# kerlink
communication is everything

**Wirnet™ iFemtoCell-evolution**
LoRaWAN® gateway for the Internet of Things
Quick Start Guide



**Thank you for choosing Kerlink.**
**We are proud to be part of your project.**

For ecological reasons, this guide has been printed on recycled paper

## 1. Need help?

- In order to provide the most updated technical documentation, as well as considering and saving the environmental resources, Kerlink is providing preferably "Online documentation".
- Kerlink is gathering all the technical information on a Wiki: http://wikikerlink.fr/
    - If you don't have yet your Wiki login/password please request them to **support@kerlink.com** (note that the "Product ID" of one of your products will be required).
    - How to find the "Product ID"? Please look at the Wirnet iFemtoCell-evolution sticker placed on the right side of the case.
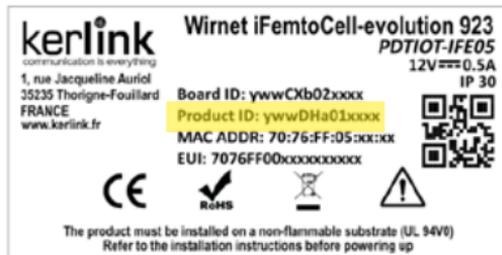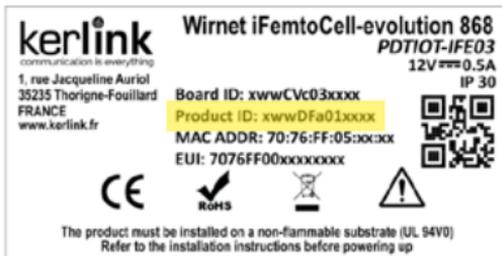


- On the Wiki, Kerlink is proposing a comprehensive set of documents and information for self-help:
    - Setup of Wirnet™ iFemtoCell-evolution Gateway: Connection to the gateway, Firmware update, Packet Forwarder installation, Packet Forwarder configuration.
    - System Management: Connection, login and credentials, KerOS REST API, …
    - Network Management: Backhaul configuration, Firewall, IPsec / OpenVPN.
    - LoRa Features, KerOS customization, Support and resources (FAQ, Troubleshoot the gateway …)

- Application Notes: for questions related to generic engineering rules (Q1 2020)
  - AN-KLK03355 - Improving radio coexistence performance of LoRaWAN gateways
  - AN-KLK03356 - LoRaWAN gateways coverage optimization
  - AN-KLK03357 - LoRaWAN gateways installation recommendations
  - AN-KLK03358 - LoRaWAN gateways lightning protection

- For any Warranty or Maintenance related request (Trouble shooting, help …)
  - If purchased from a Distributor, please contact the distributor directly for Level1 support
  - If purchased from Kerlink directly, please open an "Assistance Request" via our ticketing tool called OTRS (Open-source Ticket Request System)
  - If you don't have yet your OTRS login/password, please request them to **support@kerlink.com** (note that the Product Id or any serial number of one of your products will be required).
  - Access to Kerlink "Technical Support team" for Maintenance Services is conditioned to a valid Maintenance contract.

For any other question related to our product, please contact our distributor or Kerlink sales@kerlink.com or + 33 2 99 12 29 00.

## 2. Manufacturer
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www.kerlink.com

## 3. Safety
- Please, read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, or maintain it.
- The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

| ⚠️ | • Refers to a critical situation.<br>• In case of non-compliance, it may result in property damage |
|---|---|
| ℹ️ | • Refers to useful information during manipulations. |

## 4. Packet contents

| ⚠️ | • Only use the Wirnet™ iFemtoCell-evolution for its intended use "Normal conditions of use".<br>• Maintenance and repair must be carried out by qualified personnel authorized by the manufacturer.<br>• The enclosure of the Wirnet™ iFemtoCell-evolution must not be opened by CUSTOMER .<br>• The Wirnet™ iFemtoCell-evolution should only be used with accessories or spare parts supplied by your reseller |
|---|---|

| N° | Components | N° | Components |
|---|---|---|---|
| 1 | Wirnet™ iFemtoCell-evolution | 9 | SMA connector for LoRa antenna |
| 2 | Silkscreened KERLINK marking | 10 | Reset push button |
| 3 | Jack connector (for power supply 12Vdc 0,5A) | 11 | Silkscreened Reset marking |
| 4 | USB-A connector for configuration | 12 | USIM connector |
| 5 | RJ45 connector (Ethernet) | 13 | USB-C connector for debug probe and for configuration |
| 6 | 3 bicolor LEDs | 14 | LoRa antenna (862-873MHz, 902-928MHZ, 3dBi, 50Ω; vertical polarization) |
| 7 | Wall mounting oblong holes | 15 | AC/DC power supply (not provided) |
| 8 | Sticker with markings | 16 | Quick Start Guide (this document) |

## 5. Markings

| Symbol | Description | Symbol | Description |
|---|---|---|---|
| Wirnet iFemtoCell-evolution | Type of equipment | QR Code | QR Code |
| 12V $\rule{8mm}{0.4pt}$ 0,5mA | Power supply information | C E  or other marking | CE marking indicating that the product complies with current European directives or other marking marking depending on the country |
| Board ID | Serial number of board | RoHS COMPLIANT | Marking indicating that the product complies with RoHS directives |
| Final product ID | Serial number of product | | Do not dispose of with domestic waste |
| MAC ADDR | MAC address | | Product must be installed on a non-flammable substrate (UL94V0). Refer to the installation instructions |
| EUI | Extended Unique Identifier | | |
| IP 30 | Indice of protection | | Refer to the installation instructions before powering up |

## 6. Installation of Wirnet™ iFemtoCell-evolution
## 6.1 Mounting of the enclosure

> ⚠ • The Wirnet™ iFemtoCell-evolution enclosure must be mounted on any concrete pedestal, concrete wall or any non-flammable surface (UL94-V0).
> • It must not be mounted on a flammable surface.

The Wirnet™ iFemtoCell-evolution may be mounted on a wall using the two oblong holes.
Only two screws (not included) are needed, all mounting information is mentioned on the following drawing.
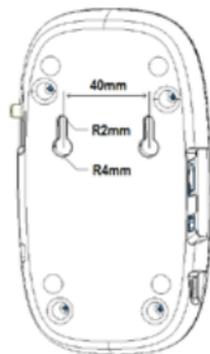
## 6.2 Setting connections

| ⚠ | Before setting all connections, ensure that the power supply is not connected to the mains supply. |
|---|---|

An external LoRa antenna is connected to SMA or RP SMA connector. A 4G/3G antenna is integrated.

Once the Wirnet™ iFemtoCell-evolution is installed, you can select up to 2 technologies to access to Internet for the data backhaul:
- Ethernet connection, requiring an Ethernet access through a dedicated RJ45 cable (not included)
- 4G/3G cellular connection, requiring an USIM (not included) and a data subscription (not included)

Note that both configurations can be used in parallel. For example, RJ45 Ethernet with a 4G/3G link as a backup.



Ethernet cable, power supply and LoRa antenna connections



USIM card inserted

Once the LoRa RF antenna, the Ethernet cable (if used) or the 4G/3G (with USIM card inserted) and the power supply jack connector are plugged, the Wirnet™ iFemtoCell-evolution can be powered ON by connecting the power supply.

| | The Ethernet cable is not provided and must consist of two RJ45 T 568A (or 568B) plugs on each side. |
|---|---|
| | KERLINK recommends using a cable with the following characteristics: |
| | • Category: 6A |
| | • Shielding: STP (U/FTP) or SSTP (S/FTP) |
| **Information** | • Section conductors: AWG26 |
| | • External jacket: LSZH or PUR |
| | • Maximum length: 100 meters |
| | |
| | The power supply jack connector supply is not provided. |
| | Please check accessories preconized by Kerlink |
| | |
| | Operating temperature range: -20°C to +55°C |
| | Humidity: 5% to 95% |
| | Altitude max. < 2000m |

## 6.3 First connection

| LED | Specification | | |
|---|---|---|---|
| LED 1: Power/Status | A solid Green for Power LED<br>A Status Red LED | | |
| | **Gateway Status** | **"Status LED" Behaviour** | |
| | Boot part 1 | Fix on | |
| | Boot part 2 | Heartbeat | |
| | Boot part 3 | Blink every second | |
| | Run time | Off | |
| | Power down sequence | Heartbeat | |
| | Update | Blink / 0.4 second | |
| | Restore backup | Blink / 2 seconds | |
| | Restore stock | Blink / 4 seconds | |
| LED 2: Backhaul | RED during boot<br>If the installed « applicative software » has been provided by Kerlink :<br>• RED if applicative software is disconnected<br>• GREEN blinking during applicative software connection<br>• GREEN fix if applicative software is connected | | |
| LED 3: LoRa Data | RED during boot<br>If the installed « applicative software » has been provided by Kerlink is installed:<br>• Applicative software management<br>• Rx: GREEN blinking<br>• Tx: RED blinking | | |

LED2
LED1
LED3

kerlink

| | Applicative software means embedded software running on the Wirnet™ iFemtoCell-evolution like KERLINK Small Private Network (SPN) or Kerlink « common » packet forwarder or any another Packet Forwarder (software that forwards LoRa packets received to a server). |
|---|---|
| **Information** | Please contact your reseller to know the LEDs behavior if the applicative software installed on the Wirnet™ iFemtoCell-evolution is not the one officially provided by KERLINK. |

To generate a software reset of the product : press the reset On/Off button during 1s.
To turn off the gateway : press the reset On/Off button during 5s.
To turn on the gateway : do a short press on the reset On/Off button.
To press the buttons, a tool with a 1mm diameter must be used.
For more information on the « Quick start of Wirnet™ iFemtoCell-evolution Gateway, please consult the Kerlink Wiki:
http://wikikerlink.fr/wirnet-productline/doku.php?id=playground:quickstart:quickstart_ifevo

## 6.4 Connection to the Web interface of the Gateway

The Wirnet productline embeds a web interface to allow to easily manage the gateways:
• Trigger software upgrade/update,
• Configure the backhaul connectivity,
• Trigger actions on the gateway: Turn-off, reboot, factory reset …

The generic syntax to access to this web interface is:  http://klk-<type_GW>-<serial>/

This means:
• for the Wirnet iFemtoCell: http://klk-wifc-03002e/
• for the Wirnet iFemtoCell-evolution: http://klk-fevo-03002e/
• for the Wirnet iStation: http://klk-wiis-03002e/
• for the Wirnet iBTS: http://klk-lpbs-03002e/

Note that if your computer is on the same local network, you can also use directly the IP address of your gateway in a browser to connect to the Web interface.
The default credentials are:

Login: admin
Password: pwd4admin

**For security reasons, it is strongly recommended to change the default passwords.**

## 6.5 Connection in SSH to the Gateway

If you want to connect to the gateway as "root", please enter login/password (root / pdmk-$serialno) of the Gateway.
Note about "Default password": To prevent Web robots to attack the gateway with standard login/

password such as root/root, default password is built using the last 6 digits of the serial number, of CPU module ID for Wirnet iBTS and « board ID » for Wirnet iFemtoCell, iFemtoCell-evolution and Wirnet iStation: pdmk-$serialno.

For example, if the serial number of a CPU module is 641ATe**0507DD**, then the root password will be pdmk-**0507DD** (case sensitive).
This 6 digits number can also be retrieved in the hostname. It is displayed in the shell prompt:

klk-lpbs_0507DD login: root
Password: pdmk-0507DD

**For security reasons, it is strongly recommended to change the default passwords.**

More information on the Kerlink Wiki: www.wikikerlink.fr in the section "Connect to the gateway" and in the section "Setup".

# 7. Declaration of Conformity
## 7.1 Wirnet™ iFemtoCell-evolution 868

Simplified EU Declaration of Conformity
Hereby, Kerlink, declares that the radio equipment type Wirnet™ iFemtoCell-evolution 868 is in compliance with Directive 2014/53/EU.
The full text of the EU Declaration of Conformity is available at the following internet address: www.kerlink.com/support
In Europe, the Wirnet™ iFemtoCell-evolution 868 station must comply with the ERC 70-03 requirements regarding duty cycle and maximum EIRP. They are summarized in the following table

| ERC 70-03 | Frequency (MHz) | Power | Duty Cycle |
|-----------|-----------------|-------|------------|
| h1.4 | 865-868 | 14dBm ERP | 1% |
| h1.5 | 868-868,6 | 14dBm ERP | 1% |
| h1.7 | 869,4-869,65 | 27dBm ERP | 10% |

| | |
|---|---|
| **i** Information | The power supply of the Wirnet™ iFemtoCell-evolution 868 must be a limited source of power. Note that: If the LoRa antenna is changed, the output power must be adjusted to take into account the gain of the antenna in order to not overrule the ERC 70-03 recommandation. Some countries in Europe may have specific frequency ranges, EIRP and duty cycles regulations. Check the local regulations before installing and commissioning the Wirnet™ iFemtoCell-evolution 868. For other countries, outside Europe, check the frequency range, the maximum EIRP and duty cycle allowed. |

## 7.2 Wirnet™ iFemtoCell-evolution 915

The Wirnet™ iFemtoCell-evolution 915 will be compliant with both FCC and IC regulations
The associated FCC and IC identifiers of the Wirnet™ iFemtoCell-evolution 915 are:

Model: Wirnet™ iFemtoCell-evolution 915    Model: EG25G
FCC ID: 2AFYS-KLKFEVO915    Contains FCC ID: XMR201903EG25G
IC: 20637-KLKFEVO915    Contient IC: 10224A-201903EG25G

| | |
|---|---|
| **i** Information | The power supply of the Wirnet™ iFemtoCell-evolution 915 must be a limited source of power. Note that: Any change or modification of this equipment not expressly authorized by Kerlink may cause, interference and void the FCC authorization to operate this equipment. This device complies with Industry Canada's license-exempt RSSs. 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 of the device. |
| | Some conditions have to be respected to maintain the FCC and IC compliance of the devices in the USA and Canada. Please contact your reseller to have details. For other countries, check the specific regulations regarding maximum EIRP and duty cycle allowed. |

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

This equipment complies with RSS102's and FCC radiation exposure limits set forth for an uncontrolled environment under the following conditions:
1. This equipment should be installed and operated such that a minimum separation distance of 20cm is maintained between the radiator (antenna) and user's/nearby person's body at all times.
2. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Cet équipement est conforme aux limites d'expositions de la CNR102 applicables pour un environnement non contrôlé aux conditions suivantes:
1. Cet équipement devra être installé et fonctionner de telle manière qu'une distance minimale de séparation de 20 cm soit maintenue entre la partie rayonnante (l'antenne) et l'utilisateur / les personnes à proximité à tout moment.
2 Cet émetteur ne doit pas être co-localisé ou opérer en conjoncion avec toute autre antenne ou émetteur.

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:
1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique 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;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

## 7.3 Wirnet™ iFemtoCell-evolution 923

The Wirnet™ iFemtoCell-evolution 923 will be compliant with the directive 2014/53/EU relating to radio equipment (RED) and is certified for the following countries:

| Country | Label, identification and comments |
|---|---|
| Australia / New Zealand | will be compliant |
| Japan | will be compliant |
| Indonesia | will be compliant |
| Singapore | will be compliant |

## 8. Disposal / recycling

Do not dispose of the product with household waste. For proper disposal, contact a waste disposal company. The product packaging (cardboard and liners) can be removed with used paper.

## 9. Warranty

Contact your reseller for warranty conditions of the Wirnet™ iFemtoCell-evolution.

The Wirnet™ iFemtoCell-evolution is not warranted by Kerlink in case the enclosure is opened, modified, painted, branded out, outligned by CUSTOMER for any reason. Feel free to contact us for a guideline for the branding.

## 10. Accessories and Professional Services

For additional information, on available accessories and Professional Services please contact your reseller.

## 11. Give us your feedback

Your shopping and operational experiences are very important to us.
We would like to invite you to leave review on our products and services.
We will appreciate your time and efforts.
We would be very proud to get any photo of your gateway installation.
Can you share them to dmk@kerlink.com

## 12. Find us in Social Media

We would like to hear from you: any tips, any news to share ?

@kerlink_news

Kerlink

Kerlink channel

We stay at your disposal for any help on your project.
Yours sincerely.

**Kerlink Team**

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