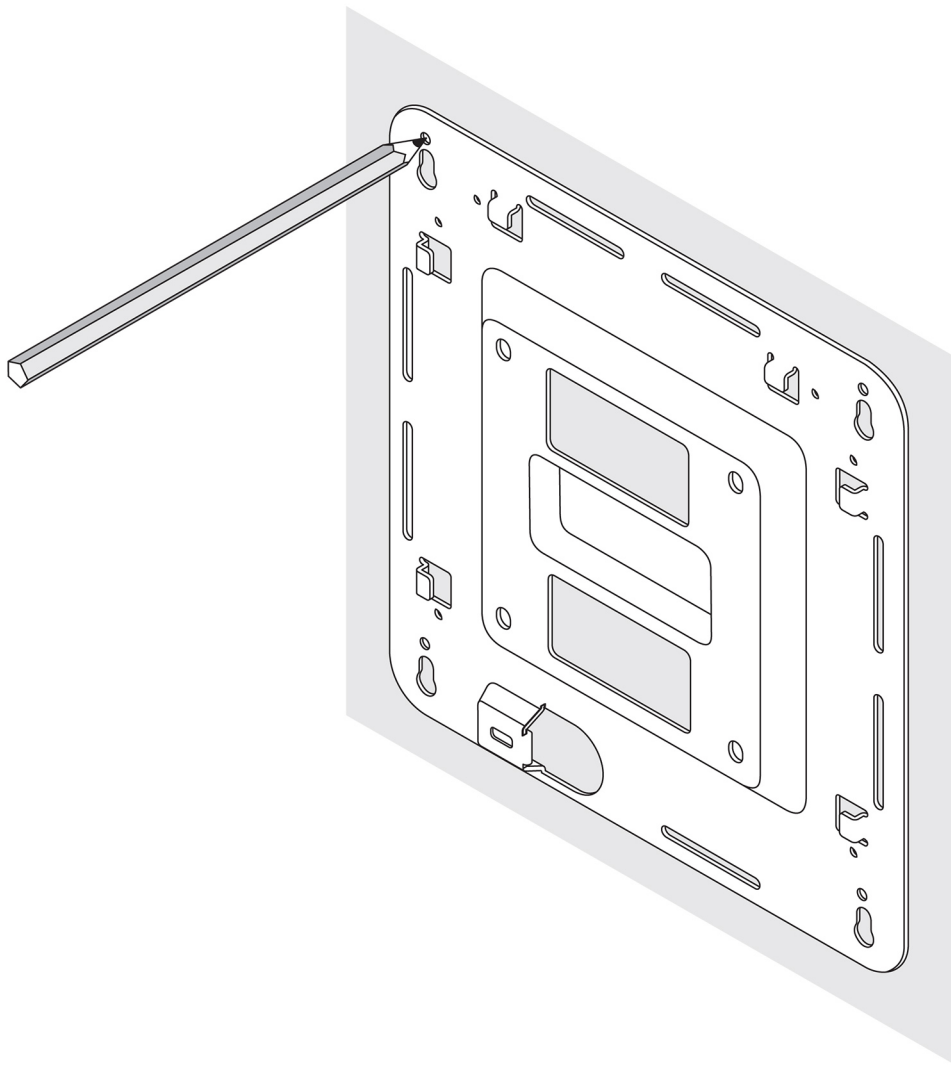
NOTE: The mounting brackets are shipped with only those screws required for securing the mounting brackets to the Edge Gateway.

Mounting dimensions



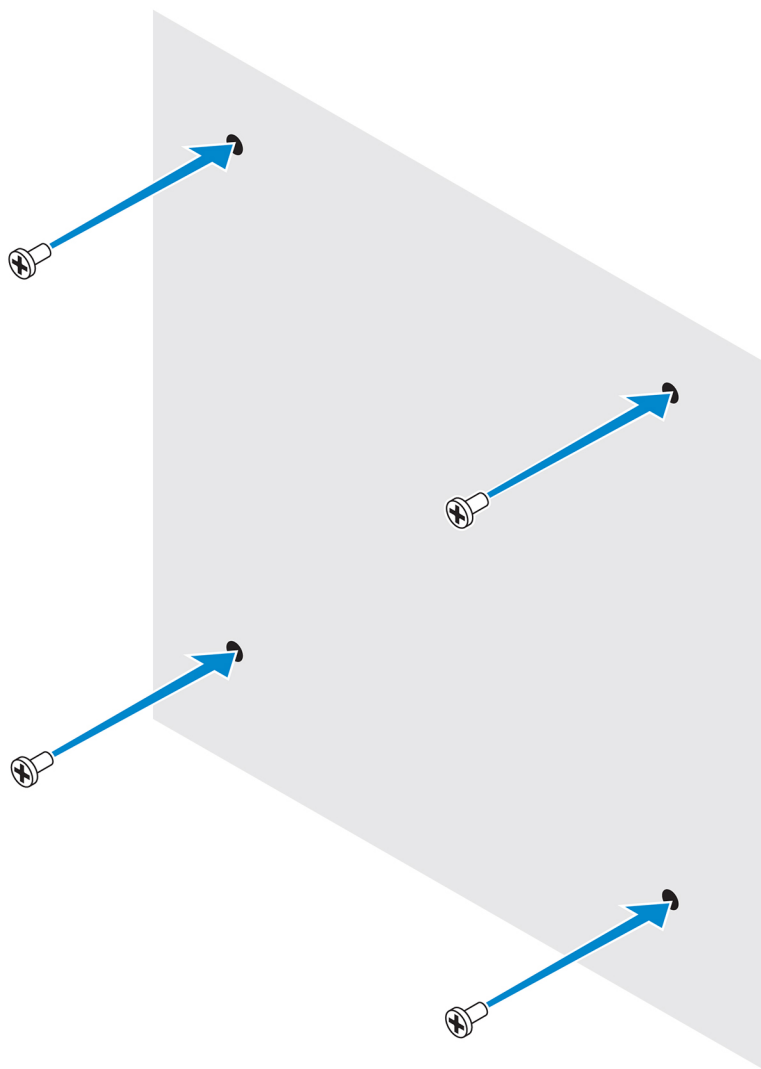
Mounting instructions

1. Place the standard-mount bracket on the wall, and using the holes above the screw holes on the bracket, mark the positions to drill the four holes.

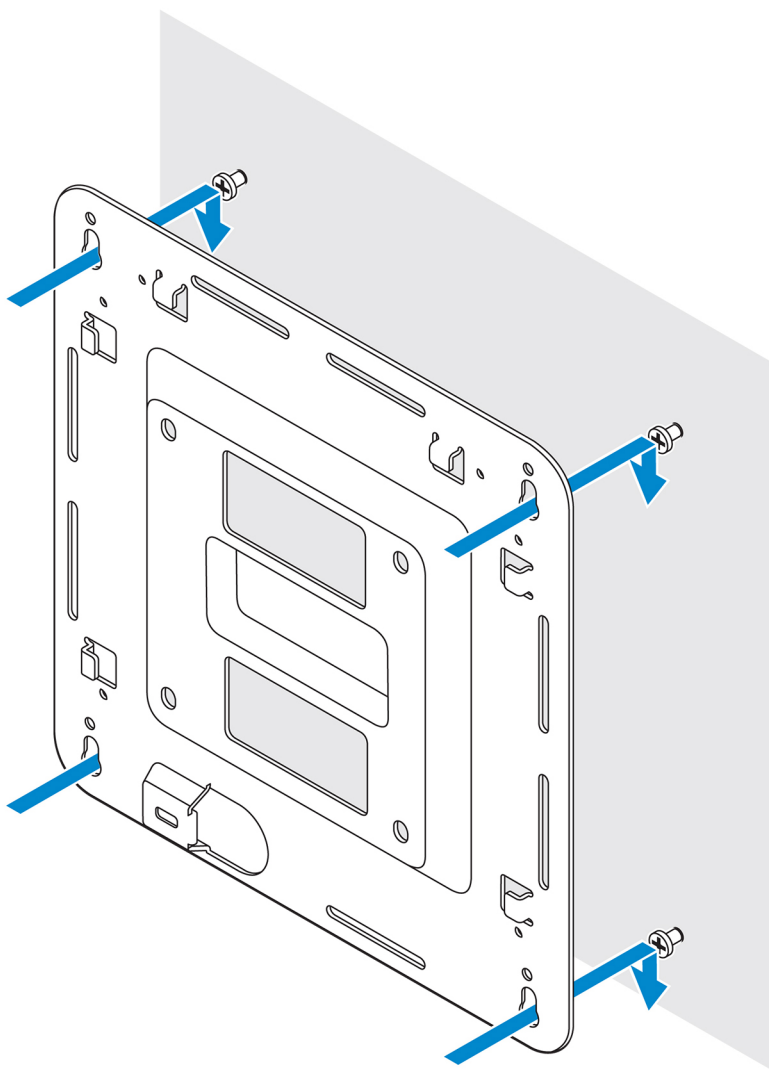


2. Drill four holes in the wall as marked.
3. Insert and tighten four screws (not supplied) to the wall.

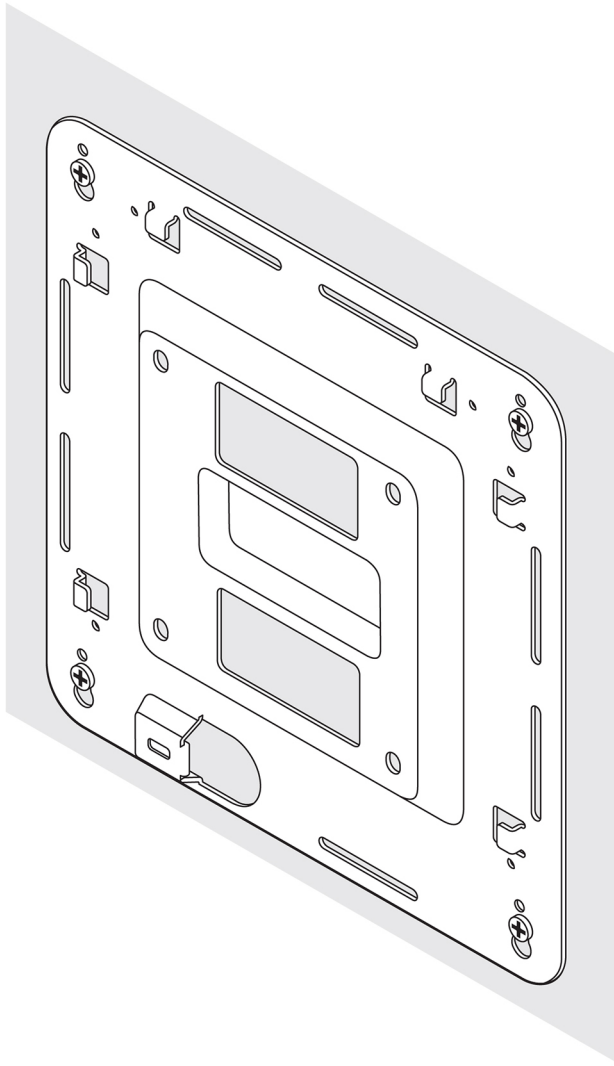
 **NOTE: Purchase screws that fit the diameter of the screw holes.**



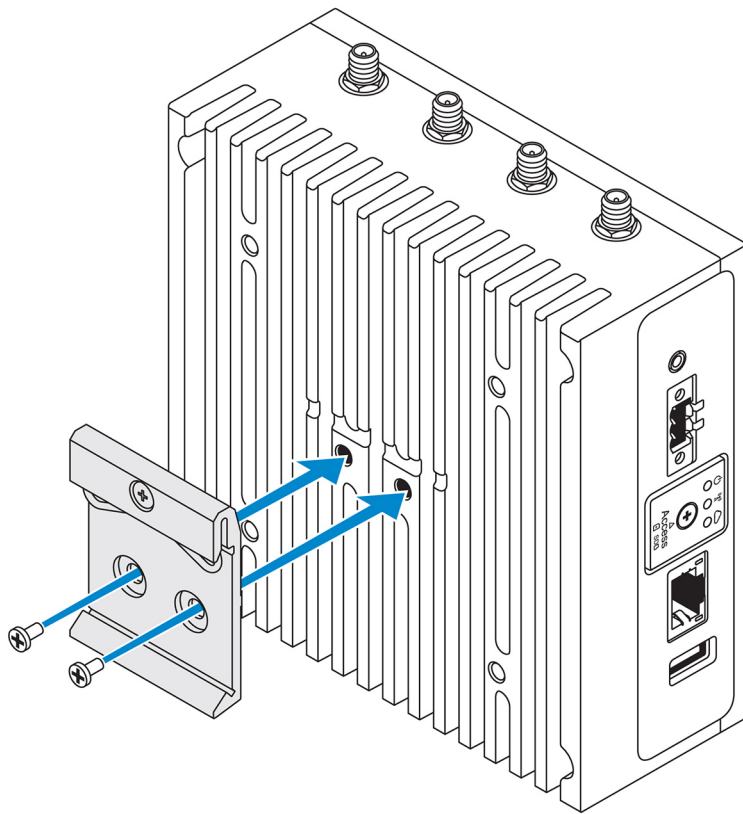
4. Align the screw holes on the standard-mount bracket with the screws on the wall, letting the bracket hang on the screws.



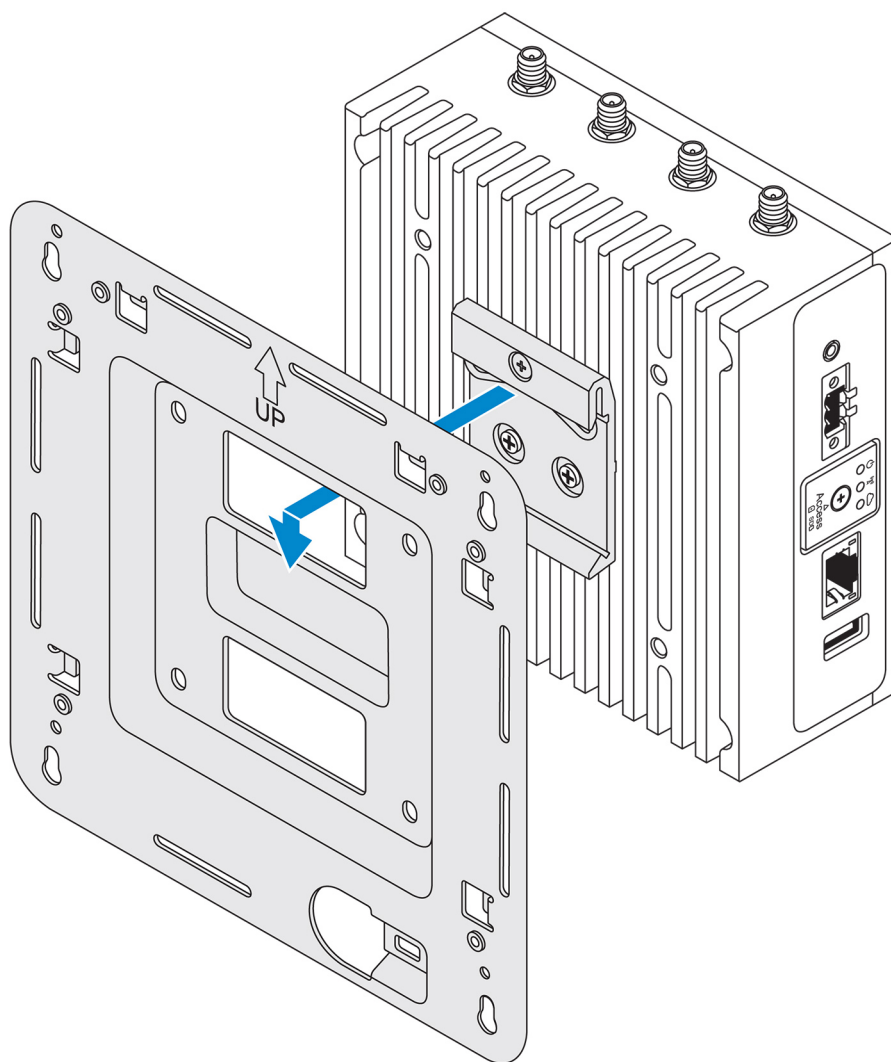
5. Tighten the screws to secure the assembly to the wall.



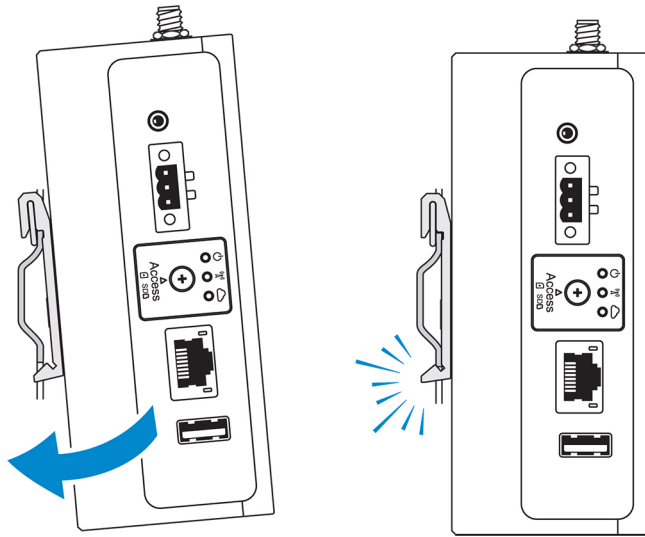
6. Align the screw holes on the DIN-rail bracket with the screw holes at the back of the Edge Gateway.
7. Place the two M4x5 screws on the DIN-rail bracket and secure it to the Edge Gateway.



8. Place the Edge Gateway on the standard mount at an angle, and then pull the Edge Gateway down to compress the springs at the top of the DIN-rail bracket.



9. Push the Edge Gateway towards the DIN-rail to secure it on the standard-mount bracket.

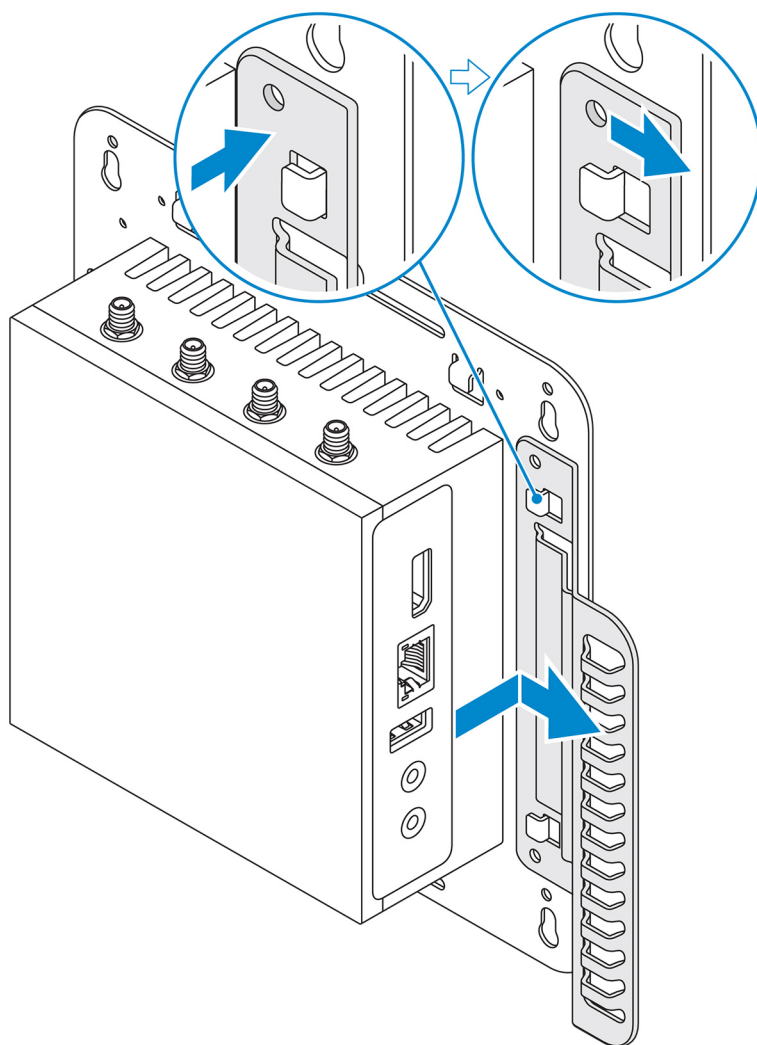


 **NOTE:** For more information about demounting the DIN-rail, see [Demounting DIN rail](#).

Attaching the cable control bars to the standard-mount bracket

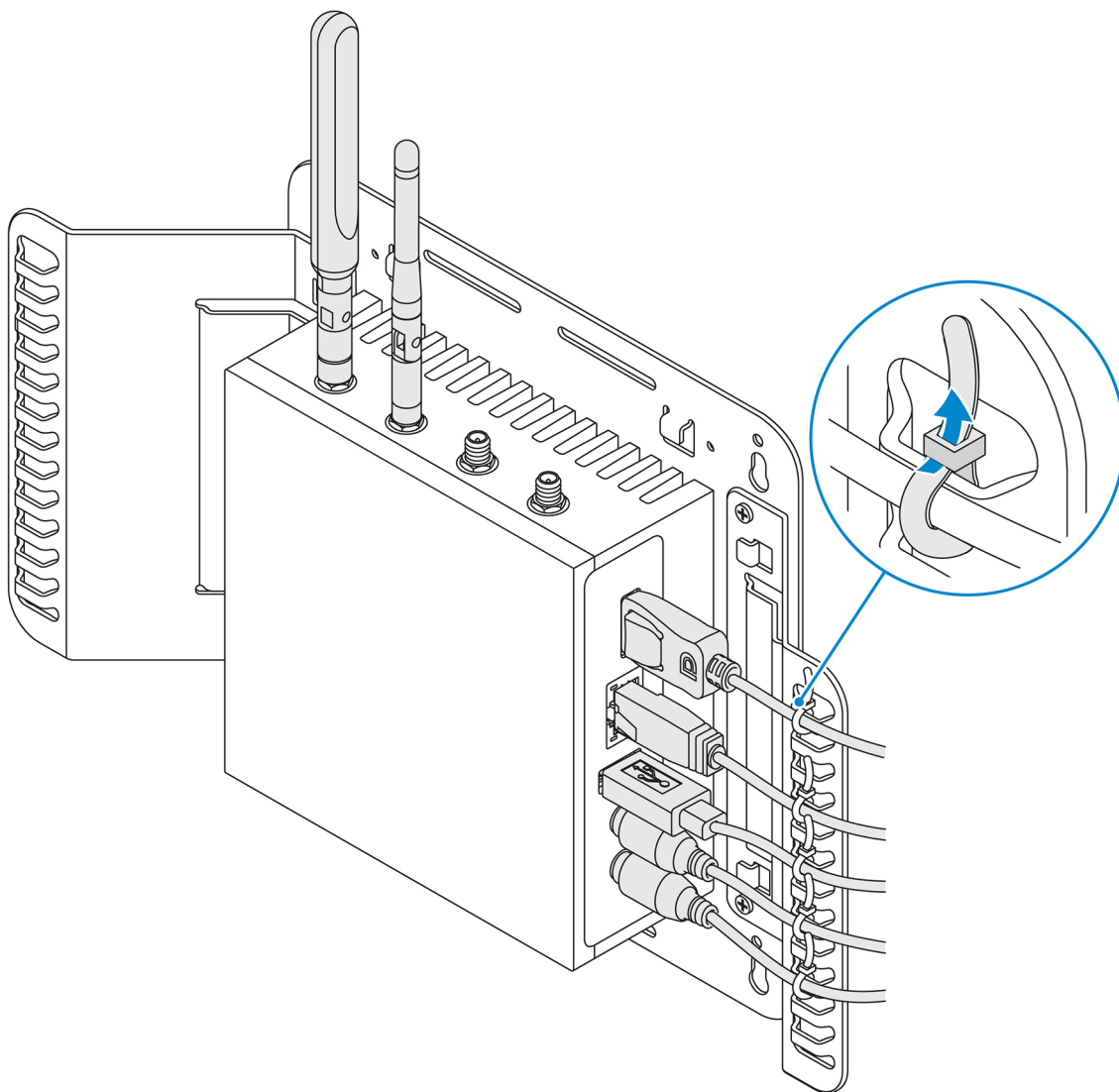
1. Mount the Edge Gateway on the wall using the [standard-mount bracket](#) or [quick-mount bracket](#).
2. Place the cable control bar on the mounting bracket and secure it to the notch.

 **CAUTION:** Use the top cable control bar only with coaxial cable connections. Do not use with antennas.

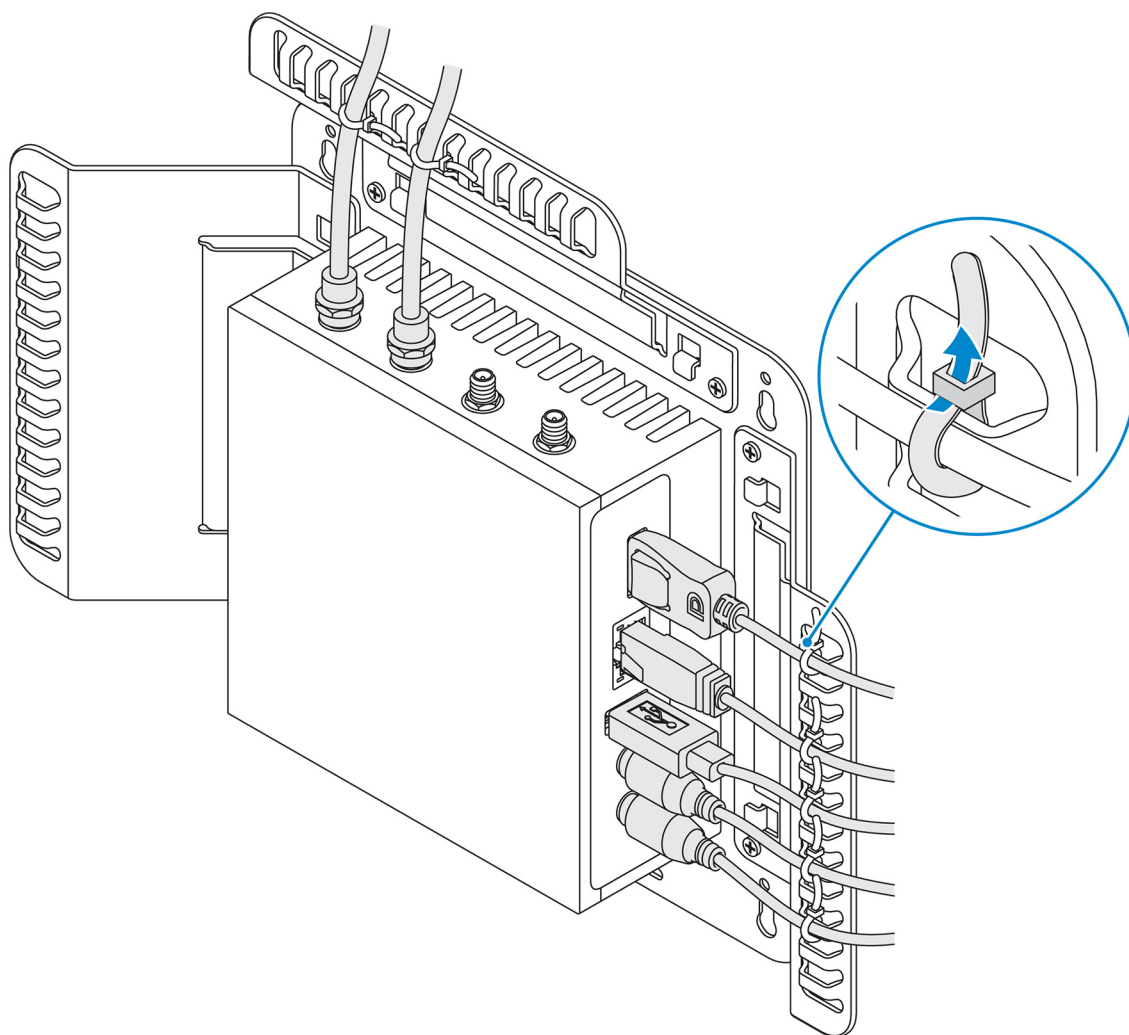


3. Align the screw holes on the cable control bar with the screw holes on the mounting bracket.
4. Tighten the six M3x3.5 mm screws that secure the cable control bar to the mounting bracket.

 **NOTE: Torque the screws at 5±0.5 kilograms-centimeter (11.02±1.1 pounds-inch).**



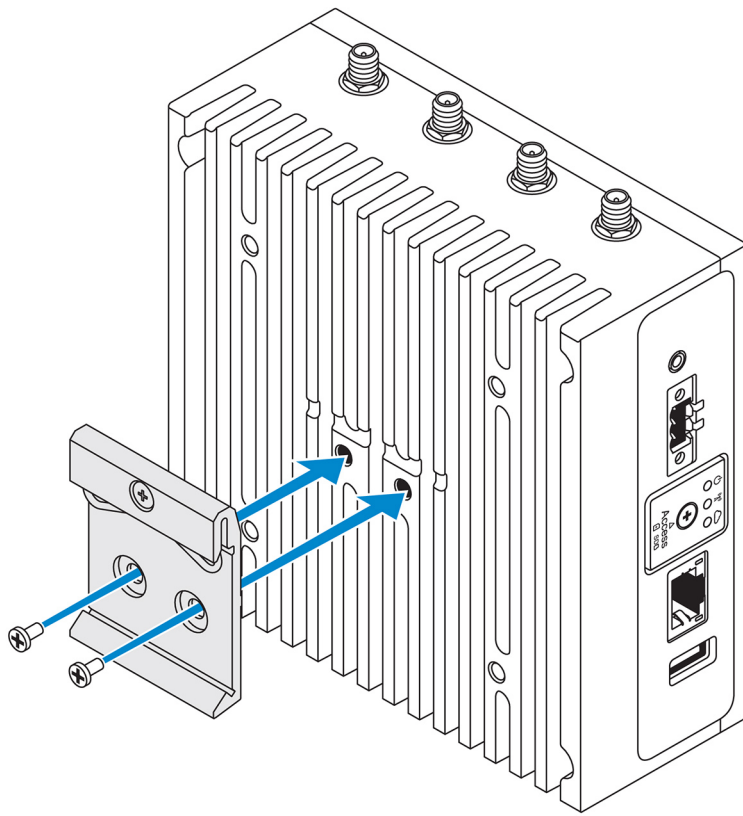
5. Connect the cables to the Edge Gateway.
6. Loop the cable lock (not supplied) to secure each cable to the cable control bar.



Mounting the Edge Gateway on a DIN rail using the DIN-rail bracket

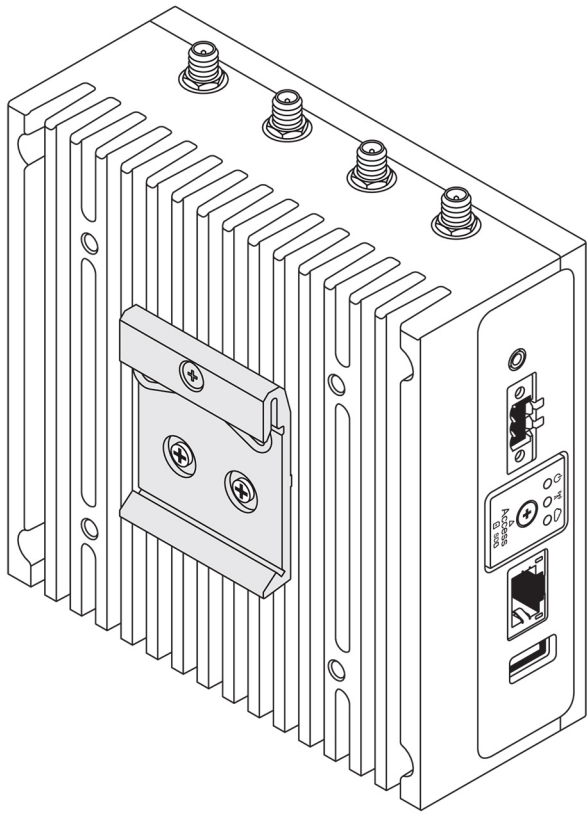
 **NOTE:** The DIN-rail bracket includes the screws that are required for securing the bracket to the Edge Gateway.

1. Align the screw holes on the DIN-rail bracket with the screw holes at back of the Edge Gateway.
2. Place the two M4x5 screws on the DIN-rail bracket and secure it to the Edge Gateway.

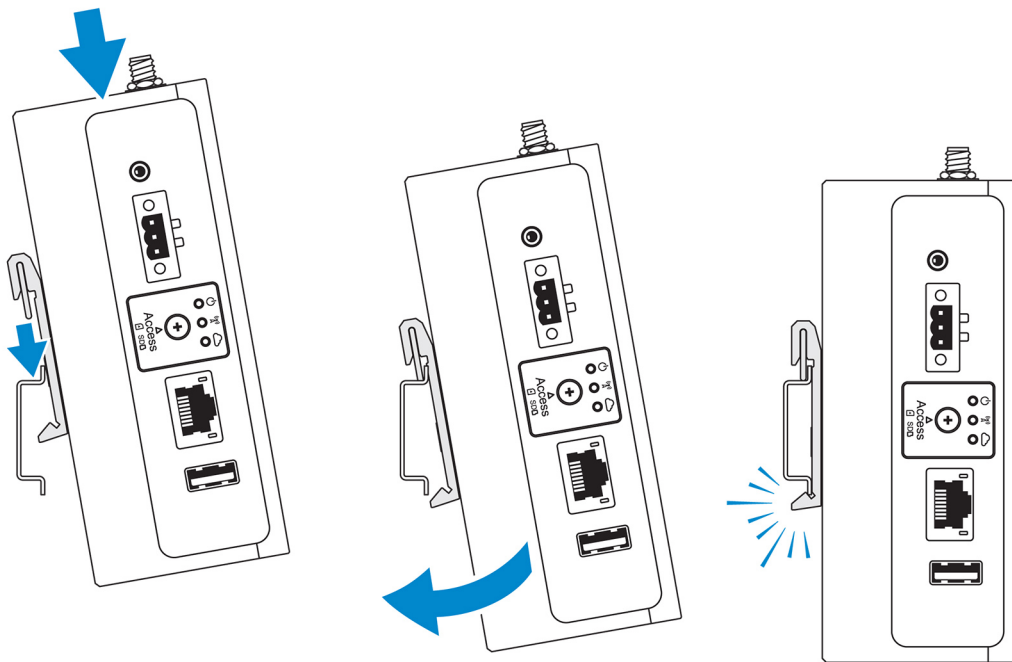


3. Secure the DIN-rail mounting bracket to the Edge Gateway using the two M4x5 screws provided.

 **NOTE:** Torque the screws at 8 ± 0.5 kilograms-centimeter (17.64 \pm 1.1 pounds-inch) on the DIN-rail mounting bracket.




4. Place the Edge Gateway on the DIN rail at an angle, and then pull the Edge Gateway down to compress the springs at the top of the DIN-rail mounting bracket.
5. Push the Edge Gateway towards the DIN-rail to secure the lower clip of the bracket onto the DIN rail.



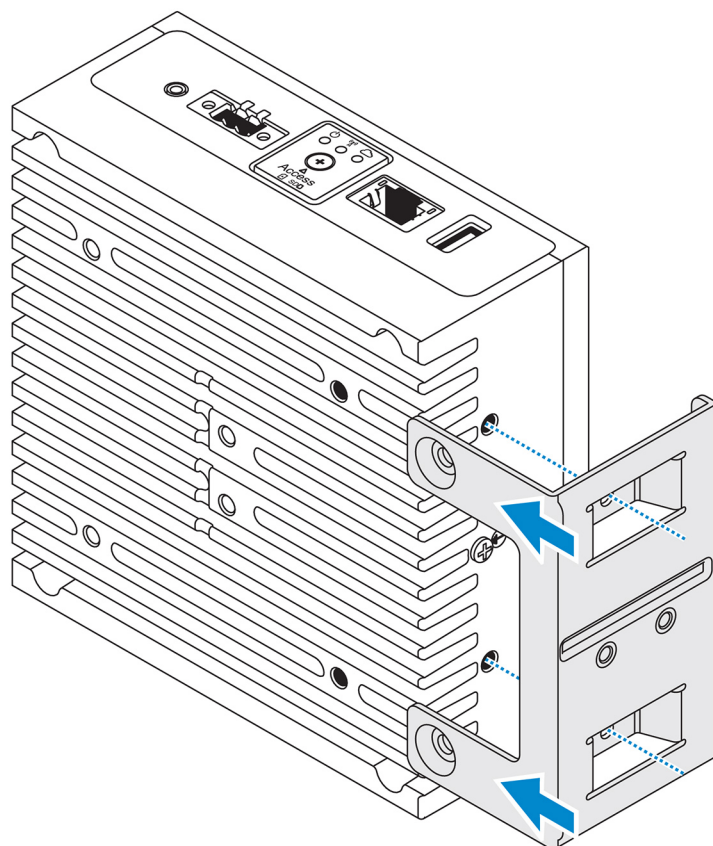
 **NOTE:** For more information about demounting the DIN-rail, see [Demounting DIN rail](#).

Mounting the Edge Gateway using the perpendicular mount

 **NOTE:** The perpendicular mount is designed for mounting in a DIN-rail only.

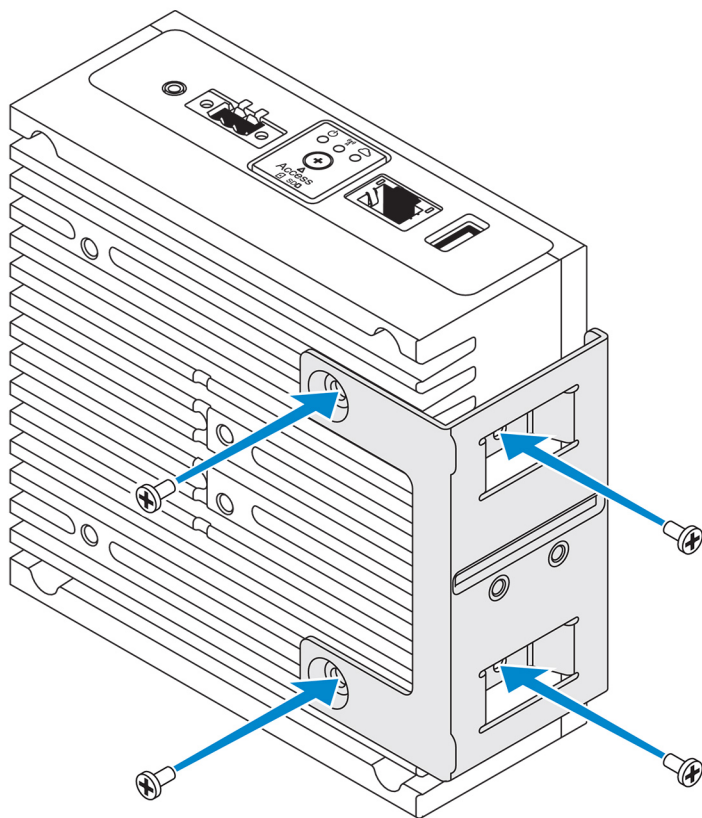
 **NOTE:** An open space of 63.50 mm (2.50 in) around the Edge Gateway is recommended for optimal air circulation. Ensure that the environmental temperature in which the Edge Gateway is installed does not exceed the operating temperature of the Edge Gateway. For more information about the operating temperature of the Edge Gateway, see the *Edge Gateway Specifications*.

1. Align the screw holes on the perpendicular-mount bracket with the screw holes on the Edge Gateway.



2. Tighten the four M4x7 screws to secure the Edge Gateway to the perpendicular-mount bracket.

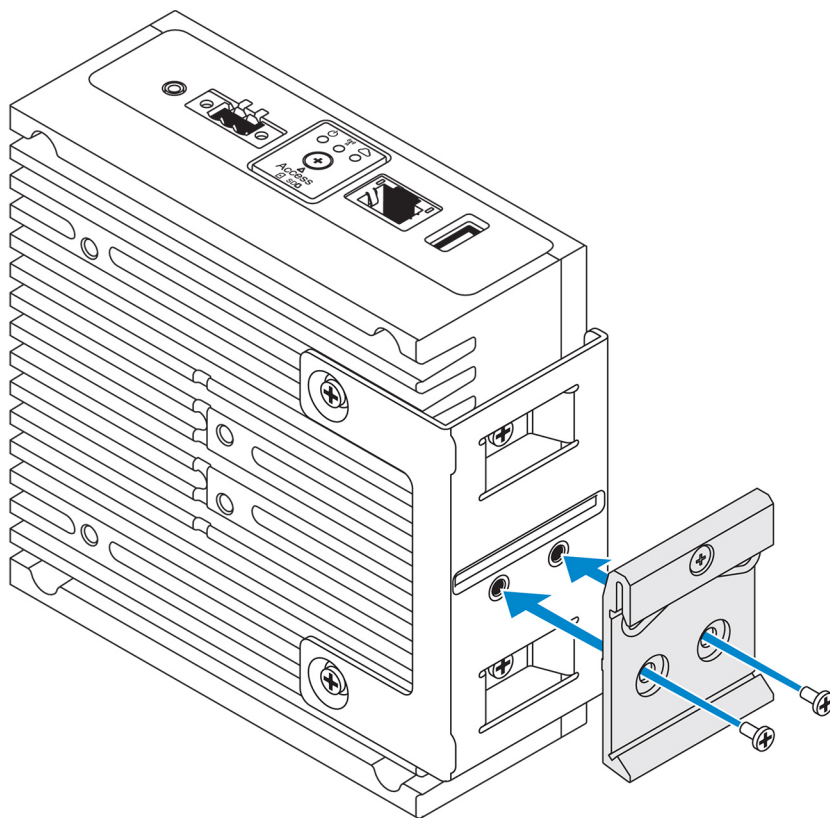
 **NOTE:** Torque the screws at 8 ± 0.5 kilograms-centimeter (17.64 ± 1.1 pounds-inch).



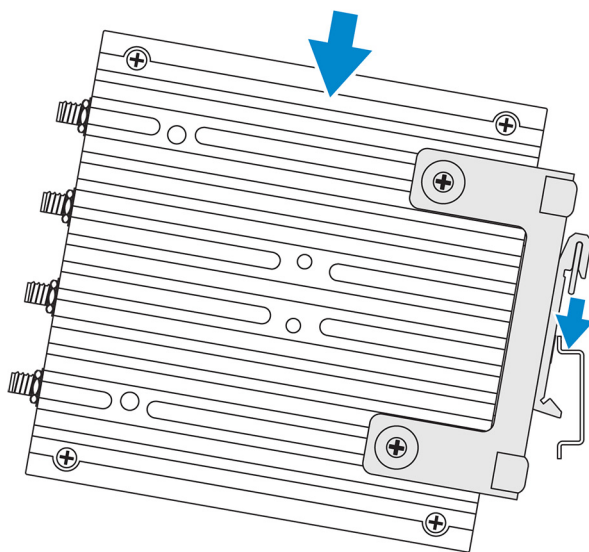
3. Align the screw holes on the DIN-rail mount bracket with the screw holes on the perpendicular-mount bracket, and tighten the two screws.



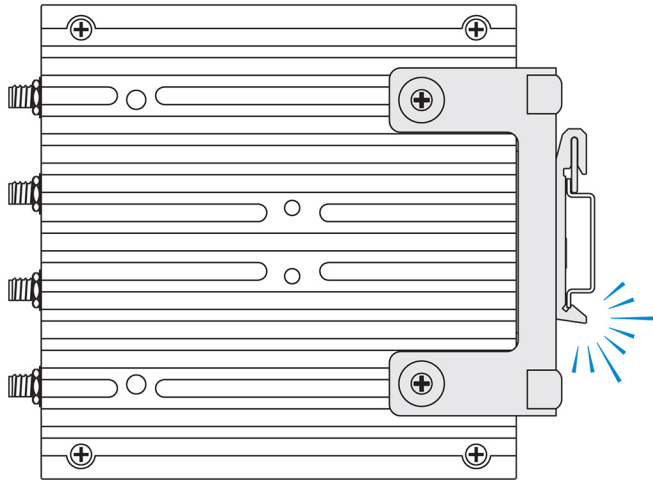
NOTE: Torque the screws at 8 ± 0.5 kilograms-centimeter (17.64 ± 1.1 pounds-inch).



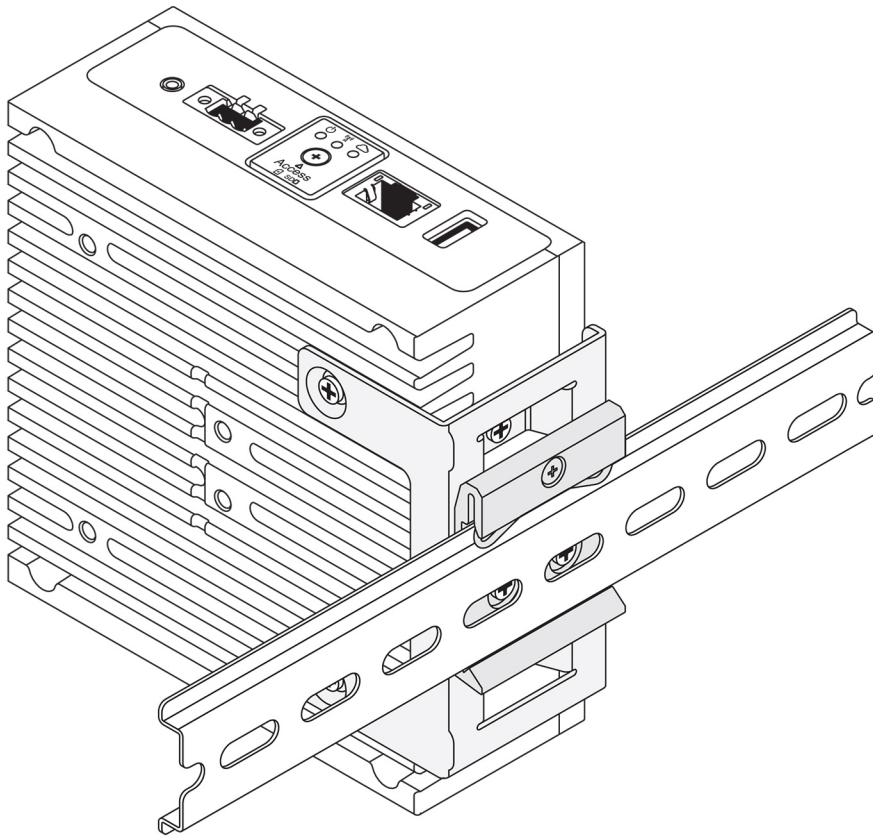
4. Place the Edge Gateway on the DIN rail at an angle and push the Edge Gateway down to compress the springs on the DIN-rail mount brackets.



5. Push the Edge Gateway towards the DIN-rail to secure the lower clip of the bracket onto the DIN rail.



6. Secure the Edge Gateway on the DIN rail.

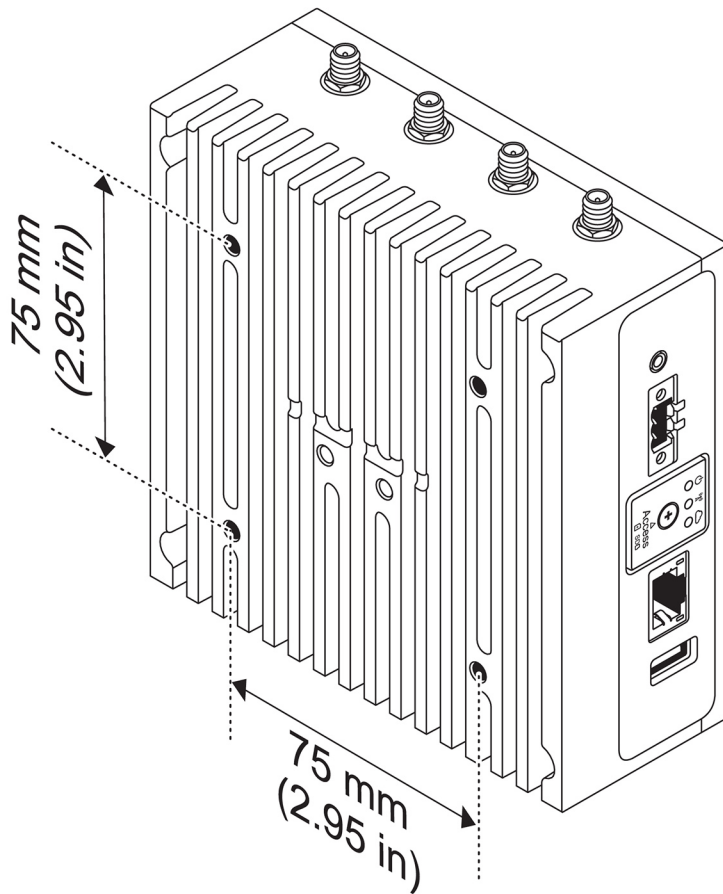


Mounting the Edge Gateway using a VESA mount

The Edge Gateway can be mounted on a standard VESA mount (75 mm x 75 mm).

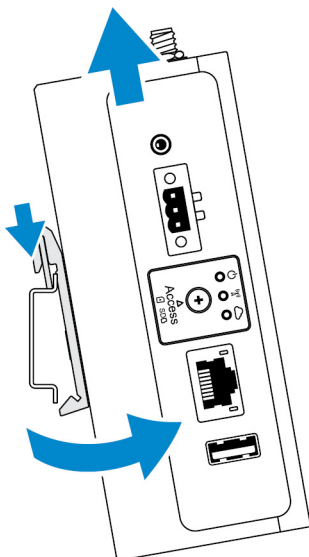


NOTE: The VESA mount option is sold separately. For VESA mounting instructions, see the documentation that is shipped with the VESA mount.



De-mounting from DIN-rail bracket

1. Pull the Edge Gateway down to release from DIN-rail bracket.
2. Lift the Edge Gateway bracket off the DIN rail.



Setting up the operating system



CAUTION: To prevent operating system corruption from sudden power loss, use the operating system to gracefully shut down the Edge Gateway.

The Edge Gateway is shipped with one of the following operating systems:

- Windows 10 IoT Enterprise LTSC 2016
- Ubuntu Core 16



NOTE: For more information about Windows 10 operating system, see msdn.microsoft.com.



NOTE: For more information about the Ubuntu Core 16 operating system, see www.ubuntu.com/desktop/snappy.

Windows 10 IoT Enterprise LTSC 2016

Boot up and login – Direct system configuration



NOTE: These steps are applicable only to the Edge Gateway 3003.

1. Connect a monitor, keyboard and mouse to the Edge Gateway before you login.
2. Power on the Edge Gateway. At the first boot, you will not be prompted to enter login credentials. Subsequent boots will prompt for you to log in.



NOTE: The default user name and password are both `admin`.

Boot up and login – Remote system configuration



NOTE: Your computer must be on the same subnet as the Edge Gateway.

1. Connect a network cable from Ethernet port one on the Edge Gateway to a DHCP-enabled network or router that provides IP addresses.



NOTE: The first-time boot to Windows takes about 5 minutes for system configuration. Subsequent boot-ups take about 50 seconds.

2. Using the MAC address provided on the front cover of the Edge Gateway, obtain the IP address through your network's DHCP server or through a network analyzer.
3. On the Windows computer, search for **Remote Desktop Connection** and launch the application.
4. Log in using the IP address.



NOTE: Ignore any certification errors when connecting to your Edge Gateway.

Boot up and login—Static IP system configuration



NOTE: These steps are applicable only to Edge Gateway 3002 and 3003.





NOTE: To help set up the Edge Gateway remotely, the static IP address of [Ethernet port two](#) on the Edge Gateway is set to these values at the factory:

- IP address: 192.168.2.1
- Subnet mask: 255.255.255.0
- DHCP server: Not applicable

You can connect your Edge Gateway to a Windows computer that is on the same subnet using a crossover cable.

1. On the Windows computer, search for **View network connections** in the control panel.
2. In the list of network devices displayed, right-click the Ethernet adaptor that you want to use to connect to the Edge Gateway, then click **Properties**.
3. On the **Networking** tab, click **Internet Protocol Version 4 (TCP/IPv4) → Properties**.
4. Select **Use the following IP address**, then enter 192.168.2.x (where x represents the last digit of the IP address, for example, 192.168.2.2).



NOTE: Do not set the IPv4 address to the same IP address as the Edge Gateway. Use an IP address between 192.168.2.2 to 192.168.2.254.

5. Enter the subnet mask 255.255.255.0, then click **OK**.
6. Secure a crossover network cable between Ethernet port two on the Edge Gateway and the configured Ethernet port on the computer.
7. On the Windows computer, launch **Remote Desktop Connection**.
8. Connect to the Edge Gateway using the IP address 192.168.2.1. The default username and password are both admin.

Restoring Windows 10 IoT Enterprise LTSP 2016



CAUTION: These steps will delete all the data on your Edge Gateway.

You can restore Windows 10 IoT Enterprise LTSP 2016 by using a USB flash drive.

Prerequisites

Create the recovery USB flash drive. For more information, see [Creating the recovery USB flash drive](#).

Procedure

1. Connect the recovery USB flash drive to the Edge Gateway.
2. Power on the Edge Gateway.

The Edge Gateway will automatically boot from the USB recovery flash drive and restore Windows back to the factory image. Restoration takes about 25 minutes to complete and a confirmation log file is stored on the USB flash drive. Once restoration is complete, the system will power off.



NOTE: The confirmation log file is named <service tag>_<date>_<time>.txt

Windows 10 IOT Enterprise LTSP 2016 basic functions

BIOS update

Download BIOS updates for the Edge Gateway from www.dell.com/support. The download includes an executable file that may be run from the local machine. For more information about updating the BIOS, see [Accessing and updating the BIOS](#).

Watchdog Timer

The Watchdog Timer for Windows 10 IoT Enterprise LTSP 2016 is controlled through the BIOS setting. Enter the BIOS during boot by pressing F2.

The Watchdog Timer is enabled and disabled under the BIOS setting **Watchdog Timer**.

 **NOTE:** For more information about BIOS settings on the Edge Gateway, see [Default BIOS settings](#).

Cloud LED

 **NOTE:** To utilize the Cloud LED, download the necessary tools and drivers from www.dell.com/support.

One unique feature of the Edge Gateway 3000 Series is the *Cloud LED*. Cloud LED enables you to visually inspect the operational status of the Edge Gateway by looking at the display light on the left panel of the Edge Gateway.

To enable this feature, you must expose and program a GPIO register on the Edge Gateway.

Follow these steps to control the Cloud LED on the Edge Gateway:

1. Download the Cloud LED utility from www.dell.com/support.
2. Extract the following files:
 - a. DCSTL64.dll
 - b. DCSTL64.sys
 - c. DCSTL64.inf
 - d. DCSTL64.cat
 - e. CloudLED.exe

 **NOTE:** These files must be in the same directory.

3. Run the **CloudLED.exe** from Command Prompt or PowerShell with administrative rights. Run the following commands:
 - CloudLED.exe ON
 - CloudLED.exe OFF

TPM support

Windows 10 IoT Enterprise LTSB 2016 supports TPM 2.0. For more information about TPM resources, see technet.microsoft.com/en-us/library/cc749022.

System shutdown and restart

Click **Start** → **Power**, and then click **Restart** or **Shutdown** to restart or shutdown the Edge Gateway, respectively.

LAN and WLAN network configuration

In the **Search** box, type **Settings** and open the **Settings** window. Select **Network & Internet** to configure the network.

Bluetooth configuration

In the **Search** box, type **Settings** and open the **Settings** window. Select **Devices**, and then select **Bluetooth** from the menu on the left panel to configure the network.

WWAN (5815) network configuration

 **NOTE:** Ensure that the micro-SIM card is already activated by your service provider before using it in the Edge Gateway. For more information, see [activate your mobile broadband service](#).

Follow these steps after installing the micro-SIM card:

1. In the **Search** box, type **Settings** and open the **Settings** window.
2. Select **Network & Internet**.
3. Locate the WWAN connection in the Wi-Fi section and select the entry to connect and disconnect from the WWAN adapter.

Retrieving data from the sensors

The sensors on the Edge Gateway provide measurements on pressure, relative humidity and temperature, and motion.



Table 15. Sensor types

Relative humidity and temperature sensor	ST Micro HTS221
Motion sensor—Accelerometer	ST Micro LNG2DMTR
Pressure sensor—Barometer	ST Micro LPS22HB

 **NOTE:** Ensure that location services are enabled on the Edge Gateway before you retrieve data from the sensors. For more information on location services, see <https://privacy.microsoft.com/en-us/windows-10-location-and-privacy>.

To access the sensors and retrieve the data, you need make use of sensor APIs along with a sensor diagnostic tool.

 **NOTE:** For more information on sensor APIs, see the article at <https://msdn.microsoft.com/en-us/library/windows/desktop/dd318953%28v=vs.85%29.aspx>.

 **NOTE:** For more information on sensor diagnostic tool, see <https://docs.microsoft.com/en-us/windows-hardware/drivers/sensors/the-sensor-diagnostic-tool>.

Sensor APIs

Sensor type	API source
Relative humidity and temperature sensor	Microsoft does not have any dedicated API for humidity and temperature sensors. A custom sensor API should be used for this sensor. For more information on the custom sensor API, see https://docs.microsoft.com/en-us/uwp/api/windows.devices.sensors.custom .
Motion sensor—Accelerometer	For more information on the accelerometer sensor API, see https://docs.microsoft.com/en-us/uwp/api/windows.devices.sensors.accelerometer
Pressure sensor—Barometer	For more information on the barometer sensor API, see https://docs.microsoft.com/en-us/uwp/api/windows.devices.sensors.barometer

 **NOTE:** You can refer to a sample code that shows sensor configuration and data access at https://github.com/dell/GW300x_Sensor_Demo

Ubuntu Core 16

Overview

Ubuntu Core 16 is a Linux OS distribution that is an entirely new mechanism for managing IOT systems and its applications. For more information about Ubuntu Core 16 OS, see

- www.ubuntu.com/cloud/snappy
- www.ubuntu.com/internet-of-things

Prerequisites for setting up Ubuntu Core 16

Infrastructure

An active connection to the internet is needed to update the Ubuntu Core 16 operating system as well as applications (snaps).

Prior knowledge

- Ensure the personnel setting up Ubuntu Core 16 operating system has prior knowledge of the following:

- Unix/Linux commands
- Serial communication protocol
- SSH terminal emulators (for example, PuTTY)
- Network settings (for example, proxy URL)

Boot up and log in – Direct system configuration

 **NOTE: These steps are applicable only to the Edge Gateway 3003.**

1. Power on the Edge Gateway. The system sets up the operating system automatically and restarts multiple times to apply all the configurations. The system takes approximately one minute to boot to the operating system.
2. When prompted, log in using the default credentials. The default user name and password are both `admin`. The default computer name is the service tag.

For example;

```
Ubuntu Core 16 on 127.0.0.1 (tty1)
localhost login: admin
Password: admin
```

Boot up and log in – Remote system configuration

 **NOTE: These steps are applicable only to Edge Gateway 3001 and 3002.**

1. Connect a network cable from Ethernet port one on the Edge Gateway to a DHCP-enabled network or router that provides IP addresses.
2. In your network's DHCP server, use the command `dhcp-lease-list` to obtain the IP address associated with the Edge Gateway's MAC address.
3. Setup an SSH session using an SSH terminal emulator (for example, native command-line `ssh` client on Linux or PuTTY on Windows).

 **NOTE: The SSH service is enabled on Ubuntu Core 16 by default.**

4. Enter the command `ssh admin@<IP address>`, followed by the default user name and password. The default user name and password are both `admin`.

For example;

```
lo@lo-Latitude-E7470:~$ ssh admin@10.101.46.209
admin@10.101.46.209's password:
```

Boot up and log in – Static IP system configuration

This allows you to connect your Edge Gateway through a host computer, which must be on the same subnet.

 **NOTE: These steps are applicable only to Edge Gateway 3002 and 3003.**

 **NOTE: The static IP address of Ethernet port two on the Edge Gateway is set to these values at the factory:**

- IP address: `192.168.2.1`
- Subnet mask: `255.255.255.0`
- DHCP server: Not applicable

1. On the host computer, configure the Ethernet adaptor that is connected to the Edge Gateway with a static IPv4 address under the same subnet. Set the IPv4 address to `192.168.2.x` (where `x` represents the last digit of the IP address, for example, `192.168.2.2`).

 **NOTE: Do not set the IPv4 address to the same IP address as the Edge Gateway. Use an IP address between `192.168.2.2` to `192.168.2.254`.**

2. Set the subnet mask to `255.255.255.0`.



Updating operating system and applications

After enabling the network connections and connecting to the internet, Dell recommends to have the latest OS components and applications installed. To update Ubuntu Core 16, run:

```
admin@localhost:~$ sudo snap refresh
```

Viewing operating system and application versions

Run the command:

```
admin@localhost:~$ sudo uname -a
```

returns

```
Linux ubuntu.localdomain 4.4.30-xenial_generic #1 SMP Mon Nov 14 14:02:48 UTC 2016 x86_64
x86_64 x86_64 GNU/Linux
```

 **NOTE:** Check if a newer version of the software is available. For more information on checking for updates, see [Updating operating system and applications](#).

Additional Ubuntu commands

Basic commands

 **NOTE:** For more information about Ubuntu commands, see <https://snapcraft.io/>.

Table 16. Basic commands

Action	Ubuntu Core 16
Viewing system attributes	#sudo snap version
Updating the image to the latest release	#sudo snap update
Viewing a list of all the snaps that are currently installed	#sudo snap find
Viewing a set and attribute to a snap	#sudo snap set <snap> <attribute>=<value>
Querying attributes from a snap	#sudo snap get <snap>
Rebooting the system	Run the command: admin@localhost:\$ sudo reboot returns: System reboot successfully
Shutting down the system	Run the command: admin@localhost:\$ sudo poweroff The system shuts down successfully.
Add a new user if libnss-extrausers is pre-installed	\$sudo adduser --extrausers testuser
Change a user's password	\$sudo passwd <user-name>
Re-mount the Ubuntu Snappy 16 root-file system as read only	Snappy 16 rootfs is Read-Only
Accessing the built-in help	admin@localhost:~\$ sudo snap --help
Listing the installed snaps	admin@localhost:~\$ sudo snap list
Updating the system name	admin@localhost:\$ network-manager.nmcli general hostname <NAME>

Action	Ubuntu Core 16
Changing the time zone	<p>When the system arrives from the factory, the operating system is usually set to the UTC time zone.</p> <p>To change the time zone to your location, run the command:</p> <pre>admin@localhost:~\$ sudo timedatectl --help</pre>
Root-user credential	<p>Run the command:</p> <pre>admin@localhost:\$ sudo su -</pre> <p>Returns:</p> <pre>\$ admin@localhost:~# sudo su - \$ root@localhost:~#</pre>
Identifying the System Service Tag	<p>Run the command:</p> <pre>admin@localhost:\$ cat /sys/class/dmi/id/product_serial</pre> <p>The system tag is printed.</p>
Identifying the system vendor	<p>Run the command:</p> <pre>admin@localhost:\$ cat /sys/class/dmi/id/board_vendor</pre> <p>returns</p> <pre>Dell Inc.</pre> <p>The system tag is printed.</p>

Ubuntu Network Manager

Network-Manager is a native Ubuntu Snappy connection manager. The application can be used to configure the Edge Gateway so that it's automatically-detected and connected to the network. The application can be used to configure multiple network devices. A command-line utility **nmcli** is included with Network-Manager to support non-graphical user interface configurations.

 **NOTE:** For more information about Network Manager, see <https://wiki.archlinux.org/index.php/NetworkManager>

Connecting through WWAN

 **NOTE:** For more information on configuring and connecting through WWAN, see <https://docs.ubuntu.com/core/en/stacks/network/network-manager/docs/configure-cellular-connections>.

1. Check if a modem is present and identify the modem index number.

```
$ sudo modem-manager.nmcli -L
```

2. Check the modem status and identify the primary port.

```
$ sudo modem-manager.nmcli -m <x>
```

 **NOTE:** **<x>** refers to the modem index number. Replace **<x>** with the modem index number after running the command at step 1.

3. Create a profile.

```
$ sudo network-manager.nmcli c add con-name test type gsm ifname <primary port> apn internet
```

 **NOTE:** Depending on the return results from step 2, replace **<primary port>** after **ifname** with the actual primary port name.

4. Check the WWAN status.

```
$ network-manager.nmcli r wwan
```

5. Turn on WWAN.

```
$ sudo network-manager.nmcli r wwan on
```



6. Find `wlan0` in the interface list.

```
$ ifconfig -a
```

7. Enable the connection profile.

```
$ sudo network-manager.nmcli c up test
```

8. Check the **Network Manager** status.

```
$ network-manager.nmcli d
```

9. Disable the connection profile.

```
$ sudo network-manager.nmcli c down test
```

10. Check the **Network Manager** status.

```
$ network-manager.nmcli d
```

Connecting through WLAN

1. Show a list of network interfaces like **eth0**, **eth1**, **wlan0**, **mlan0**, and so on.

```
$ network-manager.nmcli d
```

2. Show a list of network interfaces like **eth0**, **eth1**, **wlan0**, **mlan0**, and so on.

```
$ network-manager.nmcli d
```

3. Show a list of available wireless access points.

```
$ network-manager.nmcli device wifi list
```

4. Wireless connection with `nmcli`: Run the following commands and replace `$$SSID`, `$PSK`, and `$WIFI_INTERFACE` with the variables for your environment.

- Connect:

```
$ sudo network-manager.nmcli dev wifi connect $$SSID password $PSK ifname  
$WIFI_INTERFACE
```

- Disconnect:

```
$ sudo network-manager.nmcli dev disconnect $WIFI_INTERFACE
```

Connecting through software-enabled Access Point (SoftAP)

This feature depends on the wireless module and its associated driver to function as a wireless-access point.

 **NOTE:** For more information on SoftAP, see <https://docs.ubuntu.com/core/en/stacks/network/wifi-ap/docs/index>.

1. Login to Ubuntu Snappy. Make sure that the system is connected to the internet.

2. Run the command to find the application from the Ubuntu Snappy Store.

```
#sudo snap search wifi-ap
```

3. Run the command to install the application.

```
#sudo snap install wifi-ap
```

4. After snap is installed, run the command to check the status.

```
$ wifi-ap.status
```

5. Run the command to enable the access point and restart the service.

```
$ wifi-ap.config set disabled=false
```

The Wi-Fi-AP default SSID **Ubuntu** is now visible to clients.

To secure the Wi-Fi access point with WPA 2 personal, change the following configuration items.

```
$ wifi-ap.config set wifi.security=wpa2 wifi.security-passphrase=Test1234
```

The command enables WPA2 security with the passphrase set to `Test1234`.

Connecting through Bluetooth

This feature allows the system to connect to Bluetooth devices such as a Bluetooth keyboard.

1. Run the command to start **bluetoothctl** console.

```
#bluetoothctl -a
```

The **bluetoothctl** console opens.

2. Run the command to power on the Bluetooth device.

```
$power on
```

3. Register the agent for the keyboard:

```
$agent KeyboardOnly
$default-agent
```

4. Run the command to put the Bluetooth controller in pair-able mode.

```
$pairable on
```

5. Run the command to scan for nearby Bluetooth devices.

```
$scan on
```

6. Run the command to stop scanning after the Bluetooth keyboard is found.

```
$scan off
```

7. Run the command to pair the Bluetooth keyboard.

```
$pair <MAC address of Bluetooth keyboard>
```

8. Enter the PIN code on the Bluetooth keyboard, if needed.

9. Run the command to trust the Bluetooth keyboard.

```
$trust <MAC address of Bluetooth keyboard>
```

10. Run the command to connect the to the Bluetooth keyboard.

```
$connect <MAC address of Bluetooth keyboard>
```

11. To quit the **bluetoothctl** console.

```
$quit
```

Switching between WLAN and Bluetooth modes

1. Unload the WLAN/BT driver.

```
$ modprobe -r ven_rsi_sdio
```

2. Adjust the mode in `/etc/modprobe.d/rs9113.conf`

3. Reload the WLAN/BT driver.

```
$ modprobe ven_rsi_sdio
```

4. Verify the operation mode. Refer to the table for operating mode values.

```
$ cat /sys/module/ven_rsi_sdio/parameters/dev_oper_mode
```

Table 17. Operating-mode values for WLAN and Bluetooth

Operating mode value	Wi-Fi station	BT/BLE modes supported	softAP	Clients supported by softAP
1	X	N/A		N/A
1		N/A	X	32
13	X	Dual (BT classic and BTLE)		N/A
14		Dual (BT classic and BTLE)	X	4
5	X	BT Classic		N/A
6		BT Classic	X	32

Bluetooth Serial Port Profile (SPP)

Assumptions for MAC addresses of each BT adapter:



- BT MAC(MYCLIENT): XX:XX:XX:XX:XX:XX
- BT MAC(MYSERVER): YY:YY:YY:YY:YY:YY

1. Pre-requirements (for Debian-only, not required on Ubuntu Core OS).

```
sudo apt-get install bluez bluez-tools
```

2. Prepare to pair MYSERVER and MYCLIENT

```
$ sudo bluez.bluetoothctl -a
[bluetoothctl]# power on
[bluetooth]# discoverable on
[bluetooth]# scan on
[NEW] Device XX:XX:XX:XX:XX:XX MYCLIENT
[bluetooth]# scan off
```

3. Pair with each other. As of Bluetooth v2.1, Secure Simple Pairing is a requirement, and offers three methods of pairing devices, which are applicable on the Dell Gateway 3000 series:

- Just Works
- Numeric Comparison
- Passkey Entry



NOTE: For more information about bluetooth pairing, see <https://blog.bluetooth.com/bluetooth-pairing-part-4>.

```
[bluetooth]# agent on
[bluetooth]# default-agent
[bluetooth]# pairable on
[bluetooth]# pair XX:XX:XX:XX:XX:XX <MAC Address of Device to Pair>
[bluetooth]# connect XX:XX:XX:XX:XX:XX [CHG] Device XX:XX:XX:XX:XX:XX Connected: yes
[bluetooth]# exit
```

4. Configure SPP.

Server Device

```
$ bluez.sdptool add --channel=22 SP
$ ./rfcomm -r listen /dev/rfcomm0 22
Waiting for connection on channel 22
Connection from XX:XX:XX:XX:XX:XX to /dev/rfcomm0 <These lines will be seen when client comes>
Press CTRL-C for hangup
```

Then, create a new instance of terminal to screen the data over bluetooth serial.

```
$ cat /dev/rfcomm0
```

Client Device

```
$ bluez.sdptool add --channel=22 SP
$ ./rfcomm -r connect /dev/rfcomm0 YY:YY:YY:YY:YY:YY 22
```

Then, create a new instance of terminal to send data, for example, a new instance of ssh.

```
$ echo "test" > /dev/rfcomm0
```





NOTE: The `rfcomm` command is not available in this command. If required, you can copy the binary to the Edge Gateway from an AMD64-based system running Ubuntu 16.04 or above.

Serial ports—Edge Gateway 3001 only

By default, the LED state of RS-232, RS-422, and RS-485 is **OFF**. It is only **ON** when data is being transmitted. The device nodes are ordered by the port position starting with the left-most port (RS-232).

Table 18. Serial ports

Number	Port Type	Device node	Manufacturer part number
1	RS-232	COM3	JVE Global
	RS-422		23N6963-10D00B-15G-2.9
	RS-485		http://www.jve.com.cn/
	 NOTE: This part number is for reference only and is subjected to change.		
2	RS-232	COM3	JVE Global
	RS-422		23N6963-10D00B-15G-2.9
	RS-485		http://www.jve.com.cn/
	 NOTE: This part number is for reference only and is subjected to change.		

RS-232

Ready-to-use software to control or manage devices are not available from Dell.

To configure the RS-232 port, run the following commands:

1. Set RS232 from the pre-installed DCC application.

```
$ dcc.cctk -h --serial1
$ dcc.cctk --serial1
$ dcc.cctk --serial1=rs232
```

2. Set serial port mode.

```
$ sudo stty -F /dev/ttyXRUSB0 ispeed 115200 ospeed 115200 -echo -onlcr -ixon -ixoff
$ sudo stty -F /dev/ttyXRUSB1 ispeed 115200 ospeed 115200 -echo -onlcr -ixon -ixoff
```

3. Transfer or receive data between two ports—for example, a wired RS-232 between two serial ports on the device.

```
$ sudo su
$ echo abcdefg > /dev/ttyXRUSB0
```

Repeat the command to send data.

4. Receive data from another terminal by ssh from your computer.

```
$ ssh admin@<IP address of Edge Gateway>
(passwd: admin)
$ sudo su
$ cat /dev/ttyXRUSB1
```

Verify that the string is received correctly.

RS-422FD\RS-485FD

Ready-to-use software to control or manage devices are not available from Dell.

To configure the RS-422/RS-485 port, run the following commands:

1. Set RS-422/RS-485 FD from the pre-installed DCC application.

```
dcc.cctk -h --serial1
dcc.cctk --serial1
dcc.cctk --serial1=rs422
```

2. Set serial port mode.

```
$ sudo stty -F /dev/ttyXRUSB0 ispeed 115200 ospeed 115200 -echo -onlcr -ixon -ixoff
$ sudo stty -F /dev/ttyXRUSB1 ispeed 115200 ospeed 115200 -echo -onlcr -ixon -ixoff
```



3. Transfer or receive data between two ports—for example, a wired RS-422/RS-485FD between two serial ports on the device.

```
$ sudo su
$ echo abcdefg > /dev/ttyXRUSB0
```

Repeat the command to send data.

4. Receive data from another terminal by ssh from your computer.

```
$ ssh admin@<IP address of Edge Gateway>
(passwd: admin)
$ sudo su
$ cat /dev/ttyXRUSB1
```

Verify that the string is received correctly.

RS-485HD

To configure the RS-485HD port, run the following commands:

1. Set RS-485HD from the pre-installed DCC application.

```
dcc.cctk -h --serial1
dcc.cctk --serial1
dcc.cctk --serial1=rs485
```

2. Set serial port mode.

```
$ sudo stty -F /dev/ttyXRUSB0 ispeed 115200 ospeed 115200 -echo -onlcr -ixon -ixoff
$ sudo stty -F /dev/ttyXRUSB1 ispeed 115200 ospeed 115200 -echo -onlcr -ixon -ixoff
```

3. Transfer or receive data between two ports—for example, a wired RS-485HD between two serial ports on the device.

```
$ sudo su
$ echo abcdefg > /dev/ttyXRUSB0
```

Repeat the command to send data.

4. Receive data from another terminal by ssh from your computer.

```
$ ssh admin@<IP address of Edge Gateway>
(passwd: admin)
$ sudo su
$ cat /dev/ttyXRUSB1
```

Verify that the string is received correctly.

Minicom—Edge Gateway 3001 only

Minicom is a terminal emulation program which allows the host machine to communicate with and debug the serial port on headless systems, such as the Edge Gateway. The following steps help you to setup Minicom.

1. Install Minicom.

```
$ sudo snap install classic --devmode --beta
$ sudo classic.create
$ sudo classic
$ (classic) sudo apt-get update
$ (classic) sudo apt-get install minicom
```

2. Set Minicom.

```
$ sudo minicom -s
```

3. Select **Serial port setup**.

4. Press A to edit the Serial Device to **ttUSB0**. This can be any other value if there is more than one USB serial cable attached. Then, press Enter to exit:

```
A - Serial Device : /dev/ttyUSB0
```

5. Press F to disable **Hardware Flow Control** to **No**.

6. Press E to edit Baud rate/Parity/Bits.

7. Press E to configure Baud rate as 115200.

- a. Press Q to configure Stopbits as 8-N-1. Press Enter to exit.

```

+-----[Comm Parameters]-----+
|  Current: 115200 8N1
|
|  Speed                      Parity          Data
|  A: <next>                  L: None          S: 5
|
|  B: <prev>                  M: Even          T: 6
|
|  C: 9600                    N: Odd           U: 7
|
|  D: 38400                   O: Mark          V: 8
|
|  E: 115200                  P: Space
|
|
|  Stopbits
|  W: 1                        Q: 8-N-1
|
|  X: 2                        R: 7-E-1
|
|
|  Choice, or <Enter> to exit?_

```

8. Press Enter to complete the settings.
9. Select **Save setup as dfi**.
10. Select **Exit from minicom**.

Start Minicom as a terminal program

```

$ sudo minicom

Welcome to minicom 2.7

OPTIONS: Tl8n
Compiled on Feb 7 2017, 13:37:27.
Port /dev/ttyUSB0, 15:06:26

Press CTRL-A Z for help on special keys

```

Exit Minicom

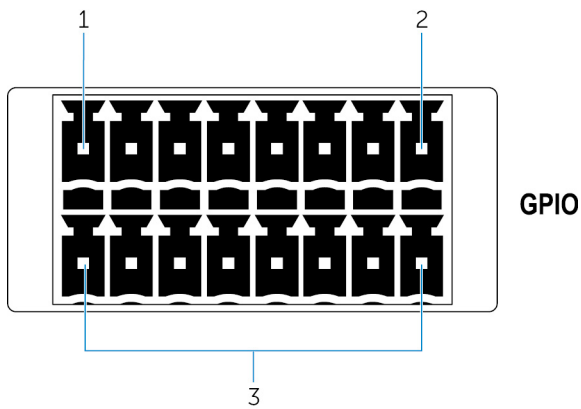
1. In terminal mode, press Ctrl+A.
A message bar is displayed at the bottom of the terminal window.
2. Press X to exit.

GPIO—Edge Gateway 3001 only

 **NOTE:** For more information on GPIO sysfs interface, see <https://www.kernel.org/doc/Documentation/gpio/sysfs.txt>.

The GPIO connector (AD5593R) on the Edge Gateway 3001 has 8 pins. The connector can be controlled by the standard Linux GPIO. The GPIOs number maps 330 to 337.





1. Pin: GPIO1
2. Pin: GPIO8
3. ISO GND: Bottom row isolated grounds

Example 1 (as root): Set GPIO 1 as output, value as 1

```
$ echo 330 > /sys/class/gpio/export
$ echo out > /sys/class/gpio/gpio330/direction
$ echo 1 > /sys/class/gpio/gpio330/value
```

Example 2 (as root): Set GPIO 8 as input, and read value

```
$ echo 337 > /sys/class/gpio/export
$ echo out > /sys/class/gpio/gpio337/direction
$ cat /sys/class/gpio/gpio337/value
0
```

Example 3 (as root): Connect GPIO 1 to 8, read GPIO 8 pin value

```
$ cat /sys/class/gpio/gpio337/value
1
```

Zigbee—Edge Gateway 3002 only

If there is a specific Zigbee programming requirement of user mode application, contact the hardware provider of that module for the API documentation.

The Edge Gateway 3002 supports these Zigbee modules:

- Telegesis ETRX358USB
- Silicon Labs ETRX3587HR-D1

Security

Trusted Platform Module (TPM)

NOTE: For more information about the TPM, see <https://developer.ubuntu.com/en/snappy/guides/security-whitepaper/>.

TPM is only supported on devices that have TPM hardware installed on products with Snappy-enhanced security support. The TPM on/off setting is configurable in the BIOS and manageable in the operating system.

If TPM is turned off, the device node (`/dev/tpm0`) does not exist.

```
(plano)ubuntu@localhost:~$ ls /dev/tpm0
ls: cannot access /dev/tpm0: No such file or directory
```

If TPM is turned on, the device node (/dev/tpm0) exists.

```
(plano)ubuntu@localhost:~$ ls /dev/tpm0  
/dev/tpm0
```

Watchdog Timer (WDT)

 **NOTE:** For more information about Watchdog Timer (WDT) commands, see www.sat.dundee.ac.uk/~psc/watchdog/Linux-Watchdog.html.

Dell recommends that you enable the WDT by default to activate the fail-safe circuitry. Snappy, a WDT-compatible operating system, provides the capability to detect and recover the system from malfunctions or unexpected crashes.

To check daemon status, run the command:

```
admin@localhost:$ systemctl show | grep -i watchdog
```

Returns:

```
RuntimeWatchdogUsec=1min  
ShutdownWatchdogUsec=10min
```

 **NOTE:** The default value is 10. The actual value should be greater than 0.

To configure WDT, run the command:

```
admin@localhost:$ sudo vi /etc/systemd/system.conf.d/watchdog.conf
```

Cloud LED On/Off

1. To export Cloud LED PIN, run the command:

```
#sudo su -  
#echo 346 > /sys/class/gpio/export  
#echo out > /sys/class/gpio/gpio346/direction
```

2. To turn on Cloud LED, run the command:

```
#echo 1 > /sys/class/gpio/gpio346/value
```

or

To turn off Cloud LED, run the command:

```
#echo 0 > /sys/class/gpio/gpio346/value
```

Global Positioning Systems (GPS)

 **NOTE:** For more information about GPS configurations, see <http://locationd.readthedocs.io/en/latest/intro.html>.

National Marine Electronics Association (NMEA) data is supported if the GPS module is present in the system. In the operating system, the location service is a central hub for multiplexing access to positioning subsystems available through hardware and software. It provides a client API offering positioning capabilities to applications and other system components..

To retrieve NMEA streaming data:

- Device node for NMEA streaming: Edge Gateway 3001/3003

```
$ cat /dev/ttyS4
```

- Device node for NMEA streaming: Edge Gateway 3002

```
$ cat /dev/ttyS5
```



To access location service:

```
$ sudo locationd.monitor
Enabled position/heading/velocity updates...
Update(Position(lat: 26.9511 deg, lon: 155.087 deg, alt: n/a, hor.acc.: n/a, ver.acc.: n/a),
1489044234694526189)
Update(0.552 m s^-1, 1489044234695698701)
Update(Position(lat: 26.9477 deg, lon: 155.098 deg, alt: n/a, hor.acc.: n/a, ver.acc.: n/a),
1489044234718316599)
```

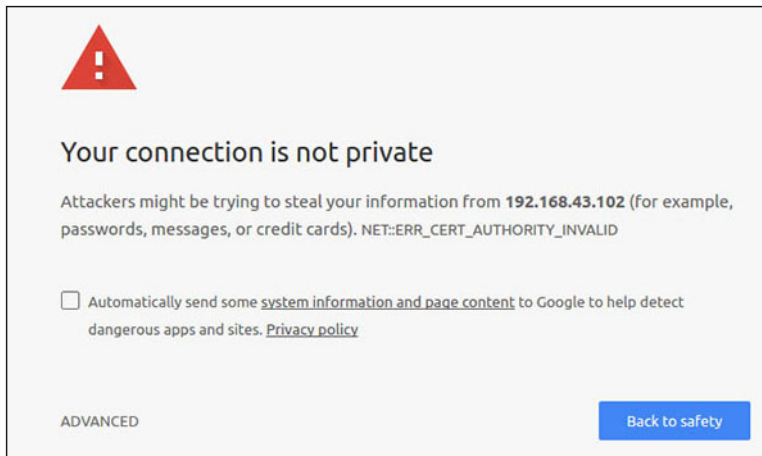
Snappy auto update/Autopilot

Snappy auto update is a feature which runs in the background, ensuring that your software always up-to-date. We recommend that you enable the feature by default. The settings can be adjusted in the Ubuntu Core.

 **NOTE:** For more information automatic updates, see <https://docs.ubuntu.com/core/en/reference/automatic-refreshes>.

Accessing Snappy Store/Snapweb

1. Enter `ip_address:4200` in a browser.



2. Select Advanced, then select proceed to the `ip_address(unsafe)`.
3. Using the default login of 'admin', keeping the password blank, open Terminal and ssh remote login

```
lo@lo-latitude-E7470:~$ ssh admin@10.101.46.209
admin@10.101.46.209's password:
```

4. While running `sudo snapweb.generate-token`, copy the token.

```
lo@lo-latitude-E7470:~$ ssh admin@10.101.46.209
admin@10.101.46.209's password:
Welcome to Ubuntu 16.04.1 LTS (GNU/Linux 4.4.0-45-generic x86_64)
```

```
* Documentation: https://help.ubuntu.com
* Management:   https://landscape.canonical.com
* Support:      https://ubuntu.com/advantage
```

Welcome to Snappy Ubuntu Core, a transactionally updated Ubuntu.

```
* See https://ubuntu.com/snappy
```

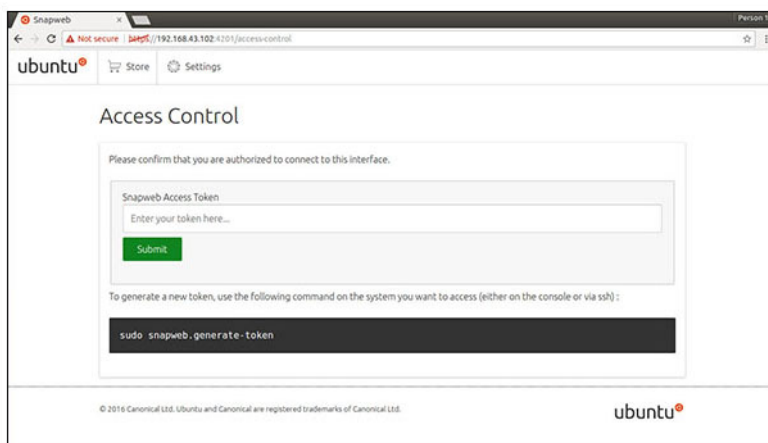
It's a brave new world here in Snappy Ubuntu Core! This machine does not use apt-get or deb packages. Please see 'snap --hwlp' for app installation and transactional updates.

```
Last login: Tue Nov 01:10:12 2016 from 10.101.46.187
Admin@localhost:~$ sudo snapweb.generate-toen
Snapweb Access Token:
```

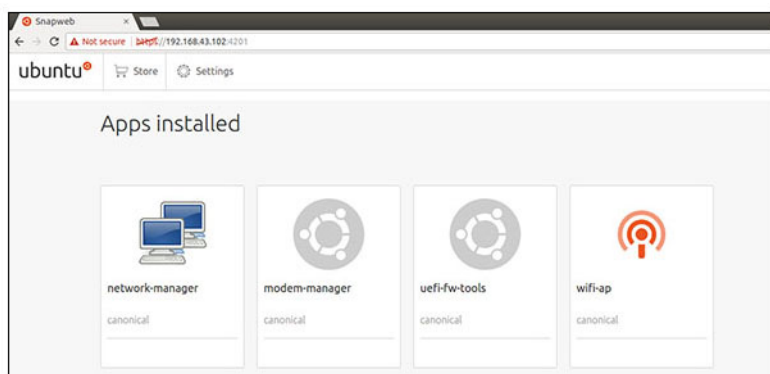
```
GtYaoevIodhTgHDyFWczWtYkEhDYROpX0pf27K62TtTOVooUwRuQ) IgBB7ECznCP
```


Use the above token in the Snapweb interface to be granted access.
admin@localhost:~\$

5. Paste the token on the web page and click Submit.



You can now access the snapweb.



CAN module—Edge Gateway 3002 only

NOTE: For information about using the CAN module, see the documentation available at www.atmel.com.

The Edge Gateway supports the CANbus model Atmel ATSAME70N19A-CNT. This feature is only supported if the hardware module is present, and the operating system provides the capability of mutual communication between user space application and physical module. If there is a specific CANbus programming requirement of user mode application, contact the hardware provider of that module for the API documentation.

To check if the CAN module is present:

```
for i in /dev/ttyACM*; do udevadm info $i | grep -q 03eb_2404_USB_CAN_FD && echo "path: /dev/${basename $i}"; done
```

Sensors

The sensors on the Edge Gateway provide measurements on pressure, relative humidity and temperature, and motion.

Table 19. Sensor types

Relative humidity and temperature sensor	ST Micro HTS221
Motion sensor—Accelerometer	ST Micro LNG2DMTR



Retrieve the raw data from the sensors by running the following commands. Then, apply the formula in the table to convert the data collected into measurements such as relative humidity and temperature.

Retrieving raw data from sensors

- To query sensor devices, run the command.

```
$ cat /sys/bus/iio/devices/iio:device*/name
```

hts221 <-- device0, Humidity and temp.

lmg2dm_accel <-- device1, G-sensor

lps22hb <-- device2, Pressure

- To retrieve data from the humidity and temperature sensor, run the command.

```
$ cat in_humidityrelative_offset
$ cat in_humidityrelative_raw
$ cat in_humidityrelative_scale
$ cat in_temp_offset
$ cat in_temp_raw
$ cat in_temp_scale
```

- To retrieve data from the motion sensor, run the command.

```
$ cat in_accel_scale_available
$ cat in_accel*_scale
$ cat in_accel*_raw
```

- To retrieve data from the pressure sensor, run the command.

```
$ cat in_pressure_raw
$ cat in_pressure_scale
```

Converting raw data for use

Apply the formula in the table to convert the raw data collected into usable measurements.

Table 20. Convert relative humidity and temperature sensor raw data

Relative humidity and temperature sensor ST Micro HTS221

$RH \text{ (in \%)} = (in_humidityrelative_raw + in_humidityrelative_offset) * in_humidityrelative_scale$

$Temperature \text{ (degC)} = (in_temp_raw + in_temp_offset) * in_temp_scale$

Table 21. Convert motion sensor raw data

Motion sensor—Accelerometer ST Micro LNG2DMTR

$accel_ \{x/y/z\} \text{ (m/s}^2\text{)} = in_accel_ \{x/y/z\}_raw * in_accel_ \{x/y/z\}_scale$

Table 22. Convert pressure sensor raw data

Pressure sensor ST Micro LPS22HB

$Pressure \text{ (hPa)} = in_pressure_raw * in_pressure_scale * 10$

$Temperature \text{ (m degC)} = in_temp_raw * in_temp_scale$

Ignition Pin

The ignition pin can be used to wake the system from S3, S4, and S5 power states. The user can use the operating system power management to configure S3, S4, and S5 power states and shutdown.



NOTE: For more information about configuring the ignition pin (using the `system.power-key-action` command), see <https://docs.ubuntu.com/core/en/reference/core-configuration>.

Specify the action to take when the power button is pressed.

Table 23. Values and configuration options for the ignition pin

<code>ignore</code>	Do nothing
<code>poweroff</code> (default)	Shut down the system
<code>reboot</code>	Reboot the system
<code>halt</code>	Halt the system
<code>kexec</code>	Direct-boot a new kernel
<code>suspend</code>	Suspend the system
<code>hibernate</code>	Hibernate the system
<code>hybrid-sleep</code>	Suspend to both disk and RAM
<code>lock</code>	Screen-lock all running sessions.

For example, to reboot the system when the power button is pressed, run the command:

```
$ snap set core system.power-key-action=reboot
```

System Power Management

Configuring low power states: S3 and S4

Configure sleep state–S3

```
$ sudo systemctl suspend
```

Configure hibernate state–S4

```
$ sudo systemctl hibernate
```

Rebooting or power off

To reboot the system

```
$ sudo reboot
```

To power off

```
$ sudo poweroff
```

Configuring system wake-up from LAN or WLAN

1. Enable **Wake on LAN** in the BIOS program. For more information on accessing the BIOS program, see [Accessing BIOS settings](#)
2. Connect the system to a wireless network.

```
$ sudo network-manager.nmcli dev wifi connect $SSID password $PSK ifname wlan0
```

3. Enable **Wake on LAN**.

```
$ sudo iw phy0 wowlan enable magic-packet
```

4. Recheck the support status.

```
$ sudo iw phy phy0 wowlan show
```

5. Make sure wlan0 is up and running with IP address.

6. Perform sleep.

```
$ sudo systemctl sleep
```

Or, perform hibernation.

```
$ sudo systemctl hibernate
```



7. Use another system to wake from wlan (Supported tools: wakeonlan, and etherwake).

```
$ sudo wakeonlan MAC  
$ sudo etherwake MAC
```

Restoring Ubuntu Core 16

When the operating system is restored to the factory image, all data on the system is deleted. You can restore Ubuntu Core 16 operating system to the factory image using one of the following methods:

- Restore Ubuntu Core 16 from USB flash drive
- Restore Ubuntu Core 16 from the recovery partition on the Edge Gateway
 - [Option 1: Restoring from the operating system](#)
 - [Option 2: Restoring during system POST](#)
 - [Option 3: Restoring from boot menu \(Edge Gateway 3003 only\)](#)

Restore Ubuntu Core 16 from USB flash drive

 **CAUTION:** These steps will delete all the data on your Edge Gateway.

Prerequisites

Create the recovery USB flash drive. For more information, see [Creating the recovery USB flash drive](#).

Procedure

 **NOTE:** For a video tutorial on how to restore Ubuntu Core 16 from a USB flash drive on the Edge Gateway 3003, click [here](#).

1. Insert the USB flash drive into the USB port on the Edge Gateway.
2. Power on the Edge Gateway.
3. The Edge Gateway boots through the USB flash drive and flashes the Ubuntu Core installation image into storage automatically.

 **NOTE:** When the installation images are being flashed to the storage, the Power LED is solid green and Cloud LED is blinking green.

4. The system powers off after the installation is complete.

 **NOTE:** The installation takes about 3 minutes to complete.

5. Remove the USB drive after the Edge Gateway powers off.
6. Power on the Edge Gateway again to continue the installation. The system reboots several times during the installation and takes about 10 minutes to complete.

Once installation is complete, a login screen is displayed.

 **NOTE:** On the Edge Gateway 3003, the login screen is displayed only if the display port is connected a monitor.

7. At the login screen, enter the default user name and password: admin.

The Edge Gateway is now ready for use.

 **NOTE:** For more information about accessing Ubuntu on the Edge Gateway remotely, see [Boot up and log in – Remote system configuration](#).

 **NOTE:** For more information about accessing Ubuntu on the Edge Gateway 3003 directly, see [Boot up and log in – Direct system configuration](#).

Restore Ubuntu Core 16 from the recovery partition on the Edge Gateway

Option 1: Restoring from the operating system

 **CAUTION:** These steps will delete all the data on your Edge Gateway

1. Connect the Edge Gateway remotely or through a KVM session.
2. Log in to the operating system.
3. Run the following command to trigger native eMMC recovery partition:

```
$ sudo efibootmgr -n $(efibootmgr | grep "factory_restore" | sed 's/Boot//g' | sed 's/[^0-9A-B]*//g') ; reboot
```

Option 2: Restoring during system POST

 **CAUTION:** These steps delete all the data on your Edge Gateway.

1. Connect a USB keyboard to the Edge Gateway.
2. Power on the Edge Gateway.
The Power LED turns solid green while the Cloud LED is off.
3. During the first 20 seconds after applying power, press **Ctrl+F** repeatedly to trigger the operating system recovery.
4. When the Cloud LED starts blinking green, continue with one of these options:

 **NOTE:** If the Cloud LED does not start blinking after 50 seconds, power off the Edge Gateway and repeat Steps 2 and 3.

Table 24. Start or cancel restoration during system POST

To start restoration

- Press **y**, then press **Enter**.

The Cloud LED changes to solid green indicating that recovery is in progress. Once restoration is complete, the Cloud LED turns off and the system reboots. The restoration takes about 2 minutes to complete.

To cancel restoration

- Press **n**, then press **Enter**. Or, if the system does not detect any key-press within 30 seconds.

The Cloud LED turns off, and the system reboots.

Option 3: Restoring from boot menu(Edge Gateway 3003 only)

 **CAUTION:** These steps will delete all the data on your Edge Gateway.

1. Connect a USB keyboard and display to the Edge Gateway.
2. Power on the Edge Gateway.
3. Press **F12** when the Dell logo is displayed on the screen to enter the boot menu.
4. Select **Factory Restore** from the boot menu.
5. When you receive the message **Factory Restore will delete all user data, are you sure? [Y/N]**, press **Y**.

Flashing a new OS image

Prerequisites

- A blank and FAT32-formatted USB flash drive with at least 4 GB of storage space
- Ubuntu Desktop ISO

 **NOTE:** You can download the latest version of the Ubuntu Desktop ISO file from <http://releases.ubuntu.com>.

- A released Ubuntu Core 16 image from Dell.com/support: <unique name-date> img.xz
- LCD monitor
- USB keyboard
- USB mouse
- DisplayPort cable
- Ubuntu workstation with Ubuntu Desktop 14.04 or higher



Flashing new Ubuntu OS image

1. Insert a USB flash drive into the Ubuntu Desktop workstation.
2. Copy `<unique name-date>img.xz` to `~/Downloads/` directory.
3. Flash the installation image to USB flash drive.
 - a. Start the **Terminal** application. It can be found by typing `Terminal` in the Unity Dash.



CAUTION: The `dd` command erases the content of the drive it writes to.

- b. Type the following command and press Enter.

```
xzcat <unique name-date>img.xz | sudo dd  
of=/dev/sda bs=32 ; sync
```



NOTE: The `sda` may have to be replaced with the actual name of the drive on the system.

4. Unmount and remove the USB flash drive.
5. Connect the power, keyboard, monitor, and Ethernet cable to your Edge Gateway.
6. Insert the USB flash drive into your Edge Gateway.
7. Power on and boot up the Edge Gateway from the USB flash drive.

The installation USB flash drive flashes the Ubuntu Core 16 installation image into storage automatically. After the installation is complete, the system shuts down.
8. Remove the USB flash drive.
9. Power on the system.

Ubuntu Core 16 is installed on your Edge Gateway.

Creating the recovery USB flash drive

Prerequisites:

- Service Tag of the Edge Gateway
 - A Windows computer with administrator rights and at least 8 GB of available storage space to download the Dell ISO recovery image
 - A blank USB flash drive with at least 8 GB of storage space. These steps delete all data on the USB flash drive.
 - .NET Framework 4.5.2 or higher
1. Download and save the Dell ISO recovery image file from:
 - For Windows: dell.com/support/home/us/en/19/drivers/osiso/win
 - For Ubuntu: dell.com/support/home/us/en/19/drivers/osiso/linux
 2. Download and install the **Dell OS Recovery Tool** on your computer.
 3. Launch the **Dell OS Recovery Tool**.
 4. Click **Yes** in the **User Account Control** prompt.
 5. Connect the USB flash drive to the computer.
 6. Click **Browse** and navigate to the location where the Dell ISO recovery image file is saved.
 7. Select the Dell ISO recovery image file and click **Open**.
 8. Click **Start** to begin creating the bootable USB recovery media.
 9. Click **Yes** to continue.
 10. Click **OK** to complete.

Accessing and updating BIOS

Accessing BIOS settings

Use Dell Command | Configure (DCC) to access BIOS settings

Dell Command | Configure (DCC) is a factory-installed application in the Edge Gateway that helps to configure the BIOS settings. It consists of a Command Line Interface (CLI) to configure various BIOS features. For more information about DCC, see www.dell.com/dellclientcommandsuitemanuals.

- On the connected computer running Windows, click **Start** → **All Programs** → **Command Configure** → **Dell Command | Configure Wizard**
- On the connected computer running Ubuntu Core, access **Dell Command | Configure** using the command `dcc.cctk`

For more information on how to use the Dell Command | Configure application, see the Dell Command | Configure *Installation Guide* and *User's Guide* at www.dell.com/dellclientcommandsuitemanuals.

For more information about BIOS settings on the Edge Gateway, see [Default BIOS settings](#)

Use Edge Device Manager (EDM) to access BIOS settings

Edge Device Manager (EDM) enables you to perform remote management and system configuration. By using the EDM cloud console, you can view and configure the BIOS settings. For more information about the EDM, see www.dell.com/support/home/us/en/19/product-support/product/wyse-cloud-client-manager/research.

Entering BIOS setup during POST

 **NOTE: These steps are applicable only to the Edge Gateway 3003.**

1. Connect a display, keyboard and mouse to the system.
2. Power on the Edge Gateway.
3. During POST, when the Dell logo is displayed, watch for the F2 prompt to appear, and then press **F2** immediately.

Updating BIOS

 **NOTE: Download the latest BIOS file from dell.com/support/home/us/en/19/product-support/product/dell-edge-gateway-3000-series/drivers/.**

Select one of these options to update the BIOS on the Edge Gateway.

- Option 1: [Using the USB invocation script](#)

 **NOTE: Dell recommends the use of the USB invocation script to update the BIOS.**

- (Edge Gateway 3003 only) Option 2: [Flashing the BIOS from a USB flash drive](#)
- Option 3: [Updating the BIOS on a Windows system](#)
- Option 4: [Using UEFI capsule update on an Ubuntu system](#)
- Option 5: [Dell Command | Configure \(DCC\)](#)



- Option 6: [Edge Device Manager \(EDM\)](#)

Option 1: Using the USB invocation script

The Edge Gateway 3000 Series come in headless configurations—that is, configurations without any video output. Certain basic system administration tasks traditionally accomplished by the BIOS Setup program are not possible without video. Hence, to perform these system administration tasks, Edge Gateways contain a facility for running an invocation script of BIOS commands from a USB flash drive.

For more information about USB invocation script, see the *Edge Gateway USB script utility User's Guide* at www.dell.com/support/home/us/en/19/product-support/product/dell-edge-gateway-3000-series/drivers/.

Option 2: Flashing the BIOS from a USB flash drive

 **NOTE: These steps are applicable only to the Edge Gateway 3003.**

Prerequisites

- BIOS file. Download the file from www.dell.com/support.
- A blank USB 2.0 or 3.0 USB flash drive with at least 4 GB of storage space.

Follow these steps to update the BIOS:

1. Power off the Edge Gateway.
2. Copy the BIOS update file to a USB flash drive.
3. Insert the USB flash drive in one of the available USB ports on the Edge Gateway.
4. Power on the Edge Gateway.
5. Press **F12** when the system is starting up to enter the one-time boot screen.
6. On the one-time boot screen, choose **Flash the BIOS**.
7. In the next screen, select the BIOS file on the USB flash drive.
8. Start the flash process.

Option 3: Updating the BIOS on a Windows system

Follow these steps to update the BIOS:

1. After connecting to the Edge Gateway.

 **NOTE: Connect and login to the Edge Gateway with one these options:**

- [Remote system configuration](#)
- [Direct system configuration](#) (only for Edge Gateway 3003)
- [Static IP system configuration](#) (only for Edge Gateway 3002 and 3003)

2. Go to www.dell.com/support.
3. Click **Product support**, enter the Service Tag of your system, and then click **Submit**.

 **NOTE: If you do not have the Service Tag, use the auto-detect feature or manually browse to your system model.**

4. Click **Drivers & downloads**.
5. Select the operating system installed on your system.
6. Scroll down the page and expand **BIOS**.
7. Click **Download** to download the latest version of the BIOS for your system.
8. After the download is complete, navigate to the folder where you saved the BIOS file.
9. Double-click the BIOS update file icon and follow the instructions on the screen.

Option 4: Using UEFI capsule update on an Ubuntu system

The `fwupdmgr` tool or commands are used to update the UEFI BIOS on the system. The UEFI BIOS for this platform is released through online Linux Vendor File System (LVFS) based methods

Dell recommends that you enable the UEFI Capsule update by default so that it is running in the background to keep the system BIOS up to date.

 **NOTE:** For more information about `fwupd` commands, see www.fwupd.org/users.

 **NOTE:** For more information about Ubuntu commands, see [Additional Ubuntu commands](#).

Without an internet connection

1. Download the latest .cab file from secure-lvfs.rhcloud.com/lvfs/devicelist.

2. Check the current BIOS details.

```
$ sudo uefi-fw-tools.fwupdmgr get-devices
```

3. Copy the **firmware.cab** file to `/root/snap/uefi-fw-tools/common/` folder.

```
$ sudo cp firmware.cab /root/snap/uefi-fw-tools/common/
```

4. Check the details of the BIOS from the .cab file.

```
$ sudo uefi-fw-tools.fwupdmgr get-details [Full path of firmware.cab]
```

5. Apply the update.

```
$ sudo uefi-fw-tools.fwupdmgr install [Full path of firmware.cab] -v
```

6. Restart the system.

```
$ sudo reboot
```

With an internet connection

1. Connect and login to the Edge Gateway.

 **NOTE:** Connect and login to the Edge Gateway with one these options:

- [Remote system configuration](#) (only for Edge Gateway 3001 and 3002)
- [Direct system configuration](#) (only for Edge Gateway 3003)
- [Static IP configuration](#) (only for Edge Gateway 3002 and 3003)

2. Check the current BIOS details.

```
$sudo uefi-fw-tools.fwupdmgr get-devices
```

3. Check if the update is available from LVFS service.

```
$sudo uefi-fw-tools.fwupdmgr refresh
```

4. Download the BIOS from the www.dell.com/support.

```
$sudo uefi-fw-tools.fwupdmgr get-updates
```

5. Apply the update.

```
$sudo uefi-fw-tools.fwupdmgr update -v
```

6. Restart the system.

```
$ sudo reboot
```

Option 5: Dell Command | Configure (DCC)

Use DCC to update and configure the BIOS settings.

For more information on how to use DCC, see the DCC *Installation Guide* and *User's Guide* at www.dell.com/dellclientcommandsuitemanuals.

For more information about BIOS settings on the Edge Gateway, see [Default BIOS settings](#).



Option 6: Edge Device Manager (EDM)

BIOS can be updated remotely through the EDM console connected to a remote system.

For more information about EDM, see www.dell.com/support/home/us/en/19/product-support/product/wyse-cloud-client-manager/research.

System configurations and specifications

Dimensions and weight

Product

Table 25. Product

Height	125 mm (4.92 in)
Width	125 mm (4.92 in)
Depth	51 mm (2 in)
Weight	1 kg (2.20 lb)
Volume	0.80 L

Packaging

 **NOTE:** The packaging weight includes the total weight of the Edge Gateway and four antennas. Antennas are available in the accessory box shipped with the Edge Gateway.

Table 26. Packaging

Height	262 mm (10.32 in)
Width	139 mm (5.47 in)
Depth	241 mm (9.49 in)
Shipping weight (includes packaging materials)	1.71 kg (3.77 lb)

Mounting dimensions

 **NOTE:** Mounting dimensions includes the dimensions of the Edge Gateway and various mounting options.

 **NOTE:** Each mounting option is sold separately.

Table 27. Mounting dimensions

	Standard mount	Quick mount	Quick mount and cable control bars	DIN mount	Perpendicular mount	Standard mount and cable control bars
Weight	1.23 kg (2.71 lb)	1.26 kg (2.78 lb)	1.55 kg (3.42 lb)	1.02 kg (2.25 lb)	1.10 kg (2.42 lb)	1.53 kg (3.37 lb)
Height	169.20 mm (6.66 in)	169.20 mm (6.66 in)	222.30 mm (8.75 in)	125 mm (4.92 in)	125 mm (4.92 in)	222.30 mm (8.75 in)
Width	167.20 mm	167.20 mm	273.30 mm	125 mm	143.50 mm	273.30 mm



	Standard mount	Quick mount	Quick mount and cable control bars	DIN mount	Perpendicular mount	Standard mount and cable control bars
	(6.58 in)	(6.58 in)	(10.76 in)	(4.92 in)	(5.65 in)	(10.76 in)
Depth	61.90 mm	64.60 mm	64.60 mm	59.20 mm	55.50 mm	61.90 mm
	(2.44 in)	(2.54 in)	(2.54 in)	(2.33 in)	(2.18 in)	(2.44 in)

VESA mounting dimensions

The Edge Gateway can be mounted on a standard VESA mount.

Table 28. VESA mounting dimensions

Height	75 mm (2.95 in)
Width	75 mm (2.95 in)

Environmental and operating conditions

Environmental conditions

Table 29. Environmental conditions

Ingress protection rating	IP50
Water and dust ingress	IEC 60529

 **CAUTION:** Install the Edge Gateway in an area that is not exposed to direct sunlight.

 **NOTE:** The Edge Gateway underwent and complies with salt fog testing conducted according to Mil-Std-810G Method 509.5, Procedure 1.

 **NOTE:** For outdoors and rugged environments, install the Edge Gateway in an external enclosure (sold separately).

Operating conditions

Table 30. Operating conditions

Maximum vibration

Operational	<ul style="list-style-type: none"> 5 Hz with 0.0002 G²/Hz 350 Hz with 0.0002 G²/Hz
-------------	--

 **NOTE:** Operational values are based on the 0.26 Grms profile. These values are tested for all operational orientations and are retrieved from two minutes per test orientation with IO meter.

 **NOTE:** All screws on the Edge Gateway are embedded with a Nylock seal to resist vibration and loosening.

Non-operational	<ul style="list-style-type: none"> 10 Hz with 0.003 G²/Hz 20 Hz with 0.01 G²/Hz 250 Hz with 0.01 G²/Hz
-----------------	--



NOTE: Non-operational values are based on the 1.54 Grms profile. These values are tested for all non-operational orientations and are retrieved every sixty minutes per test orientation with IO meter.

Long Life Vibration

0.79 Grms



NOTE: The values are tested for all operational orientations and are retrieved every five hours per test orientation with IO meter.

Maximum shock

Operational

Half sine shock

All operational orientations; 40 G \pm 5% with pulse duration of 2 msec \pm 10% (equivalent to 20 in/sec [51 cm/sec])

Non-operational

Half sine shock

Tested on all six sides; 160 G \pm 5% with pulse duration of 2 msec \pm 10% (equivalent to 50 in/sec [127 cm/sec])

Maximum altitude

Operational (maximum, unpressurized)

–15.20 m to 5,000 m (–50 ft to 16,404 ft)



NOTE: The maximum temperature is derated 1°C/305 m (1000 ft) above sea level altitude.

Non-operational (maximum, unpressurized)

–15.20 m to 10,668 m (–50 ft to 35,000 ft)

Operating environment

Temperature range (system)

- Operating (Edge Gateway 3001 and 3002):
 - With 0.7 m/s airflow: –30°C to 75°C (–22°F to 167°F)
 - Without airflow: –30°C to 70°C (–22°F to 158°F)
- Operating (Edge Gateway 3003):
 - With 0.7 m/s airflow: –30°C to 70°C (–22°F to 158°F)
 - Without airflow: –30°C to 60°C (–22°F to 140°F)
- Non-operating—With a maximum temperature gradation of 15°C (59°F) per hour:
 - With 0.7 m/s airflow: –40°C to 85°C (–40°F to 185°F)
 - Without airflow: –40°C to 85°C (–40°F to 185°F)



WARNING: The maximum operating temperature of the Edge Gateway 3001 and 3002 is 70°C (158°F). Do not exceed this maximum temperature while operating the Edge Gateway inside an enclosure. Internal heating of the Edge Gateway electronics, other electronics, and the lack of ventilation inside an enclosure can cause the operating temperature of the Edge Gateway to be greater than the outside ambient temperature. Continuous operation of the Edge Gateway at temperatures greater than 70°C (158°F) may result in an increased failure rate and a reduction of the product life. Ensure that the maximum operating temperature of the Edge Gateway when placed inside an enclosure is 70°C (158°F) or less.



WARNING: The maximum operating temperature of the Edge Gateway 3003 is 60°C (140°F). Do not exceed this maximum temperature while operating the Edge Gateway inside an enclosure. Internal heating of the Edge Gateway electronics, other electronics, and the lack of ventilation inside an enclosure can cause the operating temperature of the Edge Gateway to be greater than the outside ambient temperature. Continuous operation of the Edge Gateway at temperatures greater than 60°C (140°F) may result in an increased failure rate and a reduction of the product life. Ensure that the maximum operating temperature of the Edge Gateway when placed inside an enclosure is 60°C (140°F) or less.

Temperature range (with components)	<ul style="list-style-type: none"> Operating (SD card): –40°C to 85°C (–40°F to 185°F) Operating (eMMC): –40°C to 85°C (–40°F to 185°F)
Maximum relative humidity (non-condensing)	<ul style="list-style-type: none"> Operating: 10% to 90%–With a maximum temperature gradation of 15°C (59°F) per hour Non-operating: 5% to 95%–With a maximum temperature gradation of 20°C (68°F) per hour
Pollution degree	2



NOTE: The ambient temperature is based on the free-air environment, system mounting, and certain workload assumptions.



NOTE: An open space of 63.50 mm (2.50 in) is recommended around the Edge Gateway for optimal air circulation.



NOTE: The maximum operating temperature may vary, depending on factors such as air flow, system mounting, software applications, and so on.



NOTE: The temperature at the center of the exposed base surface must not exceed 82°C (179.6°F).



NOTE: For optimal thermal distribution when mounted, ensure that Edge Gateway is installed as instructed in the supplied documentation.

Power

Power source

The Edge Gateway supports the following power sources, which are isolated to 2.5 kV:

- DC
- Power over Ethernet (PoE)



CAUTION: Power off the Edge Gateway before you change the power source.



NOTE: For marine applications, limit input voltage to 12–48 VDC. The cable length for rail applications must not exceed 30 meters.



NOTE: You can connect either DC-IN or PoE.



NOTE: USB power is limited to 0.6 A/3 W for USB 3.0 port and 0.4 A/2 W for USB 2.0 port.

Table 31. Power consumption

Power consumption (applicable to power source from DC or PoE)	
Maximum power consumption	12.9 W
System idle	4.2 W

Power consumption (applicable to power source from DC or PoE)




	 NOTE: Operating system is active but no applications are running.
Processor full load	8.1 W
	 NOTE: Operating system active with 100% processor utilization and 2D/3D load.
System full load	12.9 W
	 NOTE: Operating system active with 100% processor utilization and simultaneous access to I/O devices.

Table 32. DC parameters




DC parameters	
Supported input voltage	12/24 V vehicle power system (12 V ~ 57 V wide DC input, ISO 7637-2 & SAE J1113 compliant).
	 NOTE: Supports vehicle cold-crank down to 6 V.
Rated DC input for marine environments	12–48 VDC
Maximum input current	1.08 A at 12 V/0.23 A at 57 V
Minimum DC supply power requirement	13 W
Power management	System power on, standby, and hibernate management through optional ignition input.
Supported wake up events	<ul style="list-style-type: none"> • Alarm (real-time clock) • WLAN and LAN (Windows OS only) • USB • Ignition and Direct Ignition (DI)
Power protection	System power protection. For example, vehicle battery protection through optional ignition input.
	 NOTE: Ignition input provides an option to turn off the device or put it into a low-power mode (depending on the OS), whenever the vehicle ignition is turned off to protect from vehicle battery draining.
Recommended power supply	17 W (20% derating)
	 NOTE: With consideration of voltage derating under high environmental temperature.

Table 33. PoE parameters

PoE parameters	
Compatibility	IEEE 802.3, IEEE 802.3u, IEEE802.3ab, IEEE802.3x, IEEE 802.3af

PoE parameters



NOTE: Compliance with Alternative A of IEEE 802.3af standard for maximum 15.4 W, with power up to 48 V over existing Ethernet infrastructure. No modifications are required. For a list of tested and approved PoE switches and injectors see Appendix: [Approved PoE injectors and switches](#).



NOTE: Standard IEEE 802.3 Ethernet interface provided for 100BASE-TX and 10BASE-T applications (802.3, 802.3u, 802.3ab, and 802.3x) 9014-bytes jumbo frame support.

Number of ports	One Fast Ethernet Media Access Control (MAC) port and one physical layer (PHY) port
Speed	10/100 Mbps (supports Wake on LAN and WLAN)
Connector	8-pin RJ45
Protection	Built-in 2.25 KV isolation protection on LAN ports and ESD IEC61000-4-2 ±30 KV
Power input	12.95 W minimum according to Alternative A of IEEE 802.3af-2003 (standard)
Supported input voltage	48 V DC
Supported input current	0.27 A

Ignition

Table 34. Ignition parameters

Parameter	Minimum voltage	Maximum voltage	Default
High-level input voltage (V_{IH})	9 V	32 V	12 V
Low-level input voltage (V_{IL})	0 V	1.2 V	0 V

3 V CMOS coin-cell battery

Table 35. Coin-cell battery

RTC coin-cell battery (lithium-ion)	
Type	BR-2032
Manufacturer	Panasonic Corporation
Nominal voltage	3 V
Nominal capacity	200 mAh



NOTE: Dell recommends that you check or replace the coin-cell battery before operation. Also, check or replace the coin-cell battery if the system has been disconnected from a power source for more than two years.

Operating systems

The Edge Gateway supports the following operating systems:

- Windows 10 IoT Enterprise LTSC 2016
- Ubuntu Core 16

 **NOTE: Windows 10 IoT Enterprise LTSC 2016 is supported only on Edge Gateway models with 32 GB eMMC.**

Processor

Table 36. Processor

Configuration	Processor	Cache	Number of Cores
Edge Gateway 3001	Intel Atom Processor E3805	1 MB L2 cache	2
Edge Gateway 3002	Intel Atom Processor E3805	1 MB L2 cache	2
Edge Gateway 3003	Intel Atom Processor E3815	512 KB L2 cache	1

Memory

Table 37. Memory type

Type	DDR3L
Memory channel	Single
Minimum memory	2 GB
Maximum system memory	2 GB

Storage

Table 38. Storage specifications

Storage type	Capacity supported
micro-SD	<ul style="list-style-type: none"> • 8 GB • 32 GB • 64 GB • 128 GB
eMMC (Edge Gateway 3001, 3002, and 3003)	<ul style="list-style-type: none"> • 8 GB • 32 GB

 **NOTE: Windows 10 IoT Enterprise LTSC 2016 is supported only on Edge Gateway models with 32 GB eMMC.**

Audio and video

Audio

Table 39. Audio specifications

Controller	Realtek ALC3277
Line-out	3.5 mm jack - Green
Line-in	3.5 mm jack - Blue



DisplayPort 1.1

DisplayPort 1.1 supports a maximum resolution of 2560 x 1440. It provides connection to VGA, DVI, HDMI monitor through DisplayPort to VGA adapter cable, to DVI adapter cable, and to HDMI adapter cable. It does not support daisy chain connection configurations.

Table 40. DisplayPort specifications

Operating temperature range	-40°C to 105°C (40°F to 221°F)
Applied voltage	40 V AC
Manufacturer part number	JYEC DP0006B-C201-20J201B http://www.jack-jyec.com



NOTE: This part number is for reference only and is subjected to change.

Graphics and video controller

Table 41. Graphics and video controller specifications

Controller	7 th Generation Intel HD Graphics
Speed	400 MHz



NOTE: The graphics and video controller is supported only on Edge Gateway 3003.

External ports and connectors





NOTE: For more information about ports and connectors locations, see the [System Views](#).

Table 42. Ports and connectors on Edge Gateway

Ports	Edge Gateway 3001	Edge Gateway 3002	Edge Gateway 3003
RS-232/RS-485/RS-422 ports	2	0	0
Audio line-out	0	0	1
Audio line-in	0	0	1
Ethernet port one (with PoE)	1	1	1
Ethernet port two (without PoE)	0	1	1
WLAN or Bluetooth antenna connector	1	1	1
GPS antenna connector	1	1	1
Mobile broadband antenna connector (3G)	1	1	1
Mobile broadband antenna connector (4G LTE)	1	1	1
ZigBee antenna connector	0	1	0
Intrusion switch (optional)	1	1	1
DisplayPort	0	0	1

Ports	Edge Gateway 3001	Edge Gateway 3002	Edge Gateway 3003
GPIO	1	0	0
USB 3.0	1	1	1
USB 2.0	1	1	1
CANbus	0	1	0



NOTE: The connector for wireless antenna () and GPS antenna () is the same.

Communications

Wireless LAN

Table 43. Wireless LAN specifications

WLAN standards supported	802.11b, 802.11g or 802.11n
802.11b data rates supported	54, 48, 36, 24, 18, 12, 9, and 6 Mbps
802.11g data rates supported	54, 48, 36, 24, 18, 12, 11, 9, 6, 5.5, 2, and 1 Mbps
802.11n data rates supported	MCS0 to MCS7 with and without Short GI.
Encryption	WEP 64-bit and 128-bit, TKIP, AES-CCMP 128-bit

Wireless WAN

Table 44. Wireless WAN specifications

Card	Region
DW5515—3G	Mexico and rest of the world
DW5815—4G LTE	AT&T (US and Canada) and Verizon (US)
DW5818—LTE, HSPA+	EMEA
DW5819—LTE, HSPA+	Asia Pacific

DW5515 specifications

Table 45. DW5515 card specifications

Network	HSPA+/WCMDA
Frequency bands	<ul style="list-style-type: none"> HSPA+/WCMDA band: 1, 2, 5, 6, 8, 19 EDGE/GPRS frequency: 850, 900, 1800, 1900 MHz
Speed—Downlink	< 21 Mbps
Speed—Uplink	< 5.76 Mbps
Fallback network	EDGE/GPRS
Fallback speed	<ul style="list-style-type: none"> Downlink: < 236.8 Kbps Uplink: < 118.4 Kbps
SIM	All



DW5815 specifications

Table 46. DW5815 card specifications

Network	LTE/HSPA+
Frequency bands	<ul style="list-style-type: none">• LTE band: 2, 4, 5, 13, 17• HSPA+/WCDMA band: 2, 5
Speed—Downlink	< 150 Mbps
Speed—Uplink	< 50 Mbps
Fallback network	HSPA+/WCDMA
Fallback speed	<ul style="list-style-type: none">• Downlink: < 42 Mbps• Uplink: < 5.76 Mbps
SIM	AT&T and Verizon

DW5818 specifications

Table 47. DW5818 card specifications

Network	LTE/HSPA+
Frequency bands	<ul style="list-style-type: none">• LTE FDD Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 20, 25, 26, 29, 30• LTE TDD Band 41• HSPA+/WCDMA Band 1, 2, 3, 4, 5, 8
Speed (Downlink)	<ul style="list-style-type: none">• LTE FDD < 300 Mbps (Cat 6)• LTE TDD < 222 Mbps
Speed (Uplink)	<ul style="list-style-type: none">• LTE FDD < 50 Mbps• LTE TDD < 26 Mbps
Fallback network	HSPA+/WCDMA
Fallback speed	<ul style="list-style-type: none">• Downlink: < 42 Mbps• Uplink: < 5.76 Mbps
SIM	All

DW5819 specifications

Table 48. DW5819 card specifications

Network	LTE/HSPA+
Frequency bands	<ul style="list-style-type: none">• LTE FDD Band 1, 3, 5, 7, 8, 18, 19, 21, 28• LTE TDD Band 38, 39, 40, 41• HSPA+/WCDMA Band 1, 5, 6, 8, 9, 19
Speed—Downlink	<ul style="list-style-type: none">• LTE FDD < 300 Mbps (Cat 6)• LTE TDD < 222 Mbps
Speed—Uplink	<ul style="list-style-type: none">• LTE FDD < 50 Mbps• LTE TDD < 26 Mbps
Fallback network	HSPA+/WCDMA

Fallback speed

- Downlink: < 42 Mbps
- Uplink: < 5.76 Mbps

SIM

All

WWAN providers and options


 **NOTE:** Depending on the network coverage available, the Edge Gateway selects the most optimal configuration and automatically switches between LTE and 3G networks. Measurements from network-signaling messages between the Edge Gateway and the WWAN provider determine the switch-over process.

Table 49. WWAN providers and options for Edge Gateway 3000 series

WWAN card	Provider	2G bands	3G bands	LTE bands
DW5515 Sierra Wireless AirPrime HL8548	HSPA+	EDGE/GPRS frequency: 850, 900, 1800, 1900 Mhz	HSPA B1, B2, B5, B6, B8, B19	Not supported
DW5815 Sierra Wireless AirPrime HL7588	AT&T (US) and Verizon (US)	Not applicable	B5 (850), B2 (1900)	B17 (700), B13 (700), B5 (850), B4 (1700), B2 (1900)
DW5818 Sierra Wireless AirPrime MC7455	LTE/HSPA+/WCDMA networks	Not applicable	HSPA+/WCDMA Band 1, 2, 3, 4, 5, 8	LTE FDD Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 20, 25, 26, 29, 30 LTE TDD Band 41
DW5819 Sierra Wireless AirPrime MC7430	LTE/HSPA+/WCDMA networks	Not applicable	HSPA+/WCDMA Band 1, 5, 6, 8, 9, 19	LTE FDD Band 1, 3, 5, 7, 8, 18, 19, 21, 28 LTE TDD Band 38, 39, 40, 41

Global Navigation Satellite System (GNSS)

Table 50. GNSS specifications

GNSS chip in Edge Gateway	Supported GNSS systems
u-blox UBX-M8030	Concurrent reception of up to three GNSS systems: GPS (Global Positioning System)/Galileo with Beidou or GLONASS.

Table 51. Supported GNSS constellations

GNSS constellation	Details
GPS	Receives and tracks GPS L1 C/A signals at 1575.42 MHz.
GLONASS	Receives and tracks GLONASS L1 signals at 1602 MHz + $k \cdot 562.5$ kHz, where k is the satellite's frequency channel number ($k = -7, \dots, 5, 6$). The GLONASS satellite system is an alternative to GPS.
BeiDou	Receives and tracks BeiDou B1I signals at 1561.098 MHz. The ability to receive and track BeiDou signals with another constellation, results in higher coverage, improved reliability and better accuracy. BeiDou coverage is only available in China, with global coverage scheduled for 2020.



GNSS constellation	Details
Galileo	Receives and tracks Galileo E1-B/C signals centered on the GPS L1 frequency band. GPS and Galileo signals can be processed with either BeiDou or GLONASS signals, enhancing coverage, reliability and accuracy.

Antenna specifications

The Edge Gateway is professionally-installed equipment. The Radio Frequency (RF) output power does not exceed the maximum limit allowed in the country of operation.



CAUTION: Unauthorized antennas, modifications, or attachments may damage the device and potentially violate international regulations.



NOTE: Use only the supplied or an approved replacement antenna.



NOTE: Modifications to the device or use of unauthorized antennas not expressly approved by Dell is the sole responsibility of the user, configurator or operator, who must reassess the equipment in accordance to all applicable international Safety, EMC, and RF standards.

The Dell-authorized antenna specifications are as follows:

- Mobile Broadband
 - Main: Dipole
 - LTE Auxiliary: PIFA
- GPS/WLAN/Zigbee: Monopole

The following tables provide the gain specifications for different antenna positions.

Table 52. Mobile broadband main antenna maximum gain (dBi)

Frequency (MHz)	Antenna position—Bent		Antenna position—Straight	
	3G (dBi)	4G (dBi)	3G (dBi)	4G (dBi)
704~806	Not applicable	2	Not applicable	1.7
824~894	1	1.4	2.1	2.1
880~960	0.5	1.4	1.4	1.5
1710~1880	3.2	4.2	1.9	3
1850~1990	3.9	4.3	3.2	3.4
1920~2170	4	4.4	3.2	3.4

Table 53. Mobile broadband main antenna maximum gain (dBi)

Frequency (MHz)	Antenna position—Bent		Antenna position—Straight	
	3G (dBi)	4G (dBi)	3G (dBi)	4G (dBi)
704~806	Not applicable	2.6	Not applicable	2.9
824~894	1.2	1.6	2.8	2.6
880~960	0.9	1.6	2.0	1.9

Frequency (MHz)	Antenna position—Bent		Antenna position—Straight	
	3G (dBi)	4G (dBi)	3G (dBi)	4G (dBi)
1710~1880	2.4	3.8	1.7	3.0
1850~1990	3.1	3.8	3.3	3.2
1920~2170	3.4	3.9	3.3	3.2

Table 54. Mobile broadband auxiliary antenna maximum gain (dBi)

Frequency (MHz)	Antenna position—Bent	Antenna position—Straight
	4G (dBi)	4G (dBi)
704~806	0.6	1.9
824~894	-0.3	-0.1
880~960	-1.9	-2.5
1710~1880	2.3	2.0
1850~1990	3.6	3.2
1920~2170	3.6	3.2

Table 55. Mobile broadband auxiliary antenna maximum gain (dBi)

Frequency (MHz)	Antenna position—Bent	Antenna position—Straight
	4G (dBi)	4G (dBi)
704~806	0.2	1.9
824~894	-0.8	-0.1
880~960	-0.6	-2.5
1710~1880	4.2	2.0
1850~1990	5.4	3.2
1920~2170	5.4	3.2

Table 56. WLAN/GPS antenna maximum gain (dBi)

Frequency (MHz)	Antenna position—Bent		Antenna position—Straight	
	GPS (dBi)	WLAN (dBi)	GPS (dBi)	WLAN (dBi)
1561~1602	2.6	Not applicable	2.4	Not applicable
2400~2500	Not applicable	3.4	Not applicable	1.6



Table 57. WLAN/GPS antenna maximum gain (dBi)

Frequency (MHz)	Antenna position—Bent		Antenna position—Straight	
	GPS (dBi)	WLAN (dBi)	GPS (dBi)	WLAN (dBi)
1561~1602	3.9	Not applicable	3.4	Not applicable
2400~2500	Not applicable	2.7	Not applicable	1.3

Table 58. ZigBee antenna maximum gain (dBi)

Frequency (MHz)	Antenna position—Bent	Antenna position—Straight
	ZigBee (dBi)	ZigBee (dBi)
2400~2500	0.4	1.7

Bluetooth

Table 59. Bluetooth specifications

Bluetooth standard supported	Dual-mode Bluetooth 4.0 BLE
Bluetooth Classic	Version 2.1+EDR
Bluetooth data rates supported	Up to 3 Mbps
Bluetooth Low Energy	Yes
Encryption	128-bit

COM ports

Table 60. COM ports specifications

Connector type	2x5 terminal block
Data rate	<ul style="list-style-type: none"> Up to 1 Mbps in RS-232 12 Mbps in RS-422/RS-485

RS-232/RS-422/RS-485

Table 61. RS-232/RS-422/RS-485 specifications

General

Bus type	USB 2.0
Connectors	2 x 2x5 terminal blocks (JVE/ 23N6963-10D00B-15G-2.9)
Power consumption	20 mA at +3.3 V

Communications

Communication controller	XR21V1412 (controller), SP339E (transceiver)
Data bits	7, 8, 9
Data signals	<ul style="list-style-type: none"> RS-232: DCD, RXD TXD, DTR, GND, DSR, RTS, CTS, RI RS-422: TXD+, TXD-, RXD+, RXD-, GND RS-485: Data+, Data-, GND

FIFO	<ul style="list-style-type: none"> • 128 bytes (TX) • 384 bytes (RX)
Flow control	Hardware (RTS/CTS or DTR/DSR), Software (Xon/Xoff)
Parity	None, Odd, Even, Mark, and Space
Speed/Baudrate	<ul style="list-style-type: none"> • Up to 1 Mbps in RS-232 • 12 Mbps in RS-422/RS-485
Stop bits	1, 2

Protection

Isolation protection	Not applicable
ESD protection	Transceiver 6100-4-2 ± 15 KV (Air), ±8 KV (Contact)
EFT protection	Not applicable
Surge protection	Not applicable

GPIO

Table 62. General information


Connector part number	Anytek KE161351A010G http://www.anytek.com.tw
	 NOTE: This part number is for reference only and is subjected to change.
Temperature range	–40°C to 115°C (–40°F to 239°F)

Table 63. GPI configuration

GPI configuration	
Logic high	3.5 V to 5 V
Logic low	0 V to 1.5 V
Input resistance	1 k between connector and controller
Interrupt source	Not applicable
Isolation voltage	1 KV DC, controller to rest of system

Table 64. GPO configuration

GPO configuration	
Output	Open-drain or push-pull
	1.6 mA per channel
Supply voltage	5 VDC
Isolation voltage	1 KV DC, controller to rest of system
	No Vdd pin on connector

Table 65. GPIO specifications

Name	Default setting	Default internal Pull-up and Pull-down
GPIO~7	85 K pull-down	Not applicable
GPO0~7	85 K pull-down	Not applicable Open-drain or push-pull output pin

Table 66. GPIO electrical specifications

Voltage/Current	Minimum	Maximum
Input low voltage (V_{il})		1.5 V
Input high voltage (V_{ih})	3.5 V	
Output low voltage (V_{ol})		0.4 V
Output high voltage (V_{oh})	4.8 V	
Output sink/source current		1.6 mA

 **CAUTION:** This port is ESD-sensitive. An insulated GPIO connector that prevents direct ESD exposure to the I/O pins is recommended.

CANbus

Table 67. CANbus specifications

General	Bus type/Card interface	USB
	Connector	3-pin terminal block Molex 39532-6503
	Power consumption	162 mA at 3.3 V (controller), 70 mA at 5 V, and 5.6 mA at 3.3 V (transceiver)
Communications	CAN controller	Atmel ATSAME70N19A-CNT
	CAN transceiver	NXP TJA1052i
	Protocol	CAN2.0 A/B/FD
	Speed	Up to 1 Mbps (CAN 2.0), 2 Mbps (CAN-FD)
	Signal support	CAN_H, CAN_L, GND
Protection	Galvanic Isolation	2.5 KV
	ESD	Transceiver IEC-61000-4-2 ± 8KV

Security

Table 68. Security specifications

Version	2.0 only
Manufacturer part number	Nuvoton NPCT654JBAYX
External enclosure chassis intrusion switch	When the chassis is opened, the external enclosure chassis intrusion switch raises an intruder electrical signal to the gateway, triggering an external enclosure chassis intrusion event.

 **NOTE:** Depending on your country's regulations, TPM system boards may not be available.

Environmental compliance

Table 69. Environmental compliance

BFR/PVC-free	No
--------------	----

Sensors

Pressure sensor

Table 70. Pressure sensor specifications

Controller	ST Micro LPS22HB
Temperature range	-40°C to 85°C (-40°F to 185°F)

Relative humidity and temperature sensor

Table 71. Relative humidity and temperature sensor specifications

Controller	ST Micro HTS221
Temperature range	-40°C to 120°C (-40°F to 248°F)
Humidity accuracy	± 3.5% rH, 20 to 80% rH
Temperature accuracy	± 0.5°C, 15 to 40°C

Accelerometer


Table 72. Accelerometer specifications

Controller	ST Micro LNG2DMTR
Type	Three-axis "fermo" accelerometer

Ignition Pin

Table 73. Ignition Pin Specifications

Temperature range	-40°C to 115°C (-40°F to 239°F)
Voltage rating	300 V
Current rating	8 A
Withstanding Voltage	1.6 KV
Manufacturer part number	Anytek VE0332010010G http://www.anytek.com.tw

 **NOTE:** This part number is for reference only and is subjected to change.

The ignition pin can be used to wake the system from S3–Sleep, S4–Hibernate, and S5–Soft Off power states. The user can use the OS power management system to configure S3, S4, and S5 power states and shutdown.

Software

The following software is supported in the Edge Gateway 3000 Series:

- Dell Command | Configure (DCC)
- Dell Command | Monitor (DCM)
- Dell Command | Powershell (DCPP)—For Windows only
- Edge Device Management (EDM)
- Support Assist (includes Dell Data Vault (DDV))

Service and support

Table 74. Service and support

One year base hardware warranty, with mail-in service.	Included
Basic extensions up to five years, with mail-in service.	Available
ProSupport extensions up to five years, with advanced exchange.	Available

 **NOTE:** For a copy of our guarantees or limited warranties, write to ‘Dell USA L.P., Attn: Warranties, One Dell Way, Round Rock, TX 78682’. For more information, visit www.dell.com/warranty.

Detailed engineering specifications

Component types

Table 75. Edge Gateway components

Component	Edge Gateway (3001)	Edge Gateway (3002)	Edge Gateway (3003)
CPU	Intel Baytrail I 3805	Intel Baytrail I 3805	Intel Baytrail I 3815 (with GPU)
DDR3L 2 GB	Yes	Yes	Yes
eMMC	8 GB or 32 GB	8 GB or 32 GB	8 GB or 32 GB
WLAN	Yes	Yes	Yes
BTLE	Yes	Yes	Yes
Discrete GPS	Yes	Yes	Yes
ZigBee (SMT)	No	Yes	No
CAN Bus (SMT)	No	Yes	No
TPM	2	2	2
micro-SD card slot	Yes	Yes	Yes
micro-SD (supported capacities)	8 GB, 16 GB, 32 GB or 64 GB	8 GB, 16 GB, 32 GB or 64 GB	8 GB, 16 GB, 32 GB or 64 GB
micro-SIM card slot	Optional	Yes	Optional
WWAN connector	Optional	Yes	Optional
DP connector	No	No	Yes
Audio codec I/C	No	No	Yes
Audio in/out connector	No	No	Yes
GPIO connector	Yes	No	No
Serial connector	Yes	No	No
RJ45 connector	1	2	2
USB connector	1 x USB 2.0 1 x USB 3.0	1 x USB 2.0 1 x USB 3.0	1 x USB 2.0 1 x USB 3.0



Component	Edge Gateway (3001)	Edge Gateway (3002)	Edge Gateway (3003)
Intrusion switch input	Yes	Yes	Yes
PCB	PCB Type 3	PCB Type 3	PCB Type 3
3-Pin Phoenix-type connector	Yes	Yes	Yes

Communications—Ethernet

Table 76. Ethernet general specifications

General specifications	
Ethernet type	Ethernet LAN 10/100
External connector type	RJ45
Data rates supported	10/100 Mbps

Table 77. Ethernet controller details

Controller details	
Controller bus architecture	PCI express base specification (revision 1.1)
Integrated memory	Yes
Data transfer mode (example: Bus-master DMA)	Yes
Power consumption (full operation per data rate connection speed)	224 mW (maximum)
Power consumption (standby operation)	135 mW (maximum)
IEEE standards compliance	802.3
Hardware certifications	n/a
Boot ROM support	EEPROM (located in SPI)

Table 78. Ethernet network transfer mode

Network transfer mode	
Network transfer rate	10 Mb (full/half-duplex)
	100 Mb (full/half-duplex)

Table 79. Ethernet Environmental

Environmental	
Operating temperature	0°C to 85°C (32°F to 185°F)
Operating humidity	20% to 80% (non-condensing)
Operating system driver support	<ul style="list-style-type: none"> Windows 10 IoT Enterprise LTSC 2016 Ubuntu Core 16

Environmental

Manageability	WOL, PXE 2.1
Management capabilities alerting	Intel standard

Communications—Wireless WAN


 **NOTE:** For more information on the certification of WWAN cards for each region, see *Dell Edge Gateway CSTL Regulatory and Certification Matrix* on SalesEdge.

Table 80. Wireless WAN specifications

Card	Region
DW5515—3G	Mexico and rest of the world
DW5815—4G LTE	AT&T (US and Canada) and Verizon (US)
DW5818—LTE, HSPA+	EMEA
DW5819—LTE, HSPA+	Asia Pacific

DW5515 specifications

Table 81. DW5515 card specifications

Model	Sierra MC-HL 8548
Chipset	Intel XMM6265
Firmware	Generic GCF
Network	HSPA+/WCMDA
Frequency bands	<ul style="list-style-type: none">• HSPA+/WCMDA band: 1, 2, 5, 6, 8, 19• EDGE/GPRS frequency: 850, 900, 1800, 1900 MHz
Speed (Downlink)	< 21 Mbps
Speed (Uplink)	< 5.76 Mbps
Fallback network	EDGE/GPRS
Fallback speed	<ul style="list-style-type: none">• Downlink: < 236.8 Kbps• Uplink: < 118.4 Kbps
SIM	All
Antenna	Main (Tx/Rx) + Aux (Rx)
Operating system support	Ubuntu, Windows 10
Host Interface	USB 2.0

DW5815 specifications

Table 82. DW5815 card specifications

Model	Sierra MC HL7588
Chipset	Intel XMM7160
Firmware	AT&T, Verizon



Network	LTE/HSPA+
Frequency bands	<ul style="list-style-type: none"> • LTE band: 2, 4, 5, 13, 17 • HSPA+/WCDMA band: 2, 5
Speed (Downlink)	< 150 Mbps
Speed (Uplink)	< 50 Mbps
Fallback network	HSPA+/WCDMA
Fallback speed	<ul style="list-style-type: none"> • Downlink: < 42 Mbps • Uplink: < 5.76 Mbps
SIM	AT&T and Verizon
Antenna	Main (Tx/Rx) + Aux (Rx)
Operating system support	Ubuntu, Windows 10
Host Interface	USB 2.0

DW5818 specifications

Table 83. DW5818 card specifications

Model	Sierra Wireless AirPrime MC7455
Chipset	Qualcomm MDM 9x30
Network	LTE/HSPA+
Frequency bands	<ul style="list-style-type: none"> • LTE FDD Band 1, 2, 3, 4, 5, 7, 8, 12, 13, 20, 25, 26, 29, 30 • LTE TDD Band 41 • HSPA+/WCDMA Band 1, 2, 3, 4, 5, 8
Speed (Downlink)	<ul style="list-style-type: none"> • LTE FDD < 300 Mbps (Cat 6) • LTE TDD < 222 Mbps
Speed (Uplink)	<ul style="list-style-type: none"> • LTE FDD < 50 Mbps • LTE TDD < 26 Mbps
Fallback network	HSPA+/WCDMA
Fallback speed	<ul style="list-style-type: none"> • Downlink: < 42 Mbps • Uplink: < 5.76 Mbps
SIM	US and EMEA regions
Antenna	Main (Tx/Rx) + Aux (Rx)
Operating system support	Ubuntu, Windows 10
Host Interface	USB 2.0/3.0

DW5819 specifications

Table 84. DW5819 card specifications

Model	Sierra Wireless AirPrime MC7430
Chipset	Qualcomm MDM 9x30

Network	LTE/HSPA+
Frequency bands	<ul style="list-style-type: none"> • LTE FDD Band 1, 3, 5, 7, 8, 18, 19, 21, 28 • LTE TDD Band 38, 39, 40, 41 • HSPA+/WCDMA Band 1, 5, 6, 8, 9, 19
Speed (Downlink)	<ul style="list-style-type: none"> • LTE FDD < 300 Mbps (Cat 6) • LTE TDD < 222 Mbps
Speed (Uplink)	<ul style="list-style-type: none"> • LTE FDD < 50 Mbps • LTE TDD < 26 Mbps
Fallback network	HSPA+/WCDMA
Fallback speed	<ul style="list-style-type: none"> • Downlink: < 42 Mbps • Uplink: < 5.76 Mbps
SIM	Asia-Pacific region
Antenna	Main (Tx/Rx) + Aux (Rx)
Operating system support	Ubuntu, Windows 10
Host Interface	USB 2.0/3.0

Communications—Wireless LAN

Table 85. Wireless LAN general specifications

General specifications	
Wireless LAN type	Redpine Signals RS9113

Table 86. Wireless LAN controller specifications

Controller specifications	
Controller Bus architecture	SDIO® 2.0 High-Speed bus interface
WLAN standards supported	802.11b, 802.11g or 802.11n
802.11b data rates supported	54, 48, 36, 24, 18, 12, 9, and 6 Mbps
802.11g data rates supported	54, 48, 36, 24, 18, 12, 11, 9, 6, 5.5, 2, and 1 Mbps
802.11n data rates supported	MCS0 to MCS7 with and without Short GI
Encryption	WEP 64-bit and 128-bit, TKIP, AES-CCMP 128-bit
Bluetooth standards supported	Bluetooth 4.0
Operating temperature	–40°C to 80°C
Operating system driver support	Ubuntu Core 16, Windows 10 IOT Enterprise 2016 LTSB (64-bit)

Communications—ZigBee

Embedded ZigBee Module Support (Silicon Labs ETRX3587HR)

The Edge Gateway 3002 includes a Silicon Labs ETRX3587HR ZigBee module within the platform.

The module supports the ZigBee protocol stack architecture from Silicon Labs, also known as NCP (Network Co-Processor) mode.



In NCP mode, the application layer of the protocol stack executes at the Operating System (OS) layer. The application layer interfaces with other layers of the ZigBee protocol stack, which are supported at the firmware-level on the ETRX3587HR module.

The Edge Gateway OS image does not include this application layer software; the ZigBee module includes the firmware component, which supports other layers of the NCP architecture.

 **NOTE:** Users developing the ZigBee application layer stack can obtain the SDK (Software Development Kit) and supporting reference documentation from [Silicon Labs](#).

 **NOTE:** Detailed specifications for ZigBee antennas are available in [Communications-Antennas](#).

International regulatory compliance regulations for ZigBee antennas

To comply with international regulatory compliance regulations, both the maximum RF output power and the maximum antenna gain, including cable loss for this radio device, must not exceed the specified limits provided in Table 1 below.

Table 87. Maximum limits for ZigBee antennas

Channels		18-11	19-24	25	26
Dipole antenna type	Max. gain (dBi)	0.1	0.1	0.1	0.1
	Max. gain (EIRP)	0.1	0.1	0.1	0.1
Max. transmit output power (dBm)	Boost mode	7	7	7	0
	Normal mode	0	0	0	0

Failure to abide by these specified parameters will result in unauthorized use. In the event that these parameters are changed for any reason, the operator will be fully responsible to pursue a reassessment of the device according to international regulatory compliance requirements.

Communications—Antennas

Table 88. Antenna supplier: Taoglas



Antenna model number	Connected to
Taoglas TS.07	Wireless LAN/Bluetooth/GPS port
 NOTE: The WLAN/GPS/Bluetooth antenna is a passive antenna, not active. It does not have a bias-circuit for DC input.	
Taoglas TG.30	Mobile broadband antenna port one (3G/LTE)
Taoglas GW.15	ZigBee antenna port (Edge Gateway 3002 only)
Taoglas TG.10	Mobile broadband antenna port two (LTE only)

Table 89. Antenna supplier: Hongbo

Antenna type	Connected to
Hongbo E46WD	Wireless LAN/Bluetooth/GPS port
 NOTE: The WLAN/GPS/Bluetooth antenna is a passive antenna, not active. It does not have a bias-circuit for DC input.	
Hongbo JYDK0	Mobile broadband antenna port one (3G/LTE)
Hongbo G9HPD	ZigBee antenna port (Edge Gateway 3002 only)

Antenna type	Connected to
Hongbo M9RV9	Mobile broadband antenna port two (LTE only)

Antennas—Taoglas TS.07

General specifications

Table 90. Taoglas TS.07 General specifications

Electrical	
Impedance	50 Ω
Polarization	Linear
Radiation pattern	Omni-directional
Input power	10 W

Table 91. Mechanical specifications

Mechanical	
Antenna length	72 mm
Antenna diameter	10 mm
Casing	POM
Connector	SMA (M)
Weight	6 grams

Table 92. Environmental specifications

Environmental	
Temperature range	–40°C to 85°C
Humidity	Non-condensing 65°C 95% RH

Taoglas TS.07 specifications for Edge Gateway 3001 and 3003 (Bent position)

Table 93. Taoglas TS.07 specifications for Edge Gateway 3001 and 3003 (Bent position)

	GPS	WLAN
Frequency (MHz)	1561 ~ 1602	2400 ~ 2500
Efficiency (%)¹		
WLAN	71.1	53.6
WWAN 3G	64.1	60.3
WWAN LTE	51.8	59.4
Average gain (dBi)¹		
WLAN	–1.5	–2.7
WWAN 3G	–1.9	–2.2
WWAN LTE	–2.9	–2.3

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.



Taoglas TS.07 specifications for Edge Gateway 3001 and 3003 (Straight position)

Table 94. Taoglas TS.07 specifications for Edge Gateway 3001 and 3003 (Straight position)

	GPS	WLAN
Frequency (MHz)	1561 ~ 1602	2400 ~ 2500
Efficiency (%)¹		
WLAN	71	56.9
WWAN 3G	52.9	51.3
WWAN LTE	43.7	52.1
Average gain (dBi)¹		
WLAN	-1.5	-2.5
WWAN 3G	-2.8	-3.0
WWAN LTE	-3.6	-2.9

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.

Taoglas TS.07 specifications for Edge Gateway 3002 (Bent position)

Table 95. Taoglas TS.07 specifications for Edge Gateway 3002 (Bent position)

	GPS	WLAN
Frequency (MHz)	1561 ~ 1602	2400 ~ 2500
Efficiency (%)¹		
WLAN	69.4	49.6
WWAN 3G	64.6	48.2
WWAN LTE	65.3	48.0
Average gain (dBi)¹		
WLAN	-1.6	-3.0
WWAN 3G	-1.9	-3.2
WWAN LTE	-1.9	-3.2

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.

Taoglas TS.07 specifications for Edge Gateway 3002 (Straight position)

Table 96. Taoglas TS.07 specifications for Edge Gateway 3002 (Straight position)

	GPS	WLAN
Frequency (MHz)	1561 ~ 1602	2400 ~ 2500
Efficiency (%)¹		
WLAN	70.5	53.9
WWAN 3G	62.1	52.2
WWAN LTE	62.6	52.2
Average gain (dBi)¹		

	GPS	WLAN
WLAN	-1.5	-2.7
WWAN 3G	-2.1	-2.8
WWAN LTE	-2.0	-2.8

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.

Antennas—Taoglas TG.30

General specifications

Table 97. Taoglas TS.30 General specifications

Electrical	
Impedance	50 Ω
Polarization	Linear
Radiation pattern	Omni-directional
Input power	5 W

Table 98. Mechanical specifications

Mechanical	
Casing	UV-resistant PC/ABS
Connector	SMA male-hinged 90°

Table 99. Environmental specifications

Environmental	
Temperature range	-40°C to 85°C
Humidity	Non-condensing 65°C 95% RH

Taoglas TG.30 specifications for Edge Gateway 3001 and 3003 (Bent position)

Table 100. Taoglas TG.30 specifications for Edge Gateway 3001 and 3003 (Bent position)

	LTE700	GSM850	GSM900	DCS	PCS	UMTS
Frequency (MHz)	704 ~ 806	824 ~ 894	880 ~ 960	1710 ~ 1880	1850 ~ 1990	1920 ~ 2170
Efficiency (%)¹						
WWAN 3G	67.5	67.0	55.1	57.5	52.2	49.5
WWAN LTE	67.2	66.0	52.9	51.2	47.94	46
Average gain (dBi)¹						
WWAN 3G	-1.7	-1.75	-2.61	-2.41	-2.85	-3.08
WWAN LTE	-1.73	-1.8	-2.8	-2.9	-3.2	-3.4

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.



Taoglas TG.30 specifications for Edge Gateway 3001 and 3003 (Straight position)

Table 101. Taoglas TG.30 specifications for Edge Gateway 3001 and 3003 (Straight position)

	LTE700	GSM850	GSM900	DCS	PCS	UMTS
Frequency (MHz)	704 ~ 806	824 ~ 894	880 ~ 960	1710 ~ 1880	1850 ~ 1990	1920 ~ 2170
Efficiency (%)¹						
WWAN 3G	71.2	65.5	47.7	64.2	59.5	55.8
WWAN LTE	71.1	62.1	45.8	61.3	58.2	54.5
Average gain (dBi)¹						
WWAN 3G	-1.6	-1.9	-3.3	-1.9	-2.3	-2.6
WWAN LTE	-1.5	-2.1	-3.4	-2.1	-2.4	-2.7

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.

Taoglas TG.30 specifications for Edge Gateway 3002 (Bent position)

Table 102. Taoglas TS.30 specifications for Edge Gateway 3002 (Bent position)

	LTE700	GSM850	GSM900	DCS	PCS	UMTS
Frequency (MHz)	704 ~ 806	824 ~ 894	880 ~ 960	1710 ~ 1880	1850 ~ 1990	1920 ~ 2170
Efficiency (%)¹						
WWAN 3G	67.0	66.7	55.3	58.3	52.2	48.93
WWAN LTE	70.1	54.2	48.3	60.4	72.3	74.0
Average gain (dBi)¹						
WWAN 3G	-1.8	-1.8	-2.6	-2.3	-2.9	-3.1
WWAN LTE	-1.6	-2.7	-3.2	-2.2	-1.4	-1.3

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.

Taoglas TG.30 specifications for Edge Gateway 3002 (Straight position)

Table 103. Taoglas TS.30 specifications for Edge Gateway 3002 (Straight position)

	LTE700	GSM850	GSM900	DCS	PCS	UMTS
Frequency (MHz)	704 ~ 806	824 ~ 894	880 ~ 960	1710 ~ 1880	1850 ~ 1990	1920 ~ 2170
Efficiency (%)¹						
WWAN 3G	69.3	65.2	49.7	66.8	58.3	53.0
WWAN LTE	66.7	57.7	45.8	57.1	70.6	71.7
Average gain (dBi)¹						
WWAN 3G	-1.6	-1.8	-3.0	-1.7	-2.4	-2.8
WWAN LTE	-1.8	-2.4	-3.4	-2.4	-1.5	-1.4

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.

Antennas—Taoglas GW.15

General specifications

Table 104. Taoglas GW.15 General specifications

Electrical	
Impedance	50 Ω
Polarization	Linear
Radiation pattern	Omni-directional
Input power	10 W

Table 105. Mechanical specifications

Mechanical	
Antenna length	72 mm
Antenna diameter	10 mm
Casing	POM
Connector	SMA (M)
Weight	6 grams

Table 106. Environmental specifications

Environmental	
Temperature range	–40°C to 85°C
Humidity	Non–condensing 65°C 95% RH

Taoglas GW.15 specifications for Edge Gateway 3002 (Bent position)

Table 107. Taoglas GW.15 specifications for Edge Gateway 3002 (Bent position)

ZigBee	
Frequency (MHz)	2400 ~ 2500
Efficiency (%) ¹	
WLAN	37.1
WWAN 3G	45.0
WWAN LTE	41.7
Average gain (dBi) ¹	
WLAN	–4.4
WWAN 3G	–3.5
WWAN LTE	–3.8

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.

Taoglas GW.15 specifications for Edge Gateway 3002 (Straight position)

Table 108. Taoglas GW.15 specifications for Edge Gateway 3002 (Straight position)

	ZigBee
Frequency (MHz)	2400 ~ 2500
Efficiency (%) ¹	
WLAN	35.1
WWAN 3G	42.4
WWAN LTE	38.0
Average gain (dBi) ¹	
WLAN	-4.7
WWAN 3G	-3.8
WWAN LTE	-4.3

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.

Antennas—Taoglas TG.10

General specifications

Table 109. Taoglas TG.10 General specifications

Electrical	
Impedance	50 Ω
Polarization	Linear
Radiation pattern	Omni-directional
Input power	5 W

Table 110. Mechanical specifications

Mechanical	
Casing	PC/ABS
Connector	Hinged SMA male
Weight	24 grams
Recommended torque for mounting	0.9 Nm
Maximum torque for mounting	1.176 Nm

Table 111. Environmental specifications

Environmental	
Temperature range	-40°C to 85°C
Humidity	Non-condensing 65°C 95% RH

Taoglas TG.10 specifications for Edge Gateway 3001 and 3003 (Bent position)

Table 112. Taoglas TG.10 specifications for Edge Gateway 3001 and 3003 (Bent position)

	LTE700	GSM850	GSM900	DCS	PCS	UMTS
Frequency (MHz)	704 ~ 806	824 ~ 894	880 ~ 960	1710 ~ 1880	1850 ~ 1990	1920 ~ 2170
Efficiency (%)¹						
WWAN LTE	39.09	33.94	26.34	42.08	55.42	61.33
Average gain (dBi)¹						
WWAN LTE	-4.12	-4.74	-5.80	-3.82	-2.58	-2.13
Peak gain (dBi)¹						
WWAN LTE	0.64	-0.3	-1.91	2.28	3.60	3.60

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.

Taoglas TG.10 specifications for Edge Gateway 3001 and 3003 (Straight position)

Table 113. Taoglas TG.10 specifications for Edge Gateway 3001 and 3003 (Straight position)

	LTE700	GSM850	GSM900	DCS	PCS	UMTS
Frequency (MHz)	704 ~ 806	824 ~ 894	880 ~ 960	1710 ~ 1880	1850 ~ 1990	1920 ~ 2170
Efficiency (%)¹						
WWAN LTE	45.82	27.20	23.55	47.48	65.85	63.50
Average gain (dBi)¹						
WWAN LTE	-3.40	-5.67	-6.28	-3.28	-1.83	-2.01
Peak gain (dBi)¹						
WWAN LTE	1.93	-0.05	-2.50	1.95	3.24	3.24

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.

Taoglas TG.10 specifications for Edge Gateway 3002 (Bent position)

Table 114. Taoglas TG.10 specifications for Edge Gateway 3002 (Bent position)

	LTE700	GSM850	GSM900	DCS	PCS	UMTS
Frequency (MHz)	704 ~ 806	824 ~ 894	880 ~ 960	1710 ~ 1880	1850 ~ 1990	1920 ~ 2170
Efficiency (%)¹						
WWAN LTE	33.65	26.99	25.04	51.24	71.32	68.94
Average gain (dBi)¹						
WWAN LTE	-4.74	-5.70	-6.01	-2.93	-1.48	-1.64
Peak gain (dBi)¹						
WWAN LTE	0.17	-0.79	-0.56	4.24	5.41	5.41

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.



Taoglas TG.10 specifications for Edge Gateway 3002 (Straight position)

Table 115. Taoglas TG.10 specifications for Edge Gateway 3002 (Straight position)

	LTE700	GSM850	GSM900	DCS	PCS	UMTS
Frequency (MHz)	704 ~ 806	824 ~ 894	880 ~ 960	1710 ~ 1880	1850 ~ 1990	1920 ~ 2170
Efficiency (%)¹						
WWAN LTE	45.82	27.20	23.55	47.48	65.85	63.50
Average gain (dBi)¹						
WWAN LTE	-3.40	-5.67	-6.28	-3.28	-1.83	-2.01
Peak gain (dBi)¹						
WWAN LTE	1.93	-0.05	-2.50	1.95	3.24	3.24

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.

Antennas—Hongbo E46WD

General specifications

Table 116. Hongbo E46WD General specifications

Electrical	
Impedance	50 Ω
Polarization	Linear
Radiation pattern	Omni-directional
Input power	10 W

Table 117. Mechanical specifications

Mechanical	
Antenna length	72 mm
Antenna diameter	10 mm
Casing	POM
Connector	SMA (M)
Weight	8.2 grams

Table 118. Environmental specifications

Environmental	
Temperature range	-40°C to 85°C
Humidity	Non-condensing 65°C 95% RH

Hongbo E46WD specifications for Edge Gateway 3001 and 3003 (Bent position)

Table 119. Hongbo E46WD specifications for Edge Gateway 3001 and 3003 (Bent position)

	GPS	WLAN
Efficiency (%)¹		
WLAN	58.2	65.8
WWAN 3G	55.5	58.3
WWAN LTE	54.6	54.1
Average gain (dBi)¹		
WLAN	-2.4	-1.8
WWAN 3G	-2.6	-2.3
WWAN LTE	-2.6	-2.7

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.

Hongbo E46WD specifications for Edge Gateway 3001 and 3003 (Straight position)

Table 120. Hongbo E46WD specifications for Edge Gateway 3001 and 3003 (Straight position)

	GPS	WLAN
Efficiency (%)¹		
WLAN	65.0	62.5
WWAN 3G	63.5	54.0
WWAN LTE	61.9	52.1
Average gain (dBi)¹		
WLAN	-1.9	-2.0
WWAN 3G	-2.0	-2.7
WWAN LTE	-2.1	-2.8

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.

Hongbo E46WD specifications for Edge Gateway 3002 (Bent position)

Table 121. Hongbo E46WD specifications for Edge Gateway 3002 (Bent position)

	GPS	WLAN
Efficiency (%)¹		
WLAN	58.7	65.9
WWAN 3G	56.8	56.0
WWAN LTE	54.8	55.7
Average gain (dBi)¹		
WLAN	-2.3	-1.8
WWAN 3G	-2.5	-2.5
WWAN LTE	-2.6	-2.5



1 Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.

Hongbo E46WD specifications for Edge Gateway 3002 (Straight position)

Table 122. Hongbo E46WD specifications for Edge Gateway 3002 (Straight position)

	GPS	WLAN
Efficiency (%)¹		
WLAN	65.5	61.9
WWAN 3G	64.1	53.6
WWAN LTE	61.9	53.2
Average gain (dBi)¹		
WLAN	-1.8	-2.1
WWAN 3G	-1.9	-2.7
WWAN LTE	-2.1	-2.7

1 Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.

Antennas—Hongbo JYDKO

General specifications

Table 123. Hongbo JYDKO General specifications

Electrical	
Impedance	50 Ω
Polarization	Linear
Radiation pattern	Omni-directional
Input power	10 W

Table 124. Mechanical specifications

Mechanical	
Antenna length	209.17 mm
Antenna diameter	42 mm
Casing	PC
Connector	SMA (M)
Weight	40 grams

Table 125. Environmental specifications

Environmental	
Temperature range	-40°C to 85°C
Humidity	Non-condensing 65°C 95% RH

Hongbo JYDKO specifications for Edge Gateway 3001 and 3003 (Bent position)

Table 126. Hongbo JYDKO specifications for Edge Gateway 3001 and 3003 (Bent position)

	LTE700	GSM850	GSM900	DCS	PCS	UMTS
Efficiency (%)¹						
WWAN 3G	92.7	61.2	52.6	72.6	71.1	74.0
WWAN LTE	87.1	56.8	50.7	66.9	65.2	66.4
Average gain (dBi)¹						
WWAN 3G	-0.3	-2.1	-2.8	-1.4	-1.5	-1.3
WWAN LTE	-0.6	-2.5	-2.9	-1.7	-1.9	-1.8

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.

Hongbo JYDKO specifications for Edge Gateway 3001 and 3003 (Straight position)

Table 127. Hongbo JYDKO specifications for Edge Gateway 3001 and 3003 (Straight position)

	LTE700	GSM850	GSM900	DCS	PCS	UMTS
Efficiency (%)¹						
WWAN 3G	73.3	57.1	50.9	56.2	55.1	56.7
WWAN LTE	69.0	54.0	48.0	57.5	56.0	55.8
Average gain (dBi)¹						
WWAN 3G	-1.3	-2.4	-2.9	-2.5	-2.6	-2.5
WWAN LTE	-1.6	-2.7	-3.2	-2.4	-2.5	-2.5

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.

Hongbo JYDKO specifications for Edge Gateway 3002 (Bent position)

Table 128. Hongbo JYDKO specifications for Edge Gateway 3002 (Bent position)

	LTE700	GSM850	GSM900	DCS	PCS	UMTS
Efficiency (%)¹						
WWAN 3G	93.0	62.4	53.6	70.2	68.1	71.0
WWAN LTE	88.9	57.9	51.4	66.8	63.8	65.7
Average gain (dBi)¹						
WWAN 3G	-0.3	-2.0	-2.7	-1.5	-1.7	-1.5
WWAN LTE	-0.5	-2.4	-2.9	-1.8	-2.0	-1.8

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.



Hongbo JYDKO specifications for Edge Gateway 3002 (Straight position)

Table 129. Hongbo JYDKO specifications for Edge Gateway 3002 (Straight position)

	LTE700	GSM850	GSM900	DCS	PCS	UMTS
Efficiency (%)¹						
WWAN 3G	73.3	57.0	50.6	55.7	54.6	56.5
WWAN LTE	69.1	55.2	47.9	57.0	55.3	55.3
Average gain (dBi)¹						
WWAN 3G	-1.3	-2.4	-3.0	-2.5	-2.6	-2.5
WWAN LTE	-1.6	-2.6	-3.2	-2.4	-2.6	-2.6

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.

Antennas—Hongbo G9HPD

General specifications

Table 130. Hongbo G9HPD General specifications

Electrical	
Impedance	50 Ω
Polarization	Linear
Radiation pattern	Omni-directional
Input power	10 W

Table 131. Mechanical specifications

Mechanical	
Antenna length	109 mm
Antenna diameter	10 mm
Casing	PC
Connector	SMA (M)
Weight	7 grams

Table 132. Environmental specifications

Environmental	
Temperature range	-40°C to 85°C
Humidity	Non-condensing 65°C 95% RH

Hongbo G9HPD specifications for Edge Gateway 3002 (Bent position)

Table 133. Hongbo G9HPD specifications for Edge Gateway 3002 (Bent position)

ZigBee	
Efficiency (%)¹	
WLAN	40.2

	ZigBee
WWAN 3G	50.5
WWAN LTE	46.2
Average gain (dBi)¹	
WLAN	-4.0
WWAN 3G	-3.0
WWAN LTE	-3.4

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.

Hongbo G9HPD specifications for Edge Gateway 3002 (Straight position)

Table 134. Hongbo G9HPD specifications for Edge Gateway 3002 (Straight position)

	ZigBee
Efficiency (%)¹	
WLAN	40.5
WWAN 3G	43.9
WWAN LTE	43.2
Average gain (dBi)¹	
WLAN	-3.9
WWAN 3G	-3.6
WWAN LTE	-3.7

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.

Antennas—Hongbo M9RV9

General specifications

Table 135. Hongbo M9RV9 General specifications

Electrical	
Impedance	50 Ω
Polarization	Linear
Radiation pattern	Omni-directional
Input power	10 W

Table 136. Mechanical specifications

Mechanical	
Antenna length	207 mm
Antenna diameter	20.5 mm
Casing	ABS
Connector	SMA (M)



Mechanical	
Weight	25 grams

Table 137. Environmental specifications

Environmental	
Temperature range	–40°C to 85°C
Humidity	Non–condensing 65°C 95% RH

Hongbo M9RV9 specifications for Edge Gateway 3001 and 3003 (Bent position)

Table 138. Hongbo M9RV9 specifications for Edge Gateway 3001 and 3003 (Bent position)

	LTE700	GSM850	GSM900	DCS	PCS	UMTS
Efficiency (%)¹						
WWAN LTE	63.2	42.9	38.0	68.0	78.2	73.1
Average gain (dBi)¹						
WWAN LTE	–2.0	–3.7	–4.2	–1.7	–1.1	–1.4
Peak gain (dBi)¹						
WWAN LTE	–0.1	–0.3	–1.2	3.0	2.9	2.7

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.

Hongbo M9RV9 specifications for Edge Gateway 3001 and 3003 (Straight position)

Table 139. Hongbo M9RV9 specifications for Edge Gateway 3001 and 3003 (Straight position)

	LTE700	GSM850	GSM900	DCS	PCS	UMTS
Efficiency (%)¹						
WWAN LTE	63.0	35.1	33.7	54.3	55.5	52.6
Average gain (dBi)¹						
WWAN LTE	–2.0	–4.5	–4.7	–2.7	–2.6	–2.8
Peak gain (dBi)¹						
WWAN LTE	0.0	–4.7	–4.5	0.7	1.8	1.8

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.

Hongbo M9RV9 specifications for Edge Gateway 3002 (Bent position)

Table 140. Hongbo M9RV9 specifications for Edge Gateway 3002 (Bent position)

	LTE700	GSM850	GSM900	DCS	PCS	UMTS
Efficiency (%)¹						
WWAN LTE	62.9	43.6	39.6	69.1	76.4	70.3
Average gain (dBi)¹						
WWAN LTE	–2.0	–3.6	–4.0	–1.6	–1.2	–1.5
Peak gain (dBi)¹						

	LTE700	GSM850	GSM900	DCS	PCS	UMTS
WWAN LTE	0.8	-1.1	-4.5	-0.9	-2.5	-0.6

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.

Hongbo M9RV9 specifications for Edge Gateway 3002 (Straight position)

Table 141. Hongbo M9RV9 specifications for Edge Gateway 3002 (Straight position)

	LTE700	GSM850	GSM900	DCS	PCS	UMTS
Efficiency (%)¹						
WWAN LTE	63.3	34.8	33.4	53.6	54.7	51.7
Average gain (dBi)¹						
WWAN LTE	-2.0	-4.6	-4.8	-2.7	-2.6	-2.9
Peak gain (dBi)¹						
WWAN LTE	0.1	-4.4	-4.4	1.2	2.1	2.1

¹ Efficiency and average gain is the average number of each frequency band. Peak gain is the maximum number of each frequency band.

Communications—CANbus port

 **NOTE:** The CANbus port is available on Edge Gateway 3002 only.

Table 142. CANbus port general specifications

General specifications	
Type	3-pin terminal block Molex 39532-6503
Processor	Atmel ATSAME70N19A-CNT
Transceiver	NXP TJA1052i
CAN signals	Electrically isolated
CAN board detect in BIOS	Required (BIOS-readable)
Driver	Standard USB HID device

 **NOTE:** For details about the CANbus programming, see [Appendix-Program the CANbus](#).

Communications—GPIO port

 **NOTE:** The GPIO port is available on Edge Gateway 3001 only.

Table 143. GPIO port—General specifications

General specifications	
Number of channels	8
Resolution	12-bit
Configuration	Any combination of: <ul style="list-style-type: none"> 8 x 12-bit DAC channels 8 x 12-bit ADC channels

General specifications

	• 8 x general-purpose I/O pins
Device	Analog Devices AD5593R
Host interface	I2C
GPIO signals	Electrically-isolated
Operating power supply input (Vdd)	5 V
Reference input/output voltage (Vref)	2.5 V
ADC input range	0 V to Vref; or, 0 V to 2 x Vref, selectable
DAC output range	0 V to Vref; or, 0 V to 2 x Vref, selectable
Series resistance	100K-ohm (between connector pin and device pin)
Type	2 x 8 terminal block

 **NOTE:** For details about GPIO programming, see [Appendix: Programming the GPIO](#).

Communications—Serial ports

 **NOTE:** Serial ports are available on Edge Gateway 3001 only.

Table 144. Communications—Serial ports


General specifications

Serial port RS	232/422/485
Connector type	2 x 2 x 5 terminal blocks
Data rates supported	Up to 12 Mbps (422/485), 1 Mbps (232)
USB-to-UART bridge	Exar XR21V1412
Transceiver	2 x Exar SP339E

Recommended specifications for serial port connectors

Table 145. General specifications


Voltage rating	250 V AC/DC
Current rating	3A AC/DC
Wire range	22-30 AWG
Temperature range	–25°C to 85°C (–13°F to 185°F)
Contact resistance (maximum)	20 mΩ
Insulation resistance (minimum)	1000 mΩ
Withstanding voltage	1500 V AC/minute
Recommended connector	Manufacturer part number: 90142-0010 https://www.molex.com

 **NOTE:** This part number is for reference only and is subjected to change.

Recommended crimp terminals (for 26-28 AWG wiring)

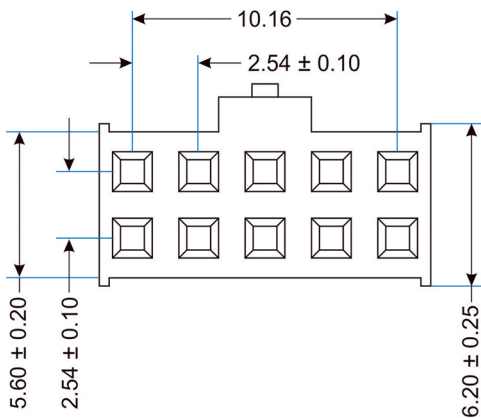
Manufacturer part number: 90119-2120

<https://www.molex.com>

 **NOTE:** This part number is for reference only and is subjected to change.

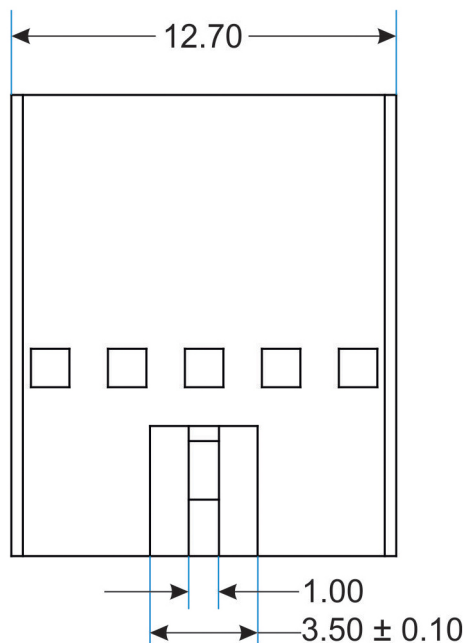
Recommended serial port connector dimensions—Front

 **NOTE:** All values in the illustration are in millimeters.



Recommended serial port connector dimensions—Top

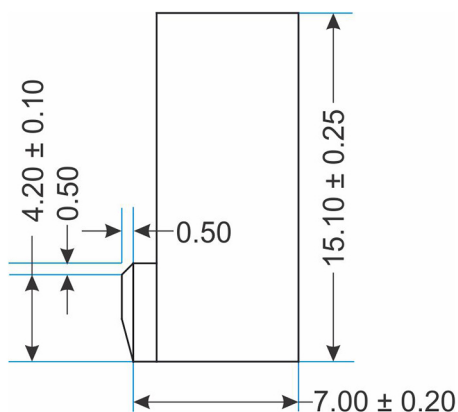
 **NOTE:** All values in the illustration are in millimeters.



Recommended serial port connector dimensions—Side

 **NOTE:** All values in the illustration are in millimeters.





micro-SD

Model: Apacer Industrial Micro Secure Digital 3.0

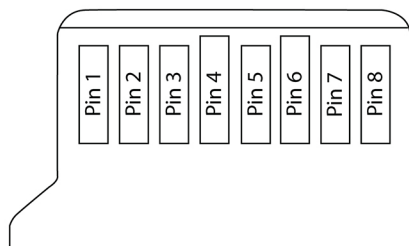


Table 146. PIN assignments

PIN	SD mode		SPI mode	
	Name	Description	Name	Description
1	DAT2	Data line (bit 2)	Reserved	N/A
2	CD/DAT3	Card detected/Data line (bit 3)	CS	Chip select
3	CMD	Command/Response	DI	Data-in
4	VDD	Supply voltage	VDD	Supply voltage
5	CLK	Clock	SCLK	Clock
6	VSS	Supply voltage ground	VSS	Supply voltage ground
7	DAT0	Data line (bit 0)	DO	Data-out
8	DAT1	Data line (bit 1)	Reserved	N/A

Table 147. Capacity

Capacity (GB)	Total bytes
8	7,960,756,224
16	16,013,819,904
32	32,098,975,744

Table 148. Performance

Modes	Capacity			
	8 GB	16 GB	32 GB	64 GB
Read (MB/s)	43	43	43	44
Write (MB/s)	26	36	34	22

Table 149. Electrical—Operating voltages

Symbol	Parameter	Minimum	Maximum	Unit
V _{DD}	Power supply voltage	2.7	3.6	V

Table 150. Electrical—Power consumption

Modes	Capacity			
	8 GB	16 GB	32 GB	64 GB
Operating (mA)	75	100	130	135
Standby (μA)	200	210	240	250

eMMC

Table 151. eMMC—General specifications

General specifications	
Capacity	<ul style="list-style-type: none"> 8 GB Kingston EMMC32G-W525-X01U¹ 32 GB Kingston EMMC08G-W525-X01U <p>¹ Windows 10 IoT Enterprise LTSB 2016 is not supported on the Edge Gateway models with 8 GB or less of the eMMC storage space.</p>
Interface	Compliant with eMMC 5.0 JEDEC Standard Number JESD84-B50
Compatibility	Backward-compatible with all prior eMMCTM specification revisions
Technology	NAND flash memory with eMMCTM 5.0 interface
Protocol	High-speed eMMCTM protocol
Power consumption (reference only)	Idle 0.5 mW, Active 0.4 W
Transfer rate (reference only)	<ul style="list-style-type: none"> 8 GB: 255 MB/s (read); 28 MB/s (write) 32 GB: 277 MB/s (read); 47 MB/s (write)

Regulatory and environmental compliance

Product-related conformity assessment and regulatory authorizations including Product Safety, Electromagnetic Compatibility (EMC), Ergonomics, and Communication Devices relevant to this product, as well as the Data Sheet for this product, are available at dell.com/regulatory_compliance.

Details of Dell's environmental stewardship program to conserve product energy consumption, reduce or eliminate materials for disposal, prolong product life span and provide effective and convenient equipment recovery solutions may be viewed at dell.com/environment. Product-related environmental information relevant to this product may be viewed by clicking the Design for Environment link on the webpage.

Appendix

OEM-ready

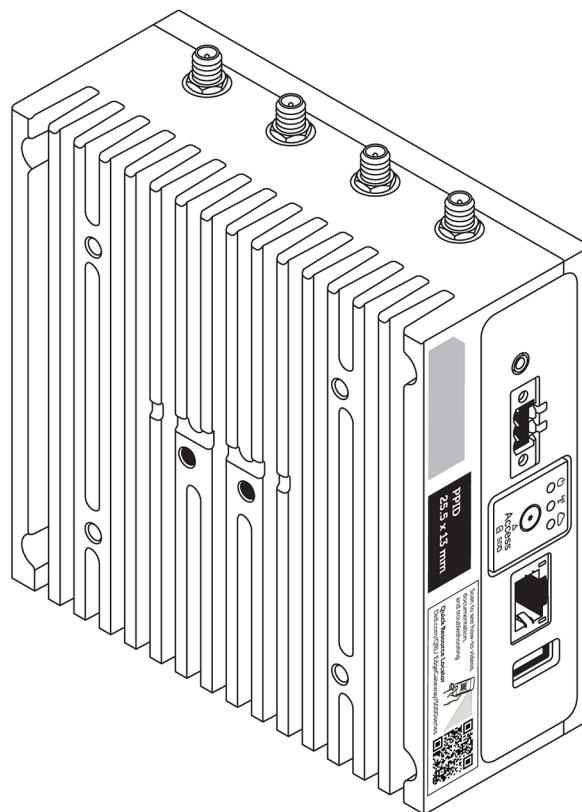
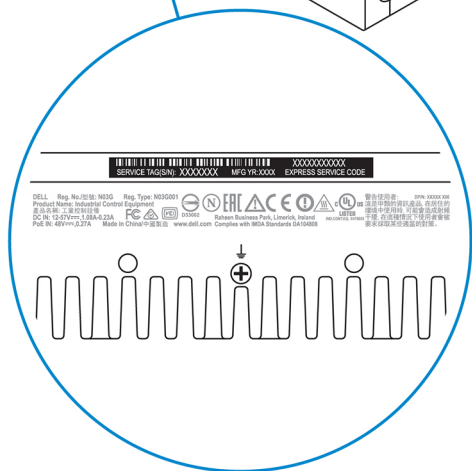
This product is OEM-ready. These are the differences between a Dell-branded and OEM-ready product:

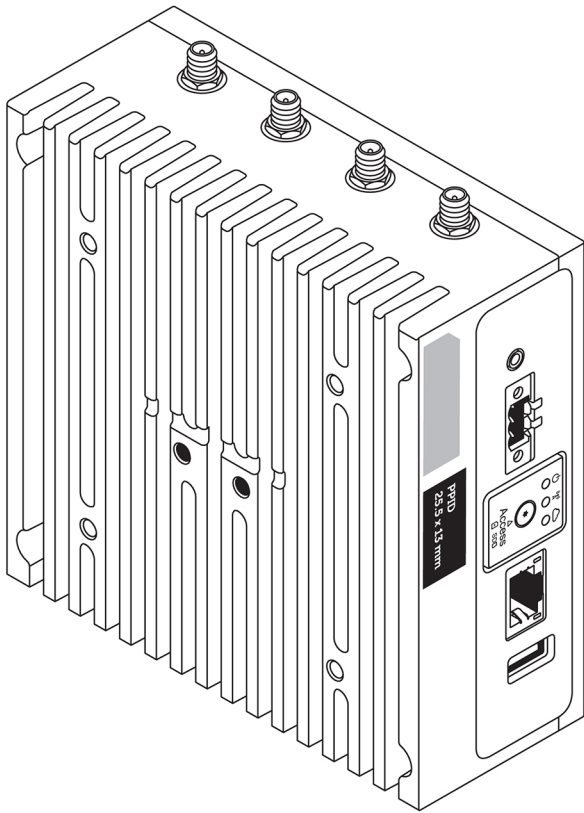
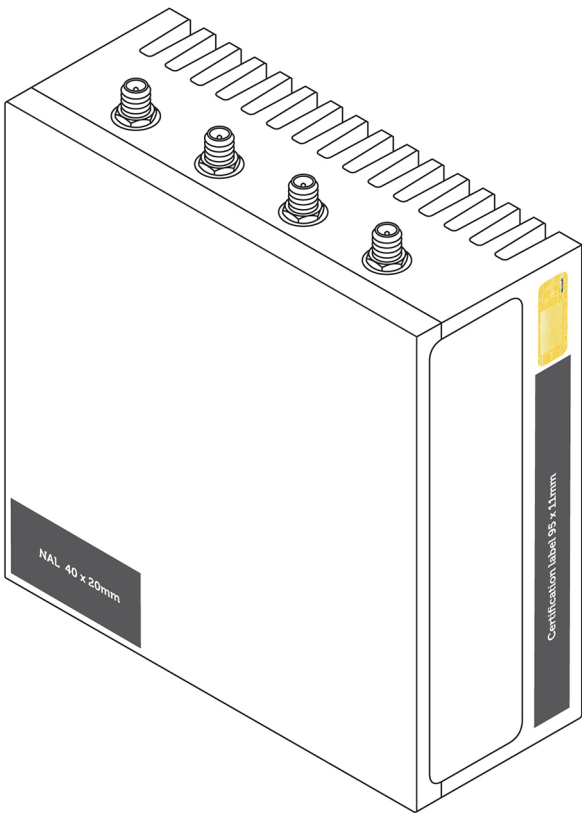
Features	Dell-branded	OEM-ready
External chassis	Dell logo on front cover	Removed or replaceable Dell branding on front cover
BIOS	Dell branding in BIOS with standard default settings	Generic (non-Dell branded) BIOS with standard default settings
Regulatory	Full Dell standard regulatory	Base country regulatory offerings
Documentation	Dell-branded documentation	Generic (non-Dell branded) documentation
Packaging	Dell-branded packaging	Generic (non-Dell branded) packaging



Dell-branded: Front

Dell-branded: Back





Program the CANbus

The CANbus appears as a Common Device Class (CDC)/USB device in supported operating systems.

For CANbus programming of user mode applications, see the API documentation available at <http://www.microchip.com/ATSAME70N19>.

Programming the GPIO

Program the GPIO port using a hardware programming utility.

1. Enter the **Extended Function Mode** of your utility by writing 87h twice to IO port **2Eh**.
2. Configure pin **GPO0** to **GPO7**.
 - a. Select **Logical Device 8**.
 - Write 07h at IO port **2Eh**.
 - Write 08h at IO port **2Fh**.
 - b. Configure Register CR E1.
 - Write E1h at IO port **2Eh**.
 - Write NNh at IO port **2Fh**.

Table 152. Programming the GPIO

GPO7	GPO6	GPO5	GPO4	GPO3	GPO2	GPO1	GPO0
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0



Example: If you want to set GPO0 to High and GPO1 to Low, you need to set **NN** to **01h**.

 **NOTE: The default values are all low.**

3. Configure pin **GPIO** to **GPI7**.
 - a. Select **Logical Device 7**.
 - Write 07h at IO port **2Eh**.
 - Write 07h at IO port **2Fh**.
 - b. Configure Register CR F5.
 - Write F5h at IO port **2Eh**.
 - Read NNh at IO port **2Fh**.

Table 153. Programming the GPIO

GPI7	GPI6	GPI5	GPI4	GPI3	GPI2	GPI1	GPI0
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0

4. Exit the **Extended Function Mode** by writing 0xAAh at IO port **2Eh**.

Sample code—Controlling GPO registers

The following example is written in Intel 8086 assembly language.

1. Enter the **Extended Function Mode**:

```
MOV DX, 2EH
MOV AL, 87H
OUT DX, AL
OUT DX, AL
```

2. Configure the GPO register:

```
MOV DX, 2EH
MOV AL, 07H
OUT DX, AL
MOV DX, 2FH
MOV AL, 08H
OUT DX, AL (select Logical Device 8 for GPO)
MOV DX, 2EH
MOV AL, E1H
OUT DX, AL (select CRE1)
MOV DX, 2FH
MOV AL, 01H (update GPO register with value 01H (GPO0 = HIGH, GPO1 to GPO7 = LOW))
OUT DX, AL
```

3. Exit the **Extended Function Mode** by:

```
MOV DX, 2EH
MOV AL, AAH
OUT DX, AL
```

Sample code—Read GPI status

The following example is written in Intel 8086 assembly language.

1. Enter the **Extended Function Mode**:

```
MOV DX, 2EH
MOV AL, 87H
OUT DX, AL
OUT DX, AL
```

2. Configure GPO register:

```
MOV DX, 2EH
MOV AL, 07H
```

```

OUT DX, AL
MOV DX, 2FH
MOV AL, 07H
OUT DX, AL (select Logical Device 7 for GP1)
MOV DX, 2EH
MOV AL, F5H
OUT DX, AL (select CRF5)
MOV DX, 2FH
IN AL, DX ; (Get value of GPIO to GPI7)

```

3. Exit the **Extended Function Mode**:

```

MOV DX, 2EH
MOV AL, AAH
OUT DX, AL

```

Approved PoE injectors and switches

The Edge Gateway 3000 series can only accept power in Alternative A/Mode A configuration. Ensure that only injectors and switches which implement Alternative A are used.

Table 154. Tested and approved PoE injectors and switches

Brand	Model	Power/port	Type
Cerio	POE-S548G	15.4 W	Injector
D Link	DPE-101GI	15.4 W	Injector
Trendnet	TPE-113GI	15.4 W	Injector
Trendnet	TPE-113GI	30 W	Injector
TP Link	TL-SF1008P	15.4 W	Injector
TP Link	TL-POE150S	15.4 W	Injector
Cerio	CS-2208-8P	30 W	Switch
Cisco	SF110D-16HP	15.4 W	Switch
Cisco	SG300-10PP	30 W	Switch
Dell	N2048P	30 W	Switch
Dell	X1026P	30 W	Switch
Trendnet	TPE-TG160G	30 W	Switch

Default BIOS settings

General (BIOS level 1)

Table 155. General (BIOS level 1)

BIOS level 2	BIOS level 3	Item	Default value
System Information	System Information	BIOS Version	Not applicable
		Service Tag	Not applicable
		Asset Tag	Not applicable
		Ownership Tag	Not applicable
		Manufacturing Date	Not applicable



BIOS level 2	BIOS level 3	Item	Default value
		Ownership Date	Not applicable
		Express Service Code	Not applicable
	Memory Information	Memory Installed	Not applicable
		Memory Available	Not applicable
		Memory Speed	Not applicable
		Memory Channel Mode	Not applicable
		Memory Technology	Not applicable
	Processor Information	Processor Type	Not applicable
		Core Count	Not applicable
		Processor ID	Not applicable
		Current Clock Speed	Not applicable
		Minimum Clock Speed	Not applicable
		Maximum Clock Speed	Not applicable
		Processor L2 Cache	Not applicable
		Processor L3 Cache	Not applicable
		HT Capable	Not applicable
		64-Bit Technology	Not applicable
	Device Information	eMMC Drive	Not applicable
		LOM MAC Address	Not applicable
		LOM2 MAC Address	Not applicable
		Video Controller	Not applicable
		Video BIOS Version	Not applicable
		Wi-Fi Device	Not applicable
		Celluar Device	Not applicable
		Bluetooth Device	Not applicable
Boot Sequence	Boot Sequence	Boot Sequence - Depends on installed boot devices	Depends on installed boot devices
		Boot List option [Legacy/UEFI]	UEFI

BIOS level 2	BIOS level 3	Item	Default value
Advanced Boot Options	Advanced Boot Options	Enable Legacy Option ROMs [Enable/Disable]	Enabled
Date/Time	Date/Time	Date [MM/DD/YY]	Not applicable
		Time [HH:MM:SS A/P]	Not applicable

System configuration (BIOS level 1)

Table 156. System configuration (BIOS level 1)

BIOS level 2	BIOS level 3	Item	Default value
Integrated NIC	Integrated NIC	Enable UEFI Network Stack [Enable/Disable]	Enabled
		[Disabled, Enabled, Enabled w/ PXE]	Enabled w/PXE
	Integrated NIC 2	[Disabled, Enabled]	Enabled
	Serial Port1	[Disable, RS232, RS-485 HALF DUPLEX, RS-485/422 FULL DUPLEX]	RS232
	Serial Port2	[Disable, RS232, RS-485 HALF DUPLEX, RS-485/422 FULL DUPLEX]	RS232
USB Configuration	USB Configuration	Enable Boot Support [Enable/Disable]	Enabled
		Enable USB 3.0 Controller [Enable/Disable]	Enabled
		Enable USB Port1 [Enable/Disable]	Enabled
		Enable USB Port2 [Enable/Disable]	Enabled
	Audio	Enable Audio [Enable/Disable]	Enabled
	Miscellaneous Devices	Enable WWAN [Enable/Disable]	Enabled
		Enable WLAN/Bluetooth [Enable/Disable]	Enabled
		Enable CANBus [Enable/Disable]	Enabled
		Enable ZigBee [Enable/Disable]	Enabled
		Enable Dedicated GPS Radio [Enable/Disable]	Enabled

BIOS level 2	BIOS level 3	Item	Default value
		Enable MEMs Sensor [Enable/Disable]	Enabled
Watchdog Timer Support	Watchdog Timer Support	Enable Watchdog Timer [Enable/Disable]	Disabled

Security (BIOS level 1)

Table 157. Security (BIOS level 1)

BIOS level 2	BIOS level 3	Item	Default value
Admin Password	Admin Password	Enter the old password	Not Set
		Enter the new password	Not applicable
		Confirm new password	Not applicable
System Password	System Password	Enter the old password	Not Set
		Enter the new password	Not applicable
		Confirm new password	Not applicable
Strong Password	Strong Password	Enable Strong Password [Enable/Disable]	Disabled
Password Configuration	Password Configuration	Admin Password Min	4
		Admin Password Max	32
		System Password Min	4
		System Password Max	32
Password Bypass	Password Bypass	[Disabled/Reboot Bypass]	Disabled
Password Change	Password Change	Allow Non-Admin Password Changes [Enable/Disable]	Enabled
UEFI Capsule Firmware Updates	UEFI Capsule Firmware Updates	Enable UEFI Capsule Firmware Updates [Enable/Disable]	Enabled
TPM 2.0 Security	TPM 2.0 Security	TPM 2.0 Security [Enable/Disable]	Enabled
		TPM On [Enable/Disable]	Enabled
		PPI Bypass for Enable Commands [Enable/Disable]	Disabled
		PPI Bypass for Disable Commands [Enable/Disable]	Disabled
		Attestation Enable [Enable/Disable]	Enabled

BIOS level 2	BIOS level 3	Item	Default value
		Key Storage Enable [Enable/Disable]	Enabled
		SHA-256 [Enable/Disable]	Enabled
		Clear [Enable/Disable]	Disabled
Computrace(R)	Computrace(R)	Deactivate/Disable/Activate	Deactivate
Chassis Intrusion	Chassis Intrusion	[Disable/Enable/On-Silent]	Disable
CPU XD Support	CPU XD Support	Enable CPU XD Support [Enable/Disable]	Enabled
Admin Setup Lockout	Admin Setup Lockout	Enable Admin Setup Lockout [Enable/Disable]	Disabled

Secure boot (BIOS level 1)

Table 158. Secure boot (BIOS level 1)

BIOS level 2	BIOS level 3	Item	Default value
Secure Boot Enable	Secure Boot Enable	[Enable/Disable]	Disabled
Expert Key Management	Expert Key Management	Enable Custom Mode [Enable/Disable]	Disabled
		Custom Mode Key Management {PK/KEK/db/dbx}	PK

Performance (BIOS level 1)

Table 159. Performance (BIOS level 1)

BIOS level 2	BIOS level 3	Item	Default value
Inter SpeedStep		Enable Intel SpeedStep [Enable/Disable]	Enabled
C-States Control	C-States Control	C-states [Enable/Disable]	Enabled
Limit CPUID Value	Limit CPUID Value	Enable CPUID Limit [Enable/Disable]	Disabled



Power management (BIOS level 1)

Table 160. Power management (BIOS level 1)

BIOS level 2	BIOS level 3	Item	Default value
Auto On Time	Auto On Time	Time Selection: [HH:MM A/P] Auto On Time (if Wake Period =0)	12:00AM
		Value Selection: [0-254] Auto-Wake Period (0-254 minutes)	000
		Day Selection: [Disabled/Every Day/Weekdays/Select Days]	Disabled
		Under [Select Days] when enabled [Sunday/Monday.../Saturday]	Not applicable
Wake on LAN/WLAN	Wake on LAN/WLAN	[Disabled/LAN Only/WLAN only/LAN or WLAN]	Disabled

POST behavior (BIOS level 1)

Table 161. POST behavior (BIOS level 1)

BIOS level 2	BIOS level 3	Item	Default value
Numlock LED	Numlock LED	Enable Numlock LED [Enable/Disable]	Enabled
Keyboard Errors	Keyboard Errors	Enable Keyboard Error Detection [Enable/Disable]	Enabled
Fastboot	Fastboot	[Minimal/Thorough/Auto]	Thorough
Extend BIOS POST Time	Extend BIOS POST Time	[0 seconds/5 seconds/10 seconds]	0 seconds
Full Screen Logo	Full Screen Logo	Enable Full Screen Logo [Enable/Disable]	Disabled
Warnings and Errors	Warnings and Errors	[Prompt on Warnings and Errors/Continue on Warnings/Continue on Warnings and Errors]	Prompt on Warnings and Errors

Virtualization support (BIOS level 1)

Table 162. Virtualization support (BIOS level 1)

BIOS level 2	BIOS level 3	Item	Default value
Virtualization	Virtualization	Enable Intel Virtualization Technology [Enable/Disable]	Enabled

Maintenance (BIOS level 1)

Table 163. Maintenance (BIOS level 1)

BIOS level 2	BIOS level 3	Item	Default value
Service Tag	Service Tag	<System Service Tag>, text entry capability when blank	Not applicable
Asset Tag	Asset Tag	<System Asset Tag>, text entry capability	Not applicable
SERR Messages	SERR Messages	Enable SERR Messages [Enable/Disable]	Enabled
BIOS Downgrade	BIOS Downgrade	Allow BIOS Downgrade [Enable/Disable]	Enabled
Data Wipe	Data Wipe	Wipe on Next Boot [Enable/Disable]	Disabled
BIOS Recovery	BIOS Recovery	BIOS Recovery from Hard Drive [Enable/Disable]	Enabled

System logs (BIOS level 1)

Table 164. System logs (BIOS level 1)

BIOS level 2	BIOS level 3	Item	Default value
BIOS Events	BIOS Events	List of BIOS events with "Clear Log" button to clear the log	Not applicable



Contacting Dell

To contact Dell for sales, technical assistance, or customer service issues:

1. Go to www.dell.com/contactdell.
2. Verify your country or region in the drop-down list at the bottom of the page.
3. Select the appropriate service or support link based on your requirement or choose the method of contacting Dell that is convenient for you.

Dell provides several online and telephone-based support and service options. Availability varies by country and product, and some services may not be available in your area.



NOTE: If you do not have an active internet connection, you can find the contact information on your purchase invoice, packing slip, bill, or Dell product catalog.