

Wirnet™ iBTS 64 Highway

LoRaWAN™ gateway for smart IoT chain

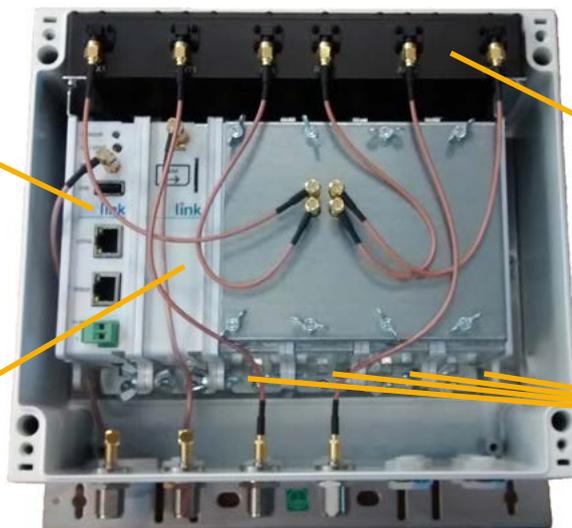


- Unlicensed band Long Range(Lora™) bidirectional communications capabilities
- Full-Duplex 72 RX channels and 8 TX channels
- Supported band: 902-928MHz
- 1 Watt transmit power (4W radiated)
- Configurable for single omnidirectional antenna, spatial diversity, dual polarization
- LoRa geolocation combining RSSI and Time Difference of Arrival (TDOA)
- Backhaul connectivity over GPRS/EDGE/HSPA/LTE or Ethernet
- Highly secured device relying on a hardware secure core
- Carrier grade casing

1. Hardware Key Features

1.1 Hardware modularity

CPU Module (CPU, Power, GPS)



Dual duplexer

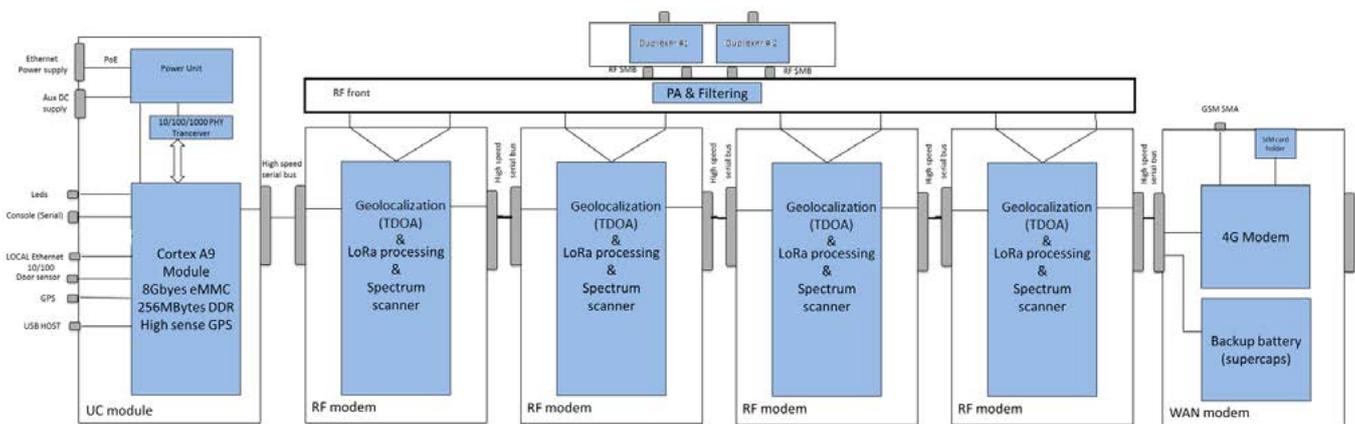
WAN Module (LTE)

LoRa Modules (x4)

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LoRaWAN™ gateway for smart IoT chain

1.2 Hardware block diagram



1.3 CPU Module

1.3.1 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

1.3.2 User interface

Internal LEDs :

- Operational status: power, software activity

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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

1.3.3 Communication

Ethernet :

- PowerOverEthernet IEEE 802.3af /at 10/100/1000 Base T compliant
- RJ45 connector

Local Ethernet interface :

- Used during installation and maintenance operations
- IEEE 802.3 10/100 Base T compliant
- RJ45 connector

1.3.4 Positioning/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)

1.3.5 Sensors

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

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LoRaWAN™ gateway for smart IoT chain

1.3.6 Power

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

1.4 LoRa™ modules

LongRange modem :

- SDR evolutive architecture including two dual core SoC DSP and ARM processor per LoRa RF modem
- 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)
 - 4 LoRa RF modules: 1x64 or 2x32 channels (single or spatial diversity or dual polarization)
- RX range: 902- 915MHz,
- TX range: 923-928MHz
- Sensitivity: up to -140 dBm (SF12) and -135dBm (SF10)
- TX conducted power from 0dBm to +30dBm
- 2 x 4TX available, up 1W total transmit power
- 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)

1.5 WWAN module

- 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 power down of the product

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LoRaWAN™ gateway for smart IoT chain

2. Mechanical

- Aluminum enclosure
- Dimensions: 295 x 317 x 125 mm (including mounting kit)
- Weight: 9Kg (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 two, depending on the configuration - N type



2.1 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)

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LoRaWAN™ gateway for smart IoT chain

2.2 Environmental

- Full operating range: -40°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 available (non-exhaustive)

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

Networking :

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

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LoRaWAN™ gateway for smart IoT chain

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 key 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

Optional

- debug probe

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LoRaWAN™ gateway for smart IoT chain

4. Certifications

- 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

5. Optional accessories

Antennas: various LoRa antennas can be proposed to adapt to environment and the gateway configurations:

- Omnidirectional, 915MHz 3dBi
- Omnidirectional, 915MHz 6dBi

Antennas mounting kit

Surge Protection: RF coaxial and indoor or outdoor PoE protections

60W PoE injector (indoor or outdoor)