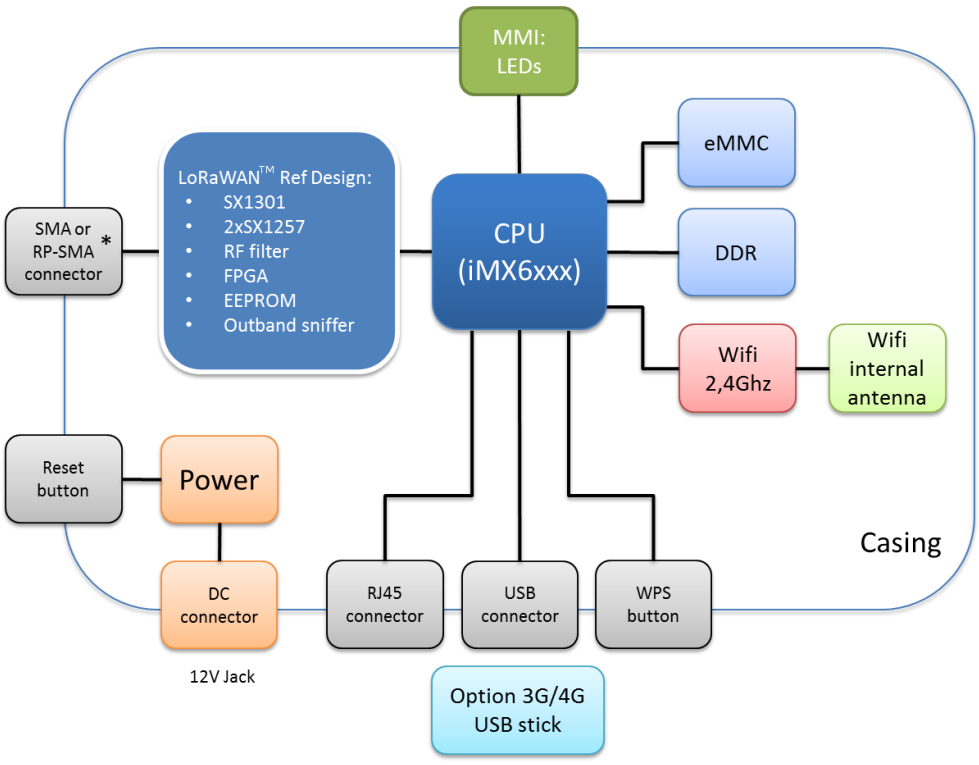
Wirnet™ iFemtoCell

Indoor LoRaWAN™ gateway for smart IoT chain

- Unlicensed band Long Range (LoRa®®) bidirectional communications capabilities
- Supported bands: 863-873MHz, 902-928MHz, 915-928MHz (depending on the version)
- Backhaul connectivity Ethernet, Wifi or 3G/4G modem (in option)
- Highly secured device relying on a hardware secure core

1. Hardware Key Features

1.1 Hardware block diagram



** SMA for 868 MHz version and RP-SMA for 915 MHz and 923 MHz versions*

1.2 CPU Module

1.2.1 System

CPU:

- Based on ARM Cortex A9 core processor (up to 800MHz)
- Hardware watchdog
- Optimized power consumption management
- Embedded hardware secure core

Volatile Memory:

- DDRAM 256MB

Non-volatile Memory:

- 8GB eMMC

1.2.2 User interface

External LEDs:

- Operational status: power, backhaul, LoRa®™ RF activity

External push buttons:

- Reset
- WPS

USB host interface allowing:

- Local secured software upgrade with simple USB stick
- External 3G/4G modem

Web local interface allowing:

- Configuration

1.2.3 Communication

Ethernet:

- Ethernet 10/100 Base-T compliant

WLAN:

- Chipset 2.4GHz
- Internal antenna without diversity
- Client and adhoc mode, AP mode
- WPS

WWAN:

- Optional, by connecting a 3G/4G modem dongle on the external USB connector

1.2.4 Power

- Power supply 230VAC/12VDC with provided jack connector

1.3 LoRa®™ capabilities

- Incorporate LoRa®™ bidirectional communication technology
- 49 LoRa®™ Demodulators over 9 channels

Provided Antenna:

- Type: omnidirectional
- Gain: 3dBi
- Size: 135.6x20.1 mm

1.3.1 868 MHz version

Capabilities:

- RX range: 863-873 MHz
- TX range: 863-873 MHz
- Sensitivity: up to -141 dBm
- Tx conducted power from 0dBm to +27dBm

1.3.2 923 MHz version

Capabilities:

- RX range: 915-928 MHz
- TX range: 915-928 MHz
- Sensitivity: up to -141 dBm
- Tx conducted power from 0dBm to +27dBm

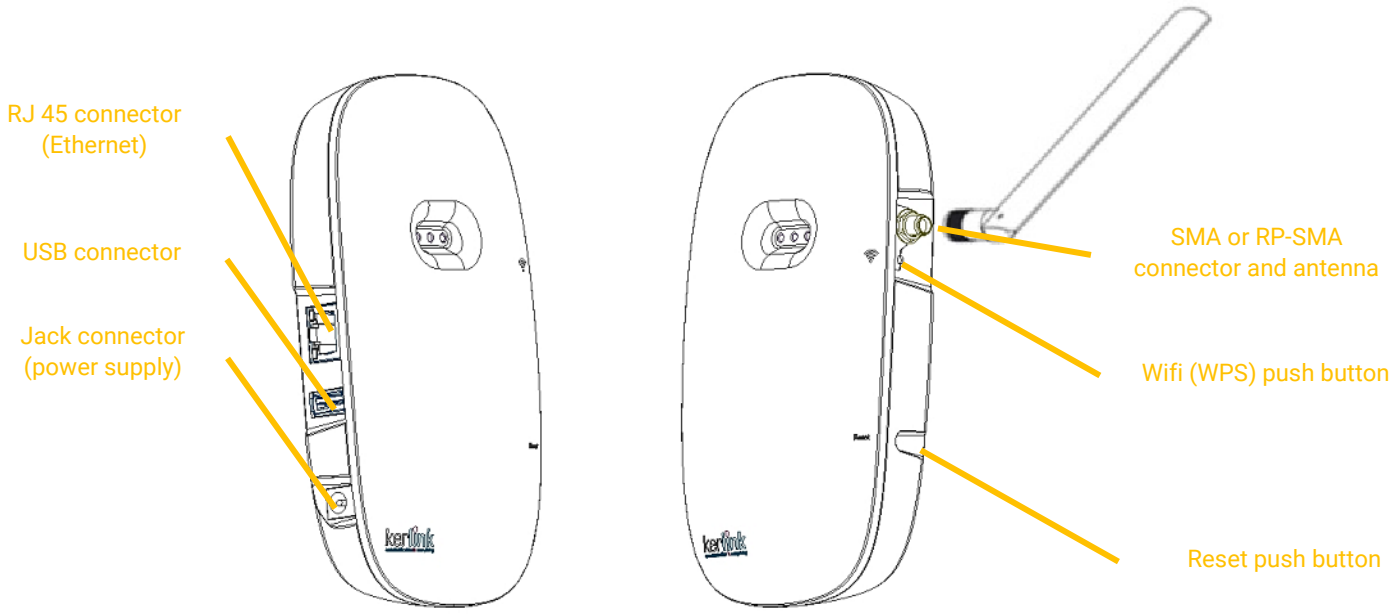
1.3.3 915 MHz version

Capabilities:

- RX range: 902-928 MHz
- TX range: 902-928 MHz
- Sensitivity: up to -141 dBm
- Tx conducted power from 0dBm to +27dBm

2. Mechanical

- Plastic enclosure
- Dimensions: [max] 160 x 90 x 35 mm
- Weight: less than 500g
- Connectors:
    - RJ45 (Ethernet 10/100)
    - SMA or RP-SMA for LoRa®™
    - Jack 2.5mm/5.5mm for power supply
    - USB type A



2.1 Mounting

- Wall mounting by 2 oblong holes
- Lay on a table (4 domes)

2.2 Environmental

- Full operating range: - 20° to +55°C (for gateway only, without power supply)
- Humidity: 5% to 95%
- Ingress protection: IP30
- For indoor use only
- Flammability rating: UL94-V0

3. Software key features

3.1 Operating system

- Based on Yocto/Poky 2.1
- Standard Long-Term Support Linux version 4.1
- File system: EXT4, Squashfs
- Support of all GNU/Linux tools (cross-compiled for ARM)
- TCP/IP BSD4.4 socket on network bearer

3.2 Software packages included (non-exhaustive)

- Embedded Base Station Controller (BSC)
- LoRa® packet Forwarder
- LoRa® test tools
- Python
- Busybox
- Ntp

Networking:

- DHCP client
- Firewalling (iptables) and IP routing (layer 3)
- OpenVPN
- IPSEC (StrongSwan)
- Connman
- Ofono

3.3 Software security

- Secure boot (software authentication and integrity control) relying on a hardware secure core
- Critical information storage (private keys, certificates…) inside a hardware secure core
- Critical software execution protection (encryption, decryption,) relying on a Trust zone embedded inside a hardware secure core
- Firewall
- Read Only file system preventing unexpected file system corruption
- Software auto-recovery mechanism to protect against software update failure
- Secured firmware upgrade (USB stick or over the air)

3.4 BSC services

BSC (Base Station Controller) interfaces are relying on standard SNMP (v2c) protocol and provide the following services:

- Alarm notifications
- Firmware upgrade

- File transfer
- Remote shell control
- Configuration
- Monitoring (platform statistics, RF statistics, RF spectrum analyzer…)

The BSC interface is secured through an SSL tunnel (openVPN)

3.5 Software development tools

- C/C++ Linux cross compilation toolchain based on GNU tools (GCC 5.3.0, Glibc 2.23)
- On-line wiki

4. Certifications (according to radio frequency)

- CE
- FCC/IC on going
- Specific countries on demand

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