



# DATASHEET

# Wirnet iBTS



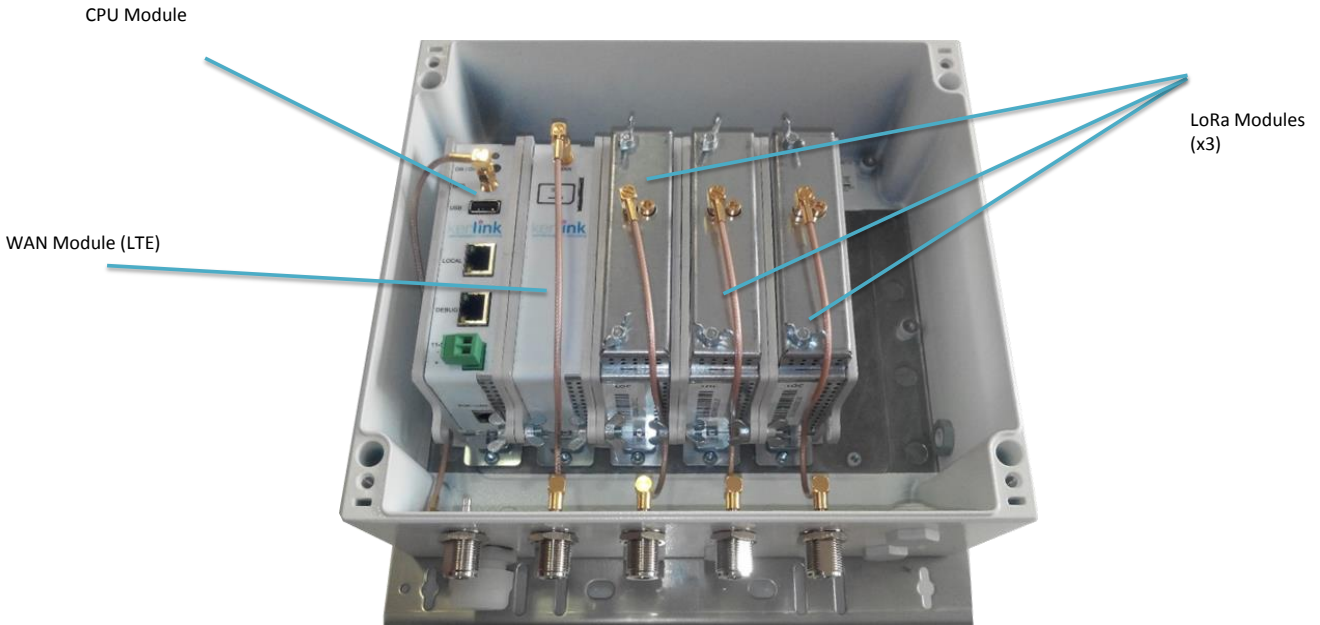
LoRa gateway for IoT chain

- Unlicensed band Long Range( Lora™) bidirectional communications capabilities
- One LoRa RF module (16 channels) extendable to four LoRa RF modules (64 channels)
  - Supported bands : 863-873MHz, 902-928MHz, 915-928MHz
- Configurable for single omnidirectional antenna, spatial diversity, dual polarization, tri-sectorization
  - LoRa geolocation combining RSSI and Time Difference of Arrival (TDOA)
- Backhaul connectivity over GPRS/EDGE/HSPA/LTE( Europe/APAC or Americas bands) or Ethernet
  - Highly secured device relying on an hardware secure core
  - Carrier grade or compact casing

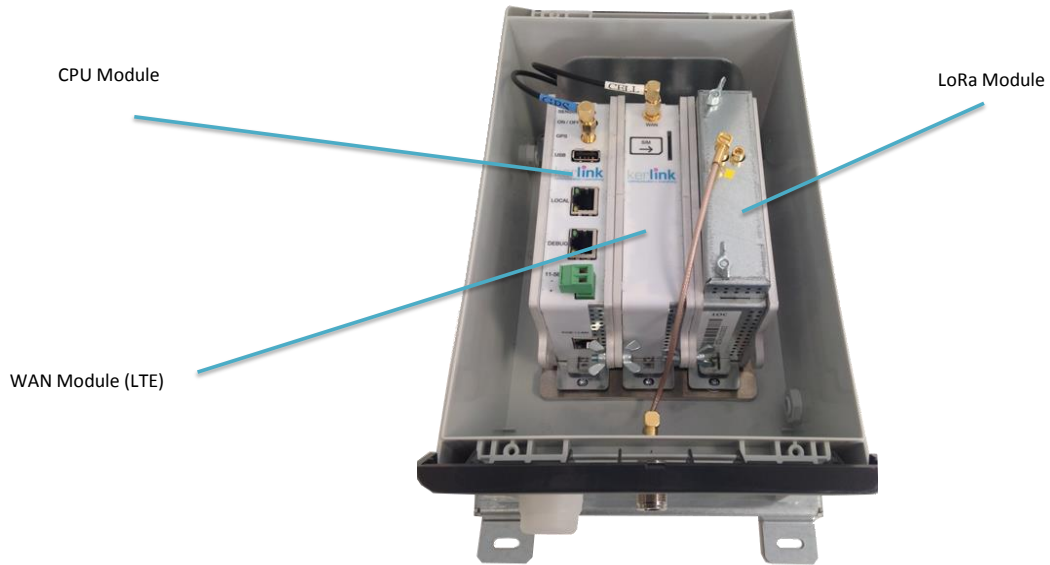
## 1. Hardware Key Features

### 1.2 Hardware modularity

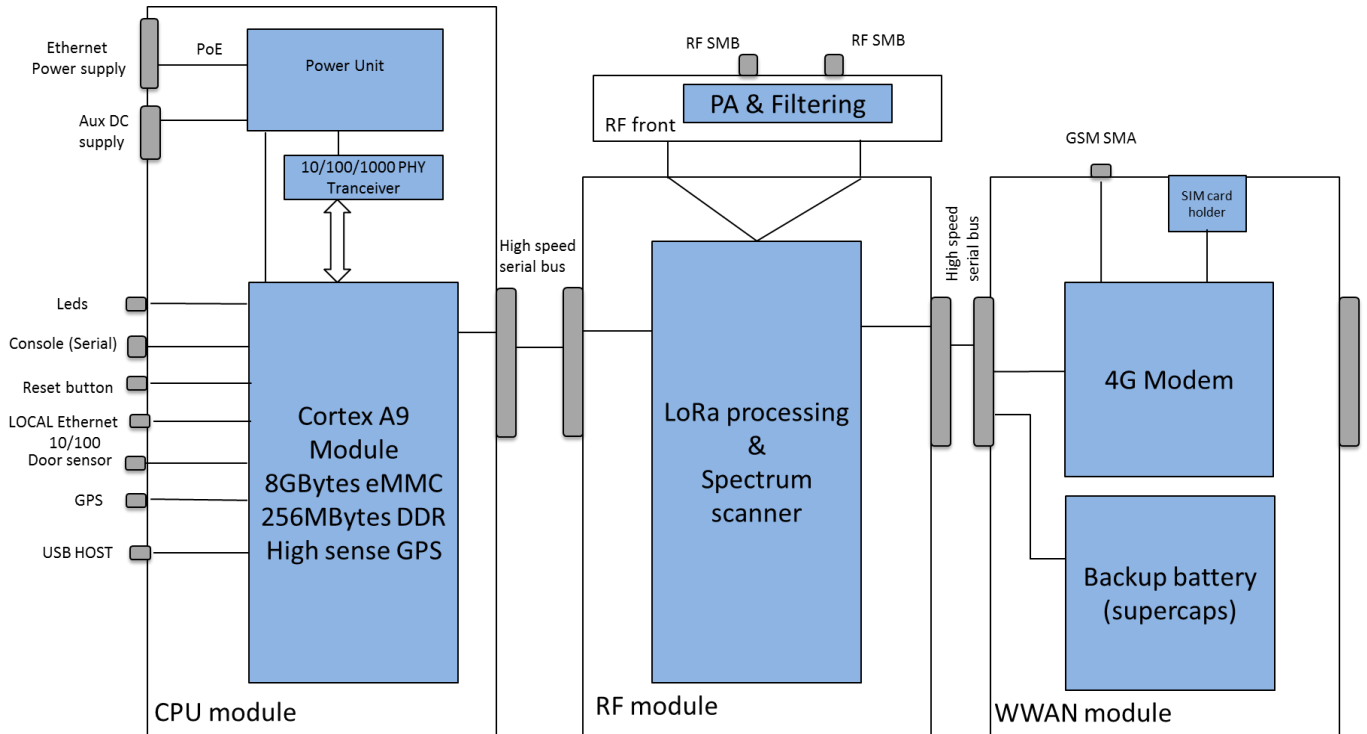
#### Standard Casing



**Compact Casing**



**1.2 Hardware block diagram**



**1.2 CPU module**

**1.2.1 System**

**CPU:**

- Based on ARM cortex A9 core processor (Up to 800 MHz)
- Real-time clock saved by battery
- Hardware watchdog
- Optimised power consumption management
- Embedded hardware secure core

**Volatile memory:**

- DDRAM 256 MB

**Non-volatile memory:**

- 8 GB eMMC

---

## 1.2.2 User interfaces

---

**Internal LEDs:**

- Operational status : power, software activity

**USB host interface allowing :**

- Local secured software upgrade with simple USB key

**Web local interface allowing :**

- Configuration
- Diagnostic
- Maintenance

**Internal push buttons :**

- Manual station power on/off
- 

---

## 1.2.3 Communication

---

**Backaul Ethernet :**

- PowerOverEthernet IEEE 802.3af /at  
10/100/1000 Base T compliant

**Local Ethernet interface :**

- Used during installation and maintenance operations
  - IEEE 802.3 10/100 Base T compliant
- 

---

## 1.2.4 Positionning/Timing

---

**GPS :**

- Integrated high sensitivity GNSS module
  - GPS L1C/A, GLONASS L1OF, BeiDou B1, QZSS L1C/A, SBAS L1C/A and Galileo E1B/C-ready
  - Time pulse accuracy < 20ns
  - NMEA 0183, version 4.0
  - External GNSS active antenna with 5m coaxial cable (integrated antenna for compact version)
- 

---

## 1.2.5 Sensors

---

- Embedded temperature sensor
  - Door opening detection system
  - Pressure sensor
- 

---

## 1.2.6 Power

---

- PowerOverEthernet supply : 48V class 4
    - 30W PoE required compact casing version
    - 60W PoE required standard casing version
  - DC power supply (ex : solar panel use) : 11 to 56V DC
  - Power control : ignition detection, software OFF switching, ON/OFF button
- 

---

## 1.3 LoRa modules

---

**LongRange modem :**

- SDR evolutive architecture including two dual core SoC DSP and ARM processor per LoRa RF modem
- One LoRa RF modem extendable to three LoRa RF modems with standard casing
- Incorporate LoRa (TM) bidirectional communications technology
- Modular "LoRa RF Modem" architecture :
  - 96 LoRa demodulators over 16 channels per LoRa RF Module (1x16 or 2x8 channels)
  - Extend the channels number adding modules :
    - 1 LoRa RF Module : 1x16 or 2x8 channels (single or spatial diversity or dual polarization)
    - 2 LoRa RF Modules : 2x16 channels or 2x2x8 channels (spatial diversity and/or dual polarization)
    - 3 LoRa RF Modules : 3x16 channels or 3x2x8 channels (tri-sectorization w/ or w/o dual polarization)
    - 4 LoRa RF Modules block (915 and 923 versions) : 1x64 or 2x32 channels (single or spatial diversity or dual polarization)
- More than 15km range in sub-urban situation
- More than 2km range in urban situation

**Geolocalization :**

- Outdoor and indoor environments
  - Synchronization with GPS
  - Combines RSSI and TDOA measurements
  - Accuracy < 100m (70% confidence, high density coverage)
- 

---

### 1.3.1 868 MHz module version

---

**Capabilities:**

- LoRa channels : 1x16 or 2x8 channels (single or spatial diversity or dual polarization)
- RX range: 863- 873MHz,
- TX range : 863-873MHz
- Sensitivity : up to -141 dBm
- Tx conducted power from 0dBm to +30dBm

---

### 1.3.2 923 MHz module version

---

**Capabilities:**

- LoRa channels : 1x16 or 2x8 channels (single or spatial diversity or dual polarization)
- RX range: 915- 928MHz,
- TX range : 920-928MHz
- Sensitivity : up to -141 dBm
- Tx conducted power from 0dBm to +30dBm

---

### 1.3.3 915 MHz module version

---

**Capabilities:**

- LoRa channels : 1x16 or 2x8 channels (single or spatial diversity or dual polarization), FCC Hybrid Mode
- RX range: 902- 928MHz,
- TX range : 902-928MHz
- Sensitivity : up to -141 dBm
- Tx conducted power from 0dBm to +30dBm

---

### 1.3.3 Four modules block 915 MHz version

---

**Capabilities:**

- 4 LoRa RF modules : 1x64 or 2x32 channels (single or spatial diversity or dual polarization)
- RX range: 902- 928MHz,
- TX range : 902-928MHz
- Sensitivity : up to -141 dBm
- Tx conducted power from 0dBm to +30dBm

---

### 1.3.3 Four modules block 923 MHz version

---

**Capabilities:**

- 4 LoRa RF modules : 1x64 or 2x32 channels (single or spatial diversity or dual polarization)
- RX range: 915- 928MHz,
- TX range : 920-928MHz
- Sensitivity : up to -141 dBm
- Tx conducted power from 0dBm to +30dBm

---

## 1.4 WWAN module

---

### 1.4.1 Europe/APAC bands

---

- PCI Express Mini Card modem
- LTE (800/900/1800/2100/2600) : cat3, DL up to 100Mbps, UL up to 50Mbps
- HSPA/UMTS (850/900/1900/2100MHz) : DL up to 42Mbps (cat 24) , UL up to 5,76Mbps (cat 6)
- EDGE (850/900/1800/1900MHz) : UL/DL up to 236.8Kbps
- GPRS (850/900/1800/1900MHz) : UL/DL up to 85.6Kbps
- IMEI inside
- External LTE (700-2700MHz) antenna with 5m coaxial cable (integrated antenna for compact version)
- Back-up battery : up to about 1 minute allowing safe powerdown of the product

---

### 1.4.1 Americas bands

---

- PCI Express Mini Card modem
- LTE (700/850/1700/1900/2100) : cat3, DL up to 100Mbps, UL up to 50Mbps
- CDMA (800/1900) : up to 3.1Mbps
- HSPA/UMTS (850/900/1700/1900/2100MHz) : DL up to 42Mbps (cat 24) , UL up to 5,76Mbps (cat 6)
- EDGE (850/900/1800/1900MHz) : UL/DL up to 236.8Kbps
- GPRS (850/900/1800/1900MHz) : UL/DL up to 85.6Kbps
- IMEI inside
- External LTE (700-2700MHz) antenna with 5m coaxial cable (integrated antenna for compact version)
- Back-up battery : up to about 1 minute allowing safe powerdown of the product

---

## 2. Mechanical

---

### 2.1 Standard casing

---

- Aluminium enclosure
- Dimensions : 295 x 317 x 125 mm (including mounting kit)
- Weight :
  - with one LoRa RF modem : about 6,2Kg (including mounting kit)
  - with three LoRa RF modems: about 7,2Kg (including mounting kit)
- Connectors :
  - One PoE cable gland
  - RF connectors : one for GPS (GNSS), one for WWAN (LTE/HSPA/GSM) - N type
  - LoRa RF connectors : from one up to six, depending on the configuration - N type
  - Three spares

**External connectors:****2.2 Compact casing**

- Polycarbonate enclosure
- Dimensions : 357 x 189 x 150 mm (including mounting kit)
- Weight : about 3Kg (including mounting kit)
- Connectors :
  - One PoE cable gland
  - LoRa RF connectors : one (single antenna configuration) or two (diversity configuration) - N type

**External connectors:****2.3 Mounting**

The provided mounting kit allows three different mounting options :

- Wall mounting by screwing
- Pole mounting by U-bolt (max diameter : 76mm for standard version and 60mm for compact version)
- Metallic strapping mounting (tube, pipe, flue...)

Specific mounting kits are provided with antennas :

- LoRa antenna bracket (wall mount, pole mount, metallic strapping)
- GNSS and WWAN antenna bracket for standard casing (wall mount, pole mount with U-bolt, metallic strapping)

**2.4 Environmental**

- Full operating range : -20°C to +55°C
- Humidity : 95%, non condensing (protective vent)
- Ingress protection : IP66
- Impact resistance : IK08
- UV resistance : UL508
- Flammability rating : UL94-V0

---

### 3. Software key features

---

#### 3.1 Operating system

---

- Based on Yocto/Poky 2.1
- Standard Long Term Support Linux version 3.14
- 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)

---

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>• Embedded Base Station Controller (BSC)</li> <li>• LoRa packet Forwarder</li> <li>• LoRa test tools</li> <li>• Python</li> <li>• Busybox</li> <li>• Ntp</li> </ul> | <b>Networking :</b> <ul style="list-style-type: none"> <li>• DHCP client</li> <li>• SSH server</li> <li>• Firewalling (iptables) and IP routing (layer 3)</li> <li>• OpenVPN</li> <li>• IPSEC (Strongswan)</li> <li>• Connman</li> </ul> |
|--|--|

---

#### 3.2 Software security

---

- Secure boot (software authentication and integrity control) relying on an hardware secure core
- Critical information storage (private keys, certificates...) inside an hardware secure core
- Critical software execution protection (encryption, decryption, ) relying on a Trust zone embedded inside an 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 key or over the air)

---

#### 3.3 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 securized through an SSL tunnel (openVPN)

---

#### 3.4 Software development tools

---

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

##### Optional

- Debug probe

---

### 4. Certifications (according to Radio module frequency)

---

- EU conformity:
  - Directive RED 2014/53/EU
  - Low Voltage Directive 2014/35/EU
  - Electromagnetic Compatibility Directive 2014/30/EU
  - The limitation of exposure of the general public to electromagnetic fields specified in the Council Recommendation 1999/519/EC

Applicable standards :

- Electromagnetic compatibility

EN 301 489-1	issue 1.9.2
EN 301 489-3	issue 1.6.1
EN 301 489-7	issue 1.3.1
EN 301 489-24	issue 1.5.1

- Efficient use of the radio frequency spectrum

EN 301 511	issue 9.0.2
EN 301 908-1	issue 7.1.1
EN 300 440-1	issue 1.6.1
EN 300 440-2	issue 1.4.1
EN 300 220-1	issue 2.4.1
EN 300 220-2	issue 2.4.1

Category 2 receiver according to the EN 300 220-1

- Safety IEC 60 950-1 (Ed. 2005 + Am 1:2009 + Am 2: 2013)  
CENELEC EN 60 950-1 (Ed. 2006 + A11:2009 + A1:2010 + A12:2011 + A2:2013)

- Magnetic field exposure EN 50385 (ed. 2002)

- CFR 47 FCC Part 15 :
  - FCC 47 CFR Part 15 : 2016 - Part 15- Radio frequency devices
  - FCC PART 15.247 - Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz. (frequency hopping and digitally modulated)
  - FCC Part 15.207 conducted emissions on AC mains in the band 150kHz – 30MHz
  - FCC Part 15.247 intentional radiated emissions
  - FCC Part 15.215 Additional provisions to the general radiated emissions limitations
- UL 60950-1: 2007 + A1:2011 + A2:2014
- RSS 247 :
  - RSS-Gen – Issue 4, November 2014- General requirements and Information for the Certification of radio Apparatus
  - RSS-247 Issue 1, May 2015 - Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSS) and Licence-Exempt Local Area Network (LE-LAN) Devices
- CAN/CSA-C22.2 NO. 60950-1-07 / A1:2011 / A2:2014
- AS/NZS 4268 2012 + A1 : 2013 : Radio equipment and systems – Short range devices – Limits and methods of measurement
- AS/NZ 60950-1 : 2011
- ARIB STD-T108 - 920MHz-Band Telemeter, Telecontrol and Data Transmission Radio Equipment
- J60950-1
- Clause 2, Article 58-2 of Radio Waves Act (Republic of Korea)
- K60950-1

---

## 5. Optional accessories

---

- **Antennas** : various LoRa antennas can be proposed to adapt to environment and the gateway configurations :
  - Omnidirectionnal, 868MHz 3dBi
  - Omnidirectionnal, 915MHz 3dBi
  - Omnidirectionnal, 915MHz 6dBi
- **Antennas mounting kit**
- **Surge Protection** : RF coaxial and indoor or outdoor PoE protections
- **PoE injector** (indoor or outdoor ) : 30W/60W depending on the gateway casing (compact/standard)

---

## 6. Contacts : For more information please contact:

---



1 Rue Jacqueline Auriol  
35235 THORIGNÉ-FOUILLARD

Tel : +33 2 99 12 29 00

E-mail : [contact@kerlink.com](mailto:contact@kerlink.com)  
Web : [www.kerlink.com](http://www.kerlink.com)