

Installation Manual – Smart Office



This installation manual describes how to install Yanzi IoT infrastructure and sensors in offices.

IMPORTANT:

This manual contains important safety, usage, and service information.

We strongly urge you to read this manual in its entirety before using the products.

This model DR3-3143 not support 3/4G mobile communication function.

Table of Contents

Disclaimer	4
1. Introduction.....	5
1.1 Best Technology	5
1.2 Easiest to install.....	5
1.3 Enterprise security.....	5
1.4 Cirrus Software as a Service	5
2. Installation Planning	6
2.1 Infrastructure.....	6
2.1.1 Connecting the Gateway to Internet	6
2.1.2 Building the IoT Network.....	6
2.1.3 Infrastructure Examples.....	6
2.2 Use Cases	9
2.2.1 Space Utilization.....	9
2.2.2 Comfortability	9
2.3 Installation Tool	10
2.4 Privacy	10
3. Installation of Infrastructure	11
3.1 Yanzi IoT Gateway overview and installation	12
3.2 Gateway Functions.....	13
3.3 Gateway LED Behavior	14
4. Teams and Equipment.....	15
5. Sensor Handling Tips	16
5.1 Battery lid	16
5.2 Sensor element	16
5.3 Battery insertion.....	16
5.4 External power input	16
5.5 Sensor buttons and switches.....	17
6. Placement of Sensors.....	18
7. Installation of Sensors	19
7.1 Start Yanzi Installation tool.....	19
7.2 Installation Procedure.....	19
7.3 Yanzi Footfall Camera Overview and Installation.....	20
8. Wireless Communication	22
9. SIM card management	23
9.1 SIM card requirements for Yanzi IoT Gateway 3G.....	23
9.1.1 SIM requirements.....	23

9.1.2	Operator requirements	23
9.2	Mobile Broadband Coverage	23
9.3	Replacing SIM card in IoT Gateway 3G	25
9.4	IoT Gateway 3G SIM card configuration	27
10.	Working with Sensors	28
10.1	LED Behavior	28
10.2	Resetting a device	28
11.	Battery Requirements	29
11.1	Battery Consumption	30
11.2	Note on Lithium Batteries	30
12.	Troubleshooting	31
13.	Security	32
13.1	Secure from Node to Cloud	32
13.2	High Security Cloud Model	33
14.	IEEE 802.15.4 Overview	34
15.	Privacy Note Examples	35
15.1	E-Mail Example	36
15.2	Desk Note Example	36
16.	Disposal and Recycling Information	37
17.	General Product Information	38
18.	Regulatory Information	40
18.1	Yanzi Motion+	40
18.2	Yanzi Comfort	40
18.3	Yanzi IoT Gateway 2	41
18.4	Yanzi Presence Mini	41
18.5	Yanzi IoT Hybrid Mesh	42

Disclaimer

Information in this document is provided in connection with Yanzi products. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Yanzi's Terms of Service and other sales conditions for such products, Yanzi assumes no liability whatsoever, and Yanzi disclaims any express or implied warranty, relating to sale and/or use of the Yanzi products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright or other intellectual property right. Products from Yanzi must be used only for smart office applications as recommended by Yanzi and are not designed, intended or authorized for use for critical applications, including, but not limited to, life support, health and safety, aviation, nuclear, and security applications or for any other application in which the failure of the Yanzi product could create a situation where personal injury or death may occur. Yanzi may make changes to product(s) and/or the service described in this manual, specifications and product descriptions at any time, without notice.



Using your Yanzi products safely

- Follow the battery requirements in section 11 before installing any batteries.
- Never force a connector into a port. If the connector and port don't join with reasonable ease, they probably don't match. Make sure that the connector matches the port and that you have positioned the connector correctly in relation to the port.
- Protect your Yanzi products from direct sunlight
- Keep away the Yanzi products from sources of liquid, e.g. drinks, bathtubs, washbasins, shower stalls and so on.
- Use Yanzi products in environments according to specification. Most products are targeted for indoor office use only.
- Only use Yanzi provided power supplies for products requiring external power.
- There are no user-serviceable parts inside Yanzi products. For service personnel: Always unplug external power supply, remove batteries, and turn off UPS battery before service operation.

About handling

Your Yanzi products may be damaged by improper storage or handling. Take caution not to drop them during transport and installation. The passive infrared sensor elements (PIR) (used in e.g. Yanzi **Motion**, Yanzi **Motion+**, Yanzi **Presence**, and Yanzi **Presence Mini**) are particularly sensitive to external force, so handle them with extra care.

WARNING: Do not attempt to open or disassemble any Yanzi products. You run the risk of electric shock and voiding the limited warranty. No user-serviceable parts are inside.

1. Introduction

Yanzi Networks delivers an end-to-end, horizontal, and all-IP software Internet of Things platform. We offer sensors, gateways, and Cirrus, a cloud platform solution packaged into a Software as a Service solution (SaaS) for Smart Building applications. The horizontal and all-IP approach provides a solution that is fast, robust, and transformative.

1.1 Best Technology

All IP technology, all the way to the sensor, ensures powerful scaling to thousands of sensors and excellent cost efficiency. Yanzi Networks focus on open standards and leverage the widely deployed protocols such as Ethernet, Wi-Fi, and the low power "brother" to Wi-Fi, IEEE 802.15.4, which enables battery operated sensors to last for 10+ years.

1.2 Easiest to install

Automatic security provisioning provides best-in-class installation provided by the patent pending zero-touch configuration. Sensor installation do not need professional installers but can leverage the employees on site. The optimized power management deliver very long battery life which secure a minimum of maintenance required once installed.

1.3 Enterprise security

Yanzi Networks combines ease of installation and maintenance with enterprise security. It is a highly secure solution with all links in Cloud and to Gateway being authenticated with client and server certificates and all communication is made using SSL encryption. All local communication, between the sensors and the Gateway, is encrypted for both wired and wireless solutions. Each sensor has an individual key and can be revoked remotely.

1.4 Cirrus Software as a Service

The Yanzi Cirrus Software as a Service provides Device and Gateway management at a new level. The Cirrus data model allow access to any data originating from any location with a uniform interface without the need to understand the sensor details. A secure Gateway-to-Cloud connector to multiple redundant link servers provides reliable remote access to Gateway.

The Cirrus open API is a JSON over web socket API where all operations are authenticated. The API support both subscriptions models as well as request/response.

2. Installation Planning

2.1 Infrastructure

The infrastructure has two parts: The Gateway and the IoT network. The Gateway is the brains of the system and manages all sensors, collects all data, and keeps a communication channel open to the Cloud. The IoT network is required to enable sensors to communicate with the Gateway. The IoT network is completely built on IP communication, same as on the Internet. The IoT network is built using one or more Access Points, just like a WiFi network is built. The Access Points communicate with the Gateway using standard Ethernet connectivity. For more information on networks and wireless technologies, please see support sections below.

Before ordering any infrastructure products, the first step is to decide type of Internet connection and way to build the IoT network according to the following sections.

2.1.1 Connecting the Gateway to Internet

Gateways can be connected to the Internet in two ways:

- 1) Sharing the Internet connection already available in the building or
- 2) Using a mobile broadband uplink

Sharing the Internet connection does not mean the IoT network must run on the corporate network. It means using a separate port on the customer' firewall to create a separate network that only provides Internet access.

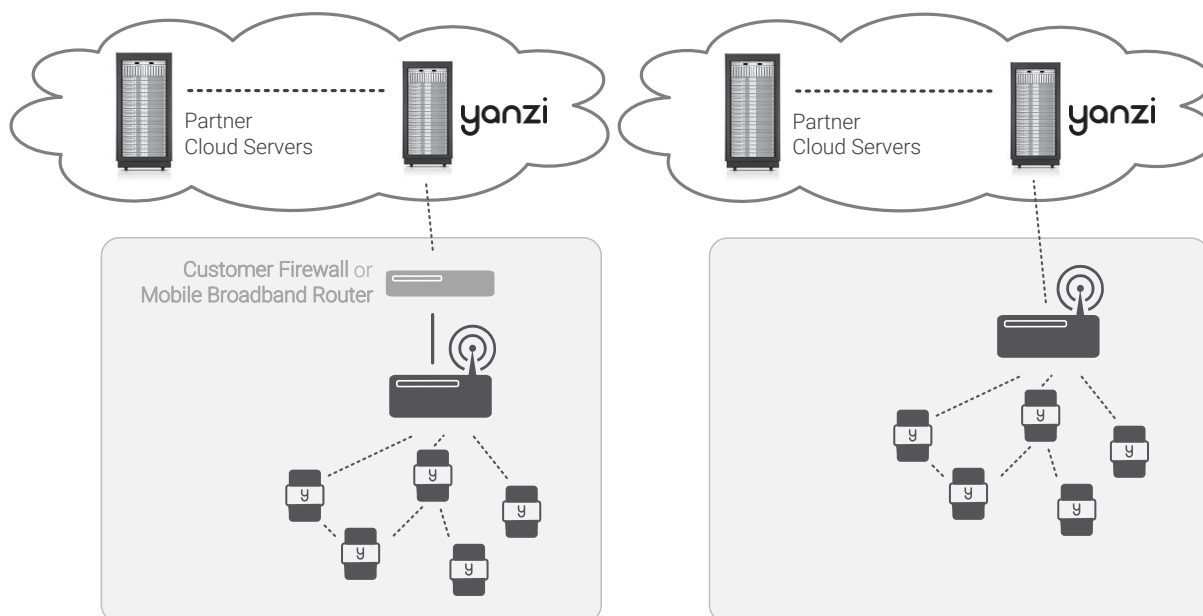
2.1.2 Building the IoT Network

The IoT Network can be built in two ways.

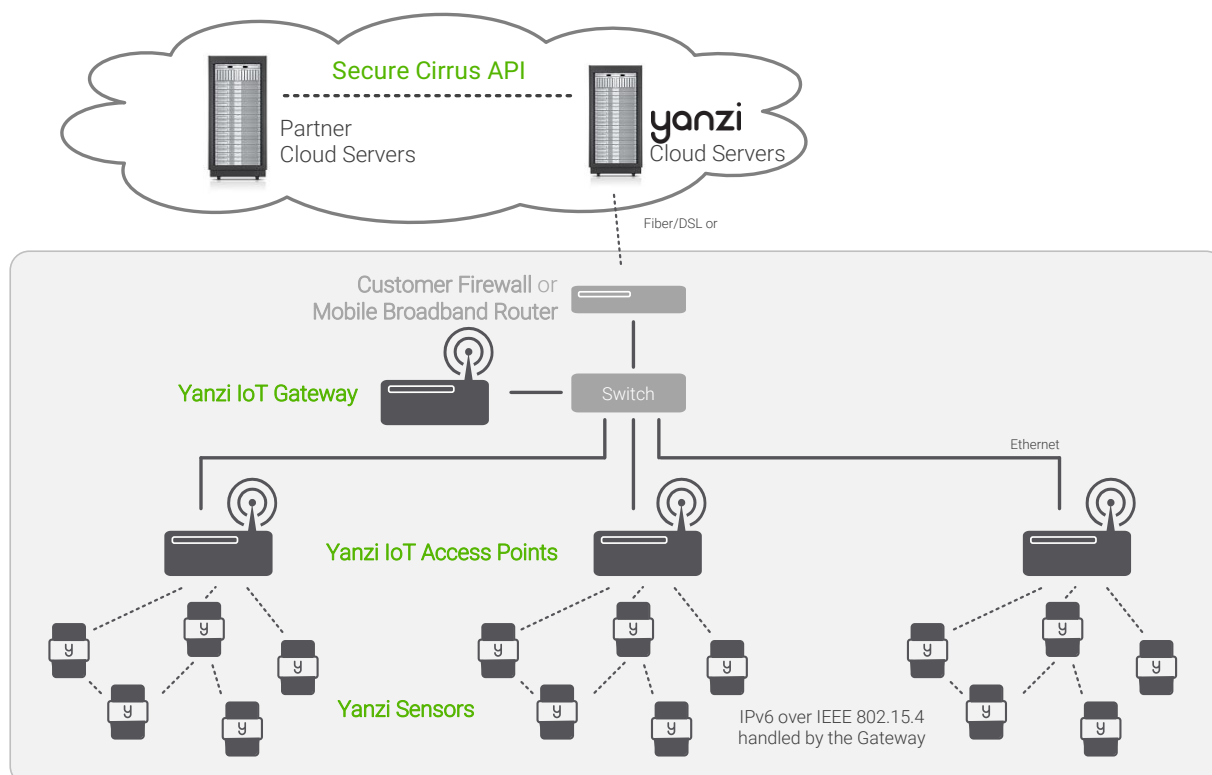
- 1) If there are Ethernet cabling available in the building, it may be possible to use a single Gateway and connect that to one or more Access Points using those Ethernet cables.
- 2) If there are no Ethernet cabling available and it is not possible to pull new cables, the IoT network is built using one or more Gateways connecting to the cloud over mobile broadband. Most of the Gateways have access points capabilities already built-in so a small IoT network can be created around each Gateway. These Gateways all communicate separately with the Cloud.

2.1.3 Infrastructure Examples

Small system where only one Gateway is enough to create the wireless IoT network. Internet connectivity can be provided using Ethernet (on the left) or using built-in mobile broadband in the Gateway (on the right).



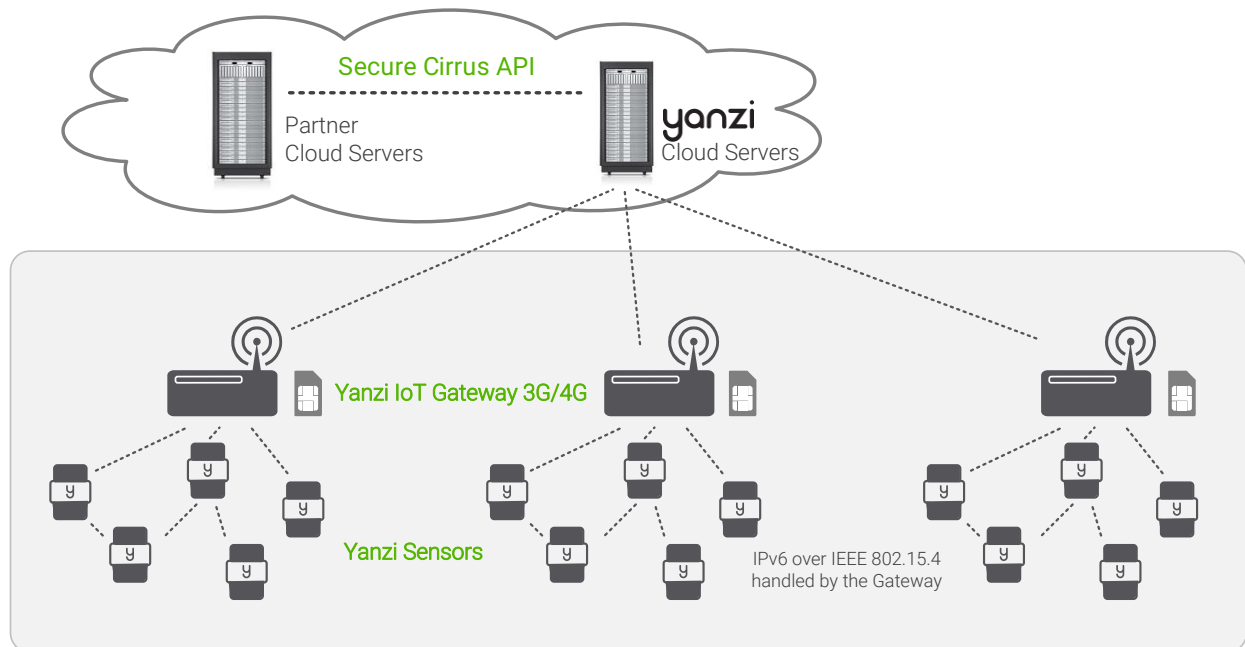
Large system reusing Ethernet infrastructure in building and where Internet connectivity can be provided by sharing a port on the existing firewall or using an external mobile broadband router.



- Gateway and Access Points needs a network with a DHCP server to get IP addresses assigned.
- The Gateway communicates with the Access Points using UPnP and SSL over Ethernet
- Internet connection only requires outgoing port 443 and 4445. No inwards connection required. Gateway connects automatically to the Yanzi server.
- All communication links are encrypted

- PoE switch connects and powers all IoT Access Points (when AP has PoE support)
- Optional UPS on PoE switch and Gateway to enable operation when power is lost

Large system completely stand-alone without using any existing infrastructure.



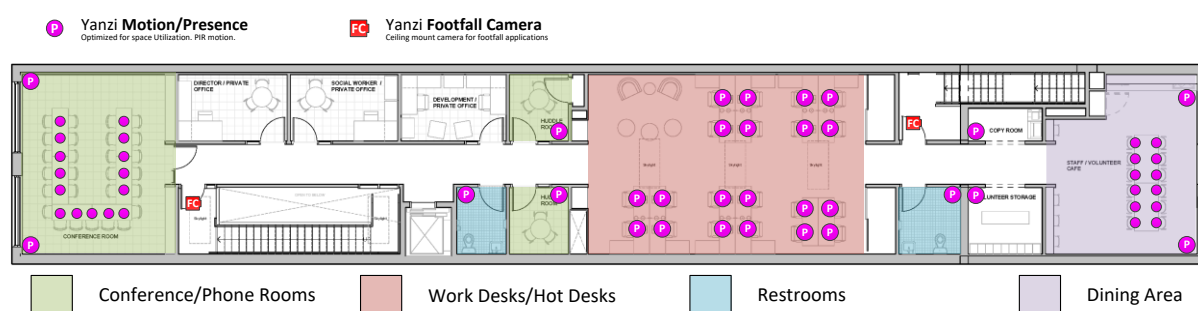
2.2 Use Cases

Depending on which use case to cover, the type and position of sensors may vary. Two typical use cases are shown below for space utilization and comfortability.

2.2.1 Space Utilization

For space utilization, Yanzi Motion/Presence sensors are added under the table at each work desk chair and at each chair of larger conference rooms (typically rooms with 6 chairs or more) to detect usage. For room usage, Yanzi Motion/Presence or Yanzi Motion+ is placed on the wall (rooms larger than 20m² are recommended to use two sensors to make sure the whole room is covered). Selection between Motion/Presence sensor and Motion+ sensor depends on if comfortability use case also should be covered as the Motion+ sensor monitors more things than the Motion/Presence sensor.

Motion/Presence sensors may also be used for restroom utilization to monitor each stall as well as the washroom.

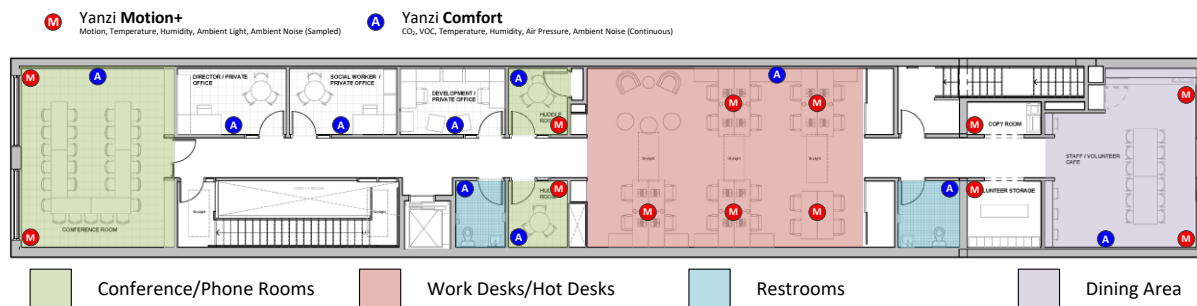


Footfall cameras may be placed in the ceiling of each entrance to the building and can as well be placed at the entrance to any area where specific information is wanted. The footfall cameras are connected to the Gateway using Ethernet/PoE. This proposal do not focus on footfall cameras.

2.2.2 Comfortability

For comfortability, the work environment is monitored using for example CO₂, temperature, humidity, barometric pressure, volatile organic compounds (VOC), ambient light and ambient noise sensors. Yanzi Comfort sensors are placed in each room (conference room, phone booths, locker room, etc.) where people are present for longer periods of time as well spread out in open work spaces. In open work spaces, recommendation is to use one Yanzi Comfort for each 15-25 work desks.

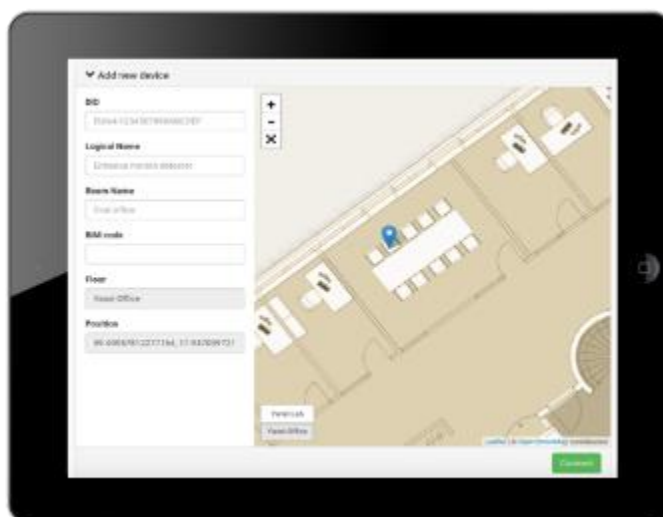
Yanzi Motion+ are used to monitor occupancy and light at work desks (preferably placed in the ceiling where it covers about 6-8 work desks depending on height of ceiling). It is also used to monitor utilization of smaller rooms such as conference rooms, phone booths, locker rooms, storage rooms, kitchens, restrooms, etc.



2.3 Installation Tool

One of the important parts after the installation is to know where sensors have been placed. The mapping between the sensor unique ID and the physical location is done at time of installation using the Yanzi installation tool in Yanzi Live. This is a browser based installation tool that allows for quick installation of many sensors.

Prior to installation, make sure the floor map(s) has been provided to Yanzi and added to your account.



2.4 Privacy

It is strongly recommended to inform personnel of the reasons for the installation, that their privacy is respected and maintained at all times, and clarify that no images, video, or sound is ever recorded.

The correct process for this is up to each company to decide but Yanzi recommends the following as a basis:

1. Send an email with information two weeks prior to installation
2. Leave a note on each person's desk at the time of installation
3. Send an email again after installation is done reminding why this is done

See section 15 for examples of wording.

3. Installation of Infrastructure

Gateways are recommended to be registered prior to installation. Register means connecting the Gateway to a specific account. Users can then be added or removed from this account to control access. Registration is done using the installation tool or provided as remote support by Yanzi. Yanzi needs the Gateway ID (printed on the Gateway label), the location name it should have, as well as a user with administrative rights for this account.

Make sure the infrastructure is always built prior to installing any sensors. Install the Gateway and connect it to Internet. Install the Access Points and connect them to the same network as the Gateway according to the pictures above.

The wireless IoT network created around Access Points have a range of about 500-1,500 m² (~ 5,000-15,000ft²). The actual range depends heavily on walls, obstacles, materials, and number of potential mesh nodes (This is very similar to WiFi access points). Wireless coverage is affected for example by elevator shafts (lots of metal), bathrooms (water and thick walls), and other radio disturbances such as WiFi access points and microwave ovens.

IoT Access Points (or Gateways with mobile broadband) is shown below with an approximated wireless coverage shown as orange circles. In this specific building, two Access Points per floor is enough.



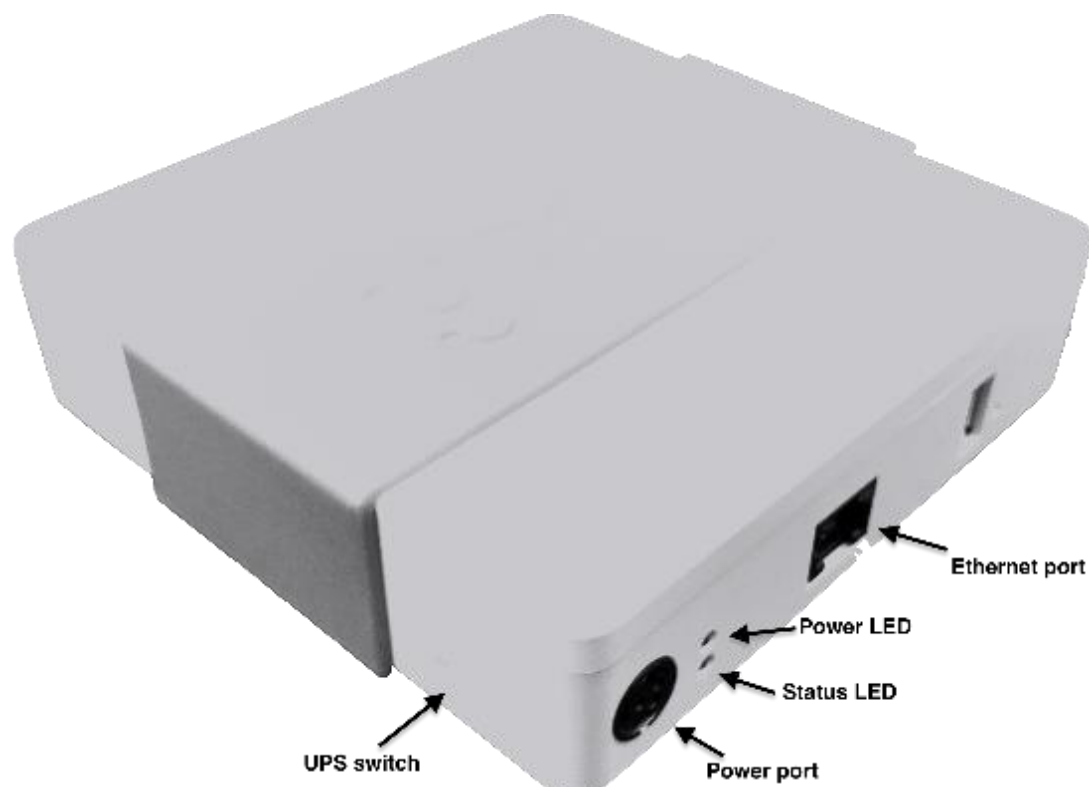
3.1 Yanzi IoT Gateway overview and installation

The following applies to all variants of Yanzi IoT Gateway (DR2-88xx) and Yanzi IoT Gateway Plus (DR2-89xx). For more details on gateway LED behavior, see section 3.3.

Installing and registering a gateway

1. Insert the included power adapter to a power outlet and plug in the cable to the gateway. The power LED should now turn solid green.
2. Optional: *Enable the gateways built in UPS by pushing the switch located on the left side of the gateway towards the grey sleeve (Applies to Yanzi Gateway and Yanzi Gateway Plus).*
3. Connect the gateway to internet
 - a. For Ethernet based gateway: *Connect an Ethernet cable to the gateways Ethernet port. Connect the cables other end to an available switch/router port with internet access.*
 - b. For 3G based gateways: *Once the gateway has booted, it will search for a cellular network, please allow up to 10 minutes for this to complete.*
4. Once step 3 is complete and the gateway has established a connection to the Yanzi cloud, the status LED should blink green.
5. Register the gateway – follow the below steps;
 - a. Use Googles Chrome browser, go to the link specified by Yanzi, typically something like <https://cirrus.yanzi.se>
 - b. Sign in using the credentials provided by Yanzi, email and password
 - c. In the upper right hand corner (below the search field) you will find a “**+Install Gateway**” button. Click this and enter the details in the ‘Connect New Gateway’ field
 - i. Gateway ID: *Fill in your gateways ID, located on the silver label on the gateway*
 - ii. Location Name: *Fill in the name of your Location, e.g. “Yanzi HQ”.*
 - iii. Account: *Select an account to link this Location to and click register*
6. Once the registration process is complete, the status LED will turn solid green.

3.2 Gateway Functions



Port	Description
Power Port	Only use Yanzi Wall Adapter according to Gateway datasheet, typically 12V/2A.
Ethernet Port	1x 10/100 Ethernet port (DR2-88xx) 2x 10/100 Ethernet ports (DR2-89xx)
UPS Switch	Enables/disables built-in battery backup. Push to front to disable. Push towards rear to enable.
Power/Status LED	Indicates power status according to section 3.3.
USB Port	Reserved. Do not use.

3.3 Gateway LED Behavior

Yanzi IoT Gateway and IoT Gateway Plus both have a dual color LED that can indicate green or orange. The typical LED behaviors are shown in the table below.

Gateway LED State	Yanzi IoT Gateway	Yanzi IoT Gateway Plus
Top LED (Power)		
Off	Power is off	Power is off
Steady green	Power applied and gateway is turned on	Power applied and gateway is turned on
Steady orange	N/A	External power failure, the gateway is operating on the built-in battery
Bottom LED (Status)		
Off	Status LED is off whenever the gateway is off and during boot	Status LED is off whenever the gateway is off and during boot
Blinking green	Gateway is ready to be registered in the portal	Gateway is ready to be registered in the portal
Steady green	Gateway is connected to portal	Gateway is connected to portal
Steady orange	Gateway has local access but is not connected to the portal	Gateway has local access but is not connected to the portal
Blinking orange*	Mobile broadband connection error	Mobile broadband connection error
*Applies to 4G/3G gateways	This could for example indicate that all the monthly data has been used	This could for example indicate that all the monthly data has been used

4. Teams and Equipment

Most efficient is usually to have installer teams of 2-3 persons. Multiple teams can work in parallel for quicker sensor installations. 1 person places the sensor on the floor map and scans the QR code. 1-2 persons place the sensor on the correct spot in the building.

Each installation team needs

- Laptop with Chrome browser
 - Internet access is required for the laptop as installation tool is web based
- QR code scanner
 - Such as the Motorola, Symbol, or Zebra DS6708
- Plastic bins for carrying sensors
- Access to all rooms in building where sensors are to be placed

5. Sensor Handling Tips

5.1 Battery lid

To open and close the battery lid, gently push the back side label close to the battery lid with your thumb and slide the battery lid downwards with your other hand.

5.2 Sensor element

The sensor elements must be handled with care as these are sensitive parts.

5.3 Battery insertion

The battery powered sensors operate with 2 or 4 batteries. Two batteries makes the product run for half the time which is usually 5 years. When using two batteries, please use the bottom two battery slots as shown in section 11. Note the polarity when inserting the batteries. Polarity is always shown in the sensors battery compartment as well as on the battery itself.

It is very important to follow the battery requirements when inserting batteries, see section 11 for more details.

Verify that the front panel LED is turned on within 5 seconds after inserting batteries. Note that it may only be turned on for a very short while to save battery. If you do not see the LED come on even for a short while, please remove the batteries and re-insert them again. If it still doesn't work, please see the Troubleshooting section.

5.4 External power input

For sensor requiring an external power supply, insert the USB-C connector on the bottom side of the sensor carefully until a "click" is detected. See each product manual for more details.

Verify that the front panel LED is turned on within 5 seconds after inserting power.

5.5 Sensor buttons and switches



All Yanzi sensors have a *status button*, a short press on the status button will indicate the status using the LED, see 9.1 for LED behavior.

Some sensors ship with batteries already inserted and therefore have a *power switch*. Carefully push the switch to its upper position to turn on the sensor. Should you want to turn off the sensor, carefully push the switch to its downward position. Use a sharp tool such as a paper clip or mobile phone SIM card ejector to flip the switch.

Yanzi Motion+ shown as example above

6. Placement of Sensors

General tips on placement

- Try to place the sensors in discrete locations
- Place sensors along walls at about 150-170 cm (60-70 inches) from floor
- Sensors are attached using adhesive tape
- Target wood, plastic, or metal surfaces that are flat
- Avoid wall papers as they may break if sensor must be removed
- Avoid painted walls when using adhesive tape as modern paint is efficient in repelling adhesive tape
- Dry target surface with a cloth to remove dust, dirt, and grease
- Remove tape cover and press firmly ON THE SLEEVE for 10 seconds. After 10 seconds, the adhesive tape is strong enough to hold the sensor. Full adhesiveness is reached after 72 hours.

Yanzi **Motion+**

- Place on wall of smaller rooms such as conference rooms and phone booths
- Place in ceiling above groups of 4-8 work desks

Yanzi **Comfort**

- Place on wall not close to work desk
- Place vertically with the power connector facing downwards
- Avoid placement near any air ventilation inlets or outlets as this may cause inaccurate readings
- Requires a power outlet within 0.5 meters (longer cables available as accessory)

Yanzi **Presence** for work desks

- Place under work desk about an arm's length from edge

Yanzi **Presence** for conference room chairs

- Place under conference room table at each chair about an arms length from edge

Yanzi **Presence** for conference room corner

- Place in corner of smaller rooms and along walls in larger rooms
- Face away from windows to avoid direct sunlight
- Face away from door to avoid detecting people walking outside the room
- Use multiple sensors for large rooms (>20m²)

7. Installation of Sensors

Sensors are installed using the Yanzi installation tool. Make sure you get login credentials from Yanzi prior to installation and that the floorplan of the building has been added to the account.

7.1 Start Yanzi Installation tool

- 1) Using a Chrome browser, go to the link specified by Yanzi, typically something like <https://cirrus.yanzi.se>
- 2) Sign in using the credentials provided by Yanzi, email and password
- 3) When logged in, click “Locations” in the left column
- 4) In the list of locations, click on the location where installation should take place.
- 5) Click “Installer” to the right of the top bar
- 6) The floor plan will now open and you are ready to install sensors

The Yanzi installation tool is a cloud based tool so make sure Internet connection is available throughout the building.

7.2 Installation Procedure

- 1) Select floor in the bottom left corner of the map
- 2) Zoom into area on the floorplan where the sensor should be installed
- 3) Click on the exact location where the sensor will be installed
- 4) Add the following properties in the “Add new device” list
 - DID.** Scan the sensor QR code using the hand scanner.
Example: EUI64-0090DAFFFE00526A
 - Optional: **Logical Name**
Example: Entrance motion detector
 - Optional: **Room name**
Example: Oval office
- 5) Click “Connect” in bottom right corner
- 6) Turn on the sensor
 - For battery powered sensors: Push power switch to ON (see section 5.5) or insert batteries.
 - For USB powered sensors: Insert the USB cable and plug in the power adapter to a wall socket.
- 7) Verify the LED on the front panel is lit within 10 seconds. If the LED has not made any indication within 10 seconds, check batteries or external power.
- 8) Dry target surface with a cloth to remove dust, dirt, and grease
- 9) Place sensor by removing the non-stick film on the back of the sensors sleeve and place it into position by pressing FIRMLY on the gray sleeve for 10 seconds (if adhesive tape is used)
- 10) Restart at point 3 for next sensor

When done, leave the Installer and go to the List view to verify that all your added sensors are connected.

Sensors are assigned a radio channel, encryption key, and configuration settings automatically and data should be available in the Cloud within a few minutes after installation.

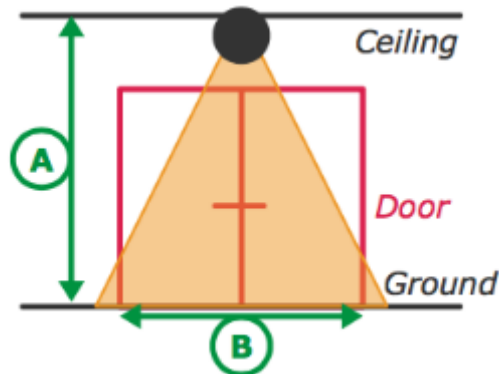
7.3 Yanzi Footfall Camera Overview and Installation

General requirements

The Yanzi footfall camera must:

- Be mounted with the correct orientation
- Be in an area where, preferably, people do not stagnate
- Be in a place with adequate illumination
- Be outside of the door opening area

Depending on the ceiling height, the width the camera will be able to count varies as shown in the illustration and in the chart below.

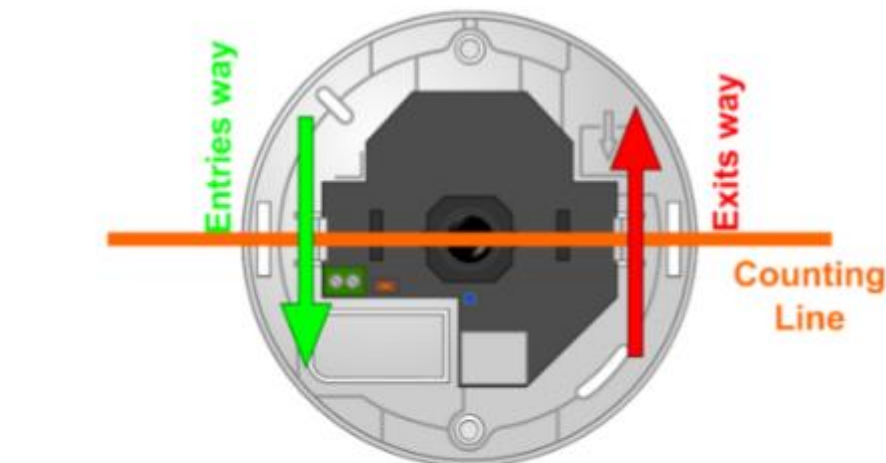


Height (A)	Width (B)
2.5m	2.5m
3.0m	3.5m
4.0m	5.5m
5.0m	7.0m
6.0m	9.0m
7.0m	11m
8.0m	12m

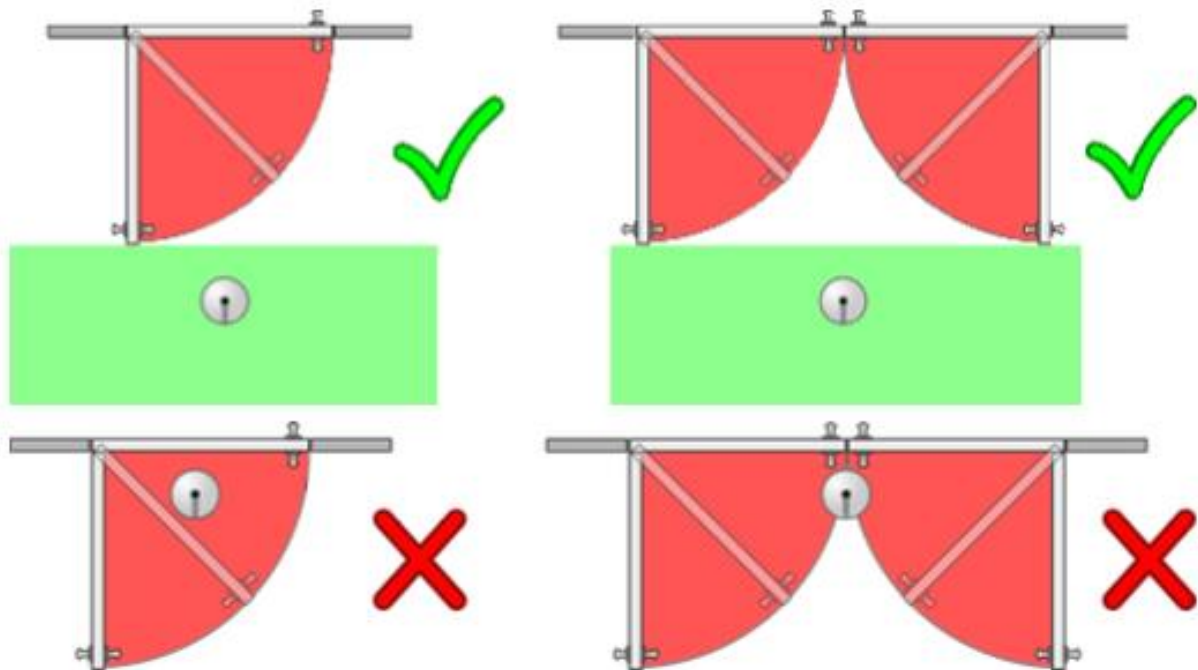
The camera correctly and as shown



footfall must be aligned oriented below.



Ensure that the door won't open directly under the cameras counting line.



Installation and configuration

1. Mount the camera in the ceiling, having considered the requirements listed above. Make sure you connect the camera using an PoE switch as it gets power over Ethernet. *Please note that the footfall camera must be connected to the same network as the Yanzi Gateway*
2. Log in to the footfall camera by typing in its assigned IP-address in your internet browser of choice. The default login credentials - username: *admin* and password: *admin*
3. When logged in, click Wizard and follow the steps to configure the footfall camera.
4. Once the footfall camera is mounted and configured you need to connect the footfall camera to you Yanzi Location, to do this:
 - a. Go to the Cirrus link specified by Yanzi, typically something like <https://cirrus.yanzi.se>
 - b. Sign in using the credentials provided by Yanzi, email and password
 - c. In the list of Locations, select the Location where you mounted the footfall camera and click **Installer**
 - d. In the dropdown menu called 'Discovered Things' you will now be able to see your recently installed footfall camera. Click **Quick Connect**
 - e. Your Yanzi Footfall Camera is now connected and will start pushing data to the cloud

8. Wireless Communication

Yanzi sensors operate on world-wide standard physical medias only such as IEEE 802.3 (Ethernet) and IEEE 802.11 (WiFi) for high performance sensors, and IEEE 802.15.4 for very low power sensors. The wireless protocols are all designed by IEEE to operate simultaneously with minimum interference. Yanzi uses very low power for IEEE 802.15.4 sensors in order to be friendly with WiFi. An advanced back-off/retransmission scheme ensures good coexistence with Wifi networks as well as providing minimal impact from unwanted interference.

IEEE 802.15.4 has similar range to WiFi and normally operates on the same ISM band, 2.4GHz. There are Sub-GHz solutions for IEEE 802.15.4 as well but for normal high density installations, it is not required for reach.

For more details on IEEE 802.15.4, please see section 14.

Sensors communicate periodically (typically every minute but depends on type of sensor) with the Gateway. Events are communicated immediately (and not periodically) for fast notifications. All communication is full duplex ensuring that all packets are received properly.

9. SIM card management

Yanzi Gateways with mobile broadband are shipped without SIM card inserted. This section describes the requirement for the SIM card as well as instructions on how to add a SIM card and configure the Gateway accordingly. For details on pre-supported operators and countries, please see section 15.

9.1 SIM card requirements for Yanzi IoT Gateway 3G

9.1.1 SIM requirements

Item	Requirement	Note
Bandwidth	Minimum HSPA	HSPA is up to 5.76 Mbit/s
Data amount	5 – 20 GB/month	Data usage heavily depends on the implementation of the analytics, front end, and end usage. For many installations, 5GB/month works well but Yanzi strongly recommends 20GB/month .
Over-usage of data	-	Strongly recommended that operator does not incur extra charges for over-usage of data. Customer will be responsible for any extra charges.
PIN	No	Pin code must be disabled
APN	Standard APN and APN authentication (username/password)	APN and APN authentication must be made available to Yanzi at the time of order if Gateway is to ship pre-configured.
Size	Micro-SIM	
Management	-	Web interface with over-usage warning recommended
Roaming	Sweden	Roaming for Sweden must be enabled (without requiring confirmation by the user) with at least 100 MB of data in order to verify APN configuration.

9.1.2 Operator requirements

Network frequency: 850/900/1900/2100MHz

Network speed: Minimum HSPA

9.2 Mobile Broadband Coverage

Good radio coverage is required for the service to work well. Verify prior to installation that the chosen operator has 3G and 4G access in the building where Gateways are to be installed. Note that even if the operator says the area has coverage, it doesn't mean coverage is available inside the building.

9.3 Replacing SIM card in IoT Gateway 3G

Always take extra caution when working with exposed electronics, never touch the internal components or the logic board.

1. Remove the grey Yanzi sleeve
2. Using a Philips screwdriver, unscrew the three screws on the back of the gateway

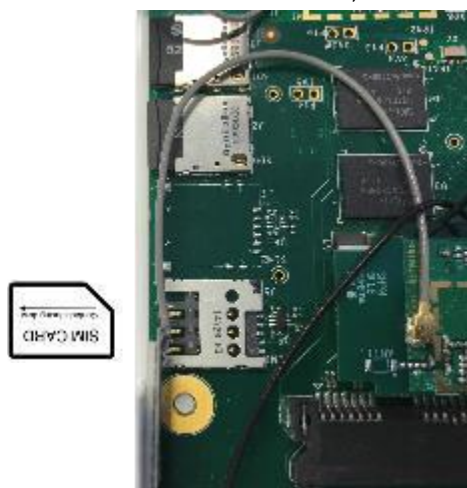


3. Carefully open the gateway as the top lid holds the battery and is connected to the logic board



4. Carefully push the micro-SIM card out of its holder

5. Insert the new micro-SIM card, take note of the SIM card orientation shown below



Yanzi IoT Gateway



Yanzi IoT Gateway Plus

6. Re-assemble the gateway

Please note that you will have to update the gateways SIM card configuration after changing operator. See section 9.4.

9.4 IoT Gateway 3G SIM card configuration

Put files in a folder named yanzi-upgrades on a USB stick and add the three following files as shown in the table below. Please note that the three files must not include a file extension.

Filename	Description	File content	Comment
wwan	Wireless WAN (3G)	on/off	When the wwan file contains "on" 3G will be enabled and when containing "off" the gateway will be configured for Ethernet use.
apn	APN config	3g.telia.com	Telia APN show as an example, ask your SIM card provider for the correct APN.
apn.auth	APN Authentication	username:password	Note that not all operators require an APN authentication, if yours doesn't, don't include this file.

Once you have put these files on a USB stick, follow the steps below:

1. **Ensure gateway is off**
2. **Insert the USB stick**
3. **Turn the gateway ON** (USB still inserted, let the gateway run for at least 15 mins)
4. **Turn the gateway OFF** (USB still inserted, make sure gateway is switched off at least 10 seconds)
5. **Turn the gateway ON** (USB still inserted, let the gateway run until the lower LED turns solid or blinking green)
6. **Remove the USB stick**
7. **Reboot the gateway:** Verify the lower LED still turns green (or blinking green)

10. Working with Sensors

10.1 LED Behavior

All sensors have a dual color LED that can indicate green or orange. The typical LED behaviors are shown in the table below.

Sensor LED State	Description	Note
Off	Power is off or sensor is in sleep	All sensors turn the LED off a short while after power has been applied to avoid light pollution. A short press on the button turns the LED on to display status if sensor has power (see section 5.5)
Short orange or green blink	Power has just been applied and sensor is booting up	Wait a few seconds for actual status
Blinking green (slow)	Sensor is ready to be peered with a location	Use the installation tool to peer the sensor with a Gateway (Location)
Steady green	Sensor is peered with a location and working	
Blinking green (fast)	Sensor is about to be reset	See details on resetting a device in section below
Blinking orange/green (fast)	Sensor has been reset to factory default	See details on resetting a device in section below

10.2 Resetting a device

If a device should be removed from an installation, please hold the status button (see section 5.5) on the sensor pressed for about 20 seconds. After 15 seconds the LED will start flashing green quickly to warn that if you keep the button pressed, it will reset. After another 5 seconds it will start flashing orange/green which means it will now reset when the button is released. Release the button and the sensor will reboot as factory default.

11. Battery Requirements

It is very important to follow these guidelines to avoid serious injuries. Bad handling of batteries may cause them to leak, potentially rapidly, creating a risk of injury as the internals of batteries are very corrosive. It is recommended to use Alkaline batteries in most use cases and Lithium (LiFeS₂) for cold use cases.



- NOTE THE POLARITY OF THE BATTERIES WHEN INSERTING THEM. Polarity is always shown in the battery compartment as well as on the battery itself. The plus side is marked on the picture below.
- NOTE THE VOLTAGE OF THE BATTERIES. There are several voltages available for the same size of batteries. See the product manual for details on which battery to use.
- ONLY USE NEW BATTERIES. Batteries older than 1 year should be avoided as they may have aged differently and therefore cause harm when used together.
- NEVER MIX TYPE OF BATTERIES. Only use the same type of chemical compound in all batteries.
- NEVER MIX OLD AND NEW BATTERIES. Make sure all batteries used are from the same package.
- IF BATTERIES GET WARM WITHIN 5 SECONDS AFTER INSERTION, REMOVE THE BATTERIES IMMEDIATELY.
- IT IS RECOMMENDED TO USE PROTECTIVE GLASSES WHEN WORKING WITH BATTERIES.



Note polarity symbols in the battery compartment

11.1 Battery Consumption

Yanzi sensors are very power efficient. Most battery driven Yanzi sensors consume less than 5uA during sleep which is class leading. Sensors wake up periodically to communicate with the Gateway with a configurable frequency. Sensors detecting motion communicates with the Gateway immediately upon motion for fast response times and goes to sleep for a certain time following a motion, called black-out period, to save battery. Things that affect the battery life is shown below. Battery life time cannot be guaranteed if used outside of below recommendation. Note that default sensor settings may differ from below requirements.

Item	Required for 5-year battery life <i>Yanzi Presence and Yanzi Climate</i>
<i>Battery</i>	
Type of battery	AA, 1.5V
Battery chemistry	Alkaline or LiFe
Number of batteries	4 (Inserted/replaced according to Yanzi battery requirements)
Battery capacity	Minimum 2,700mAh
<i>Usage</i>	
Radio usage	Minimum 70% of 2.4GHz radio channel Maximum background noise floor of -100dBm
Radio coverage	Minimum RSSI of -80dBm
Communication interval	2 minutes or more with 50% blackout period
Environment	16-25°C 20%-80% relative humidity
PIR usage	Maximum 8h per day
Peering process	Peered within 4 hours
Gateway availability	>99%

11.2 Note on Lithium Batteries

There are several types of Lithium batteries on the market in the standard size called AA. First, care must be taken to make sure the voltage is correct according to the datasheet; 1.5V, 3.0V, or 3.6V.

Yanzi has identified that several suppliers of 1.5V Lithium batteries of type LiFeS₂ often produce a voltage higher than 1.8V. Voltages above 1.8V may harm products targeted for 1.5V batteries so please verify that the battery you use follows the recommendations in the product datasheet.

12. Troubleshooting

Behavior	Solution	Note
Gateway won't connect	<u>Ethernet-based gateways</u> Yanzi IoT Gateway: 1. Ensure Ethernet cable is plugged in 2. Verify gateway is receiving power and is turned on Yanzi IoT Gateway Plus: 1. Ensure Ethernet cable is plugged in to the right-hand port 2. Verify gateway is receiving power and is turned on. If using PoE, double-check your switch is providing power over Ethernet. Yanzi IoT Gateway Rack: 1. Ensure Ethernet cable is plugged into the right-hand port (the one next to the VGA port) 2. Verify the gateway is receiving power and is turned on <u>3G/4G-based gateways</u> Yanzi IoT Gateway 3G: 1. Verify gateway is receiving power and is turned on 2. Ensure sim card is inserted Yanzi IoT Gateway Plus 3G: 1. Verify gateway is receiving power and is turned on 2. Ensure sim card is inserted	
Sensor won't connect	<u>Battery powered sensors</u> 1. Ensure batteries are inserted 2. Some battery powered sensors have a power switch, verify this is set to ON <u>USB powered sensors</u> 1. Ensure cable is plugged in 2. Verify the power adapter is plugged in to a working outlet	It is always possible to check any sensors status by pushing the button. The LED will then indicate the current state of the sensor, see section 10.1 for LED behavior.

13. Security

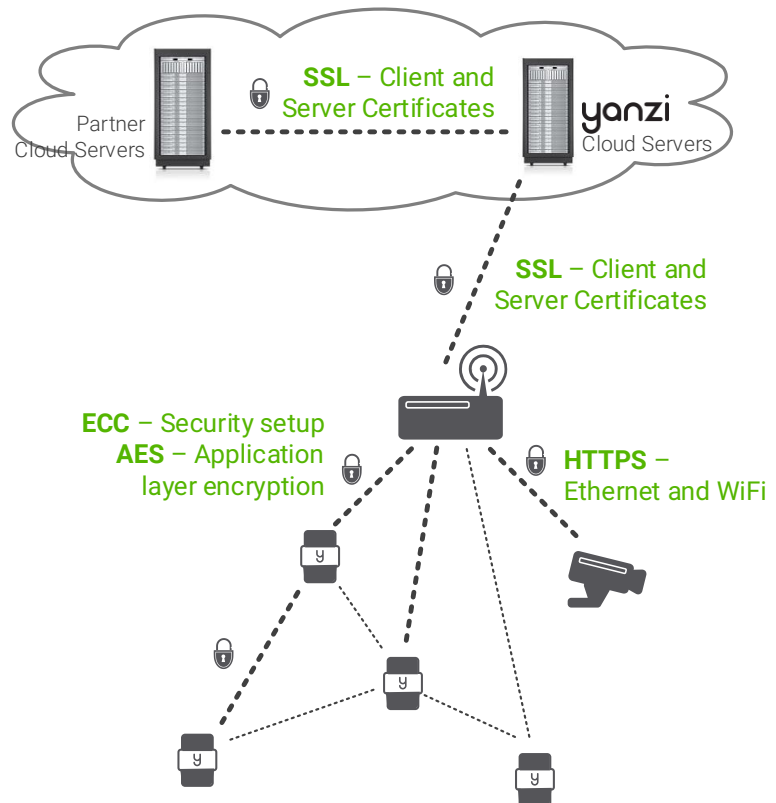
Security is one of the most important pillars as distributed IoT devices require high security on all links. This section gives a quick overview of the security models on Gateway to cloud and sensor to Gateway.

13.1 Secure from Node to Cloud

SSL encrypted channels from Open Cloud API to Cloud to Gateway authentication by certificate.

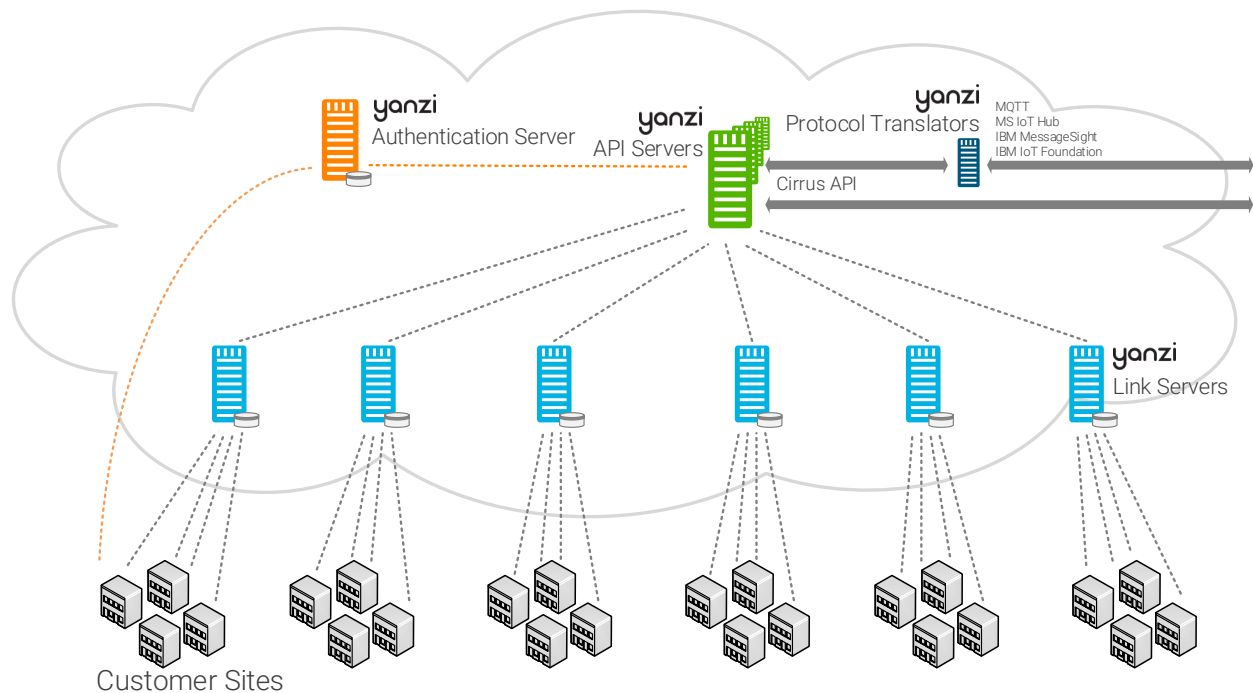
Automatic security provisioning of devices provides quick installation:

- Automatic key management with ECC (Vendor, Owner, and Location keys)
- Application layer encryption for user data and management data including firmware updates
- Layer 2 key distribution when applicable (Wi-Fi and IEEE 802.15.4)
- Individual security keys per device with revoke capability



13.2 High Security Cloud Model

All access to IoT data is authenticated in the API. All links are authenticated with client and server certificates and all communication is made using SSL encryption.



Data model

- **Authentication server** (Orange) signs all certificates as well as redirects the Gateways to the correct Link server
- **Link servers** (Light Blue) manage Gateways and pass data to Microsoft IoT Hub via API Server.
- **API servers** (Green) provides a secure interface to analytics partner and acts as an aggregator for multiple link servers.
- **Prototocl Translators** (Dark Blue) translates Yanzi Cirrus API to other APIs such as MQTT.
- Local **Gateway** (Gray) stores all sensor data temporarily to support autonomous operation when Internet connection is down

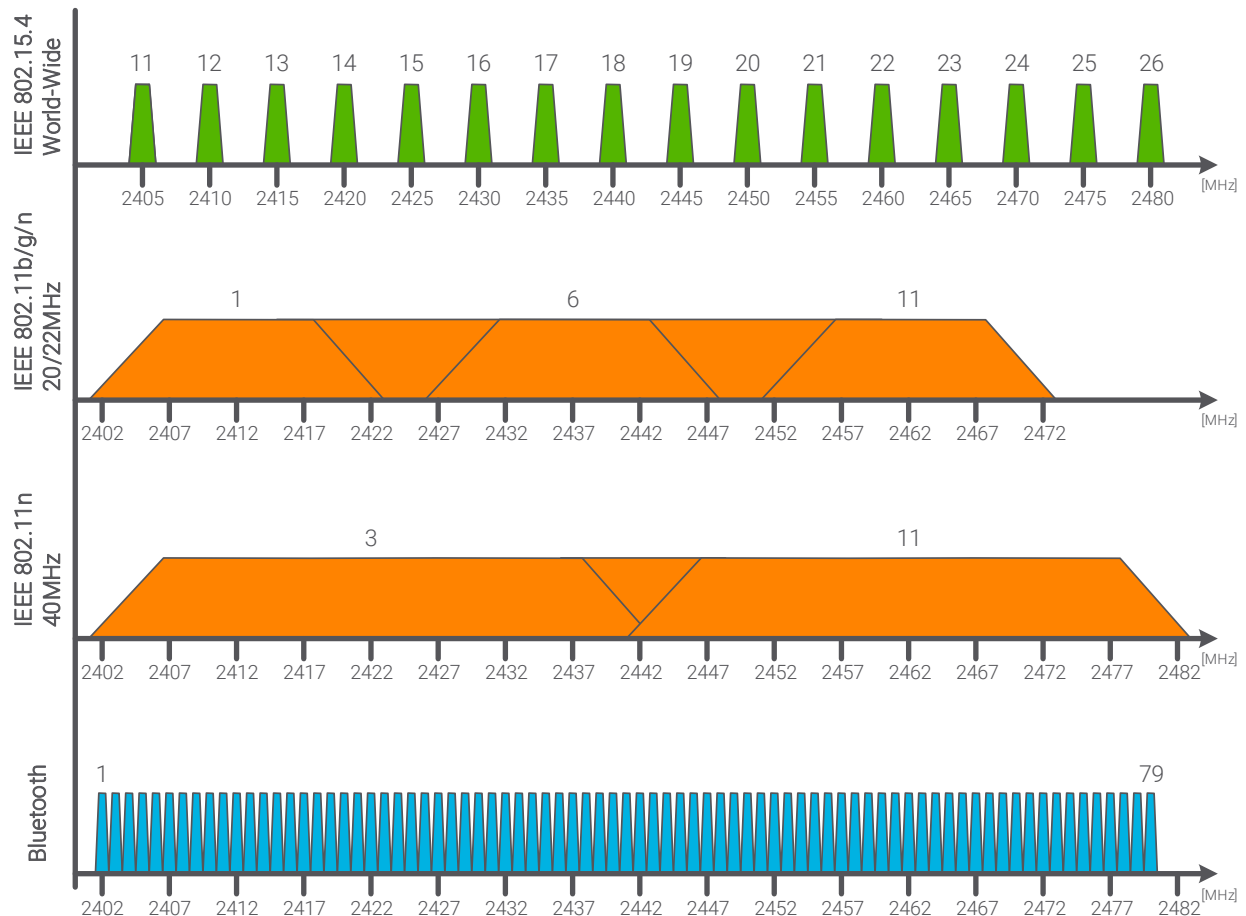
Two Cloud Server models:

- **Shared:** Servers are shared between customers
- **Dedicated:** All data is kept within a specific cloud provider

14. IEEE 802.15.4 Overview

IEEE 802.15.4 is a low power wireless network optimized for battery driven devices. On the world-wide approved 2.4GHz spectrum, it supports 16 channels with 250kbps per channel where each channel has a bandwidth of 2MHz.

A comparison with WiFi, IEEE 802.11b/g/n, and Bluetooth can be seen on the below picture. IEEE 802.11b uses 11 channels in US and 13 channels in Europe with a bandwidth of 22MHz per channel.



Yanzi Gateways automatically select channels for IEEE 802.15.4 that sensors attach to.

15. APN

The table below shows the pre-configured APN (Access Point Name) settings in the latest Gateway software release. Any SIM/APN settings outside this table must be manually configured according to section 9. If a manual configuration of APN results in a failed connection, the pre-configured APNs will be automatically tested by the Gateway.

Below APN settings are applied based on the SIM card IMSI (International Mobile Subscriber Identity) number according to longest prefix match. This list will be updated as more operators are qualified.

Country	Operator	APN	Username / Password	Network ID
Sweden	Telia	online.telia.se	- / -	24001
	Tre	bredband.tre.se	- / -	24002
	Tele 2	Internet.tele2.se	- / -	24007
	Telenor	internet.telenor.se	- / -	24008
Denmark	Telia M2M	internet.ts.m2m	- / -	23820

16. Privacy Note Examples

The privacy notes below are only examples and should be modified to work with your company's privacy policy.

16.1 E-Mail Example

The following contains some information about the smart sensors we will install throughout the office to help enhance the comfort of our teams.

Installing sensors is a step towards our continuous work to improve the office environment experience for all team members. By using these sensors, we can learn more about our office building and work environment, and begin to utilize it fully.

The sensors measure parameters such as temperature, humidity, CO₂ levels, light levels, motion, and ambient noise.

Being aware and able to track and analyze these factors in turn enables us to ensure a great working experience. Your workplace privacy is maintained and no video or sound is recorded at any time

If you have any questions regarding this, please do not hesitate to contact the project manager:

16.2 Desk Note Example

This desk is part of our efforts to improve the office experience and increase your comfort.

A sensor has been placed under this desk. Note that this sensor only gathers anonymous data and never pictures, video, or sound.

For more detailed information, please contact facility management.



17. Disposal and Recycling Information



This symbol indicates that your product must be disposed of properly according to local laws and regulations. When your product reaches its end of life, contact Yanzi or your local authorities to learn about recycling options.

18. General Product Information

The information below relates to the following products

- Yanzi IoT Gateway	DR2-8830
- Yanzi IoT Gateway Plus	DR2-8910
- Yanzi IoT Gateway 2	DR3-314x(DR3-3143 not support 3/4G, DR3-3146 support 3/4G)
- Yanzi Climate	SWTH1-1230
- Yanzi Motion	MDW1-0201
- Yanzi Presence	MDW3-0180
- Yanzi Presence Mini	MDH3-1620
- Yanzi Motion+	MDW3-0231
- Yanzi Comfort	SWAQ3-0372

These devices comply with part 15 of the FCC Rules / Industry Canada license-exempt RSS standard(s). 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.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class B 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 or more 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.

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. Les antennes installées doivent être situées de façon à ce que la population ne puisse y être exposée à une distance de moins de 20 cm. Installer les antennes de façon à ce que le personnel ne puisse approcher à 20 cm ou moins de la position centrale de l'antenne. La FCC des États-Unis stipule que cet appareil doit être en tout temps éloigné d'au moins 20 cm des personnes pendant son fonctionnement.

The information below relates to the following product
- Yanzi IoT Gateway Plus DR2-8910

For your own safety, and in terms of the RF exposure requirements of the FCC, always observe these precautions:

- Always maintain a minimum separation distance of 20 cm (7.8 inches) between yourself and the radiating antenna.
- Do not co-locate the antenna with any other transmitting device.

19. Regulatory Information

This section shows the regulatory information for each product and country that is not available on the product label.

19.1 Yanzi Motion+

The below information relates to Yanzi Motion+, MDW3-0231.

Country	Standard	Regulatory Information
China	SRRC	CMIIT ID: xxxxxxxxxx
Japan	MIC	XXX-ABCDEF
Mexico	IFETEL	IFT: xxxxxxxxxx
Singapore	iDA	Complies with IMDA Standards DBxxxxxx

19.2 Yanzi Comfort

The below information relates to Yanzi Comfort, SWAQ3-0372.

Country	Standard	Regulatory Information
China	SRRC	CMIIT ID: xxxxxxxxxx
Japan	MIC	XXX-ABCDEF
Mexico	IFETEL	IFT: xxxxxxxxxx
Singapore	iDA	Complies with IMDA Standards DBxxxxxx

19.3 Yanzi IoT Gateway 2

The below information relates to Yanzi IoT Gateway 2, DR3-314x.

Country	Standard	Regulatory Information
China	SRRC	CMIIT ID: xxxxxxxxxx
Japan	MIC	XXX-ABCDEF
Mexico	IFETEL	IFT: xxxxxxxxxx
Singapore	iDA	Complies with IMDA Standards DBxxxxxx

19.4 Yanzi Presence Mini

The below information relates to Yanzi Presence Mini, MDH3-1620.

Country	Standard	Regulatory Information
China	SRRC	CMIIT ID: xxxxxxxxxx
Japan	MIC	XXX-ABCDEF
Mexico	IFETEL	IFT: xxxxxxxxxx
Singapore	iDA	Complies with IMDA Standards DBxxxxxx

19.5 Yanzi IoT Hybrid Mesh

The below information relates to Yanzi IoT Hybrid Mesh, IoT-U42.

Country	Standard	Regulatory Information
China	SRRC	CMIIT ID: xxxxxxxxxx
Japan	MIC	XXX-ABCDEF
Mexico	IFETEL	IFT: xxxxxxxxxx
Singapore	iDA	Complies with IMDA Standards DBxxxxxx