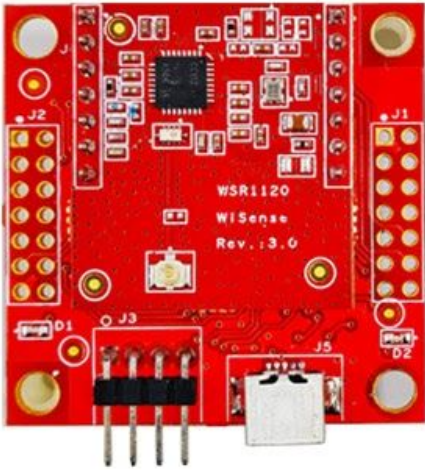


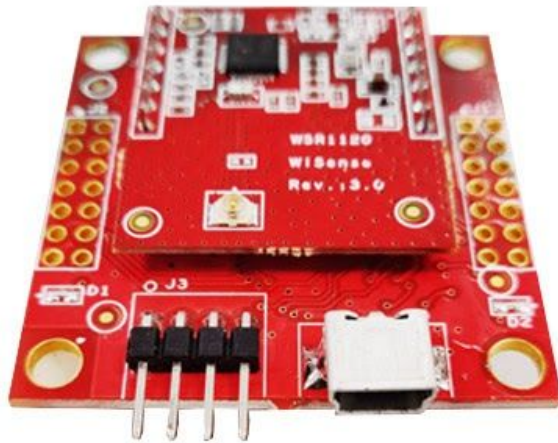
WiSense WSN1120CL Datasheet (WiSense Network Coordinator)



Top view



Back view



Front view

The WSN1120CL is WiSense Sub 1-GHz wireless mesh coordinator node. It includes the CC1120 high-performance sub-GHz radio (from TI) and the MSP430G2955 microcontroller (from TI).

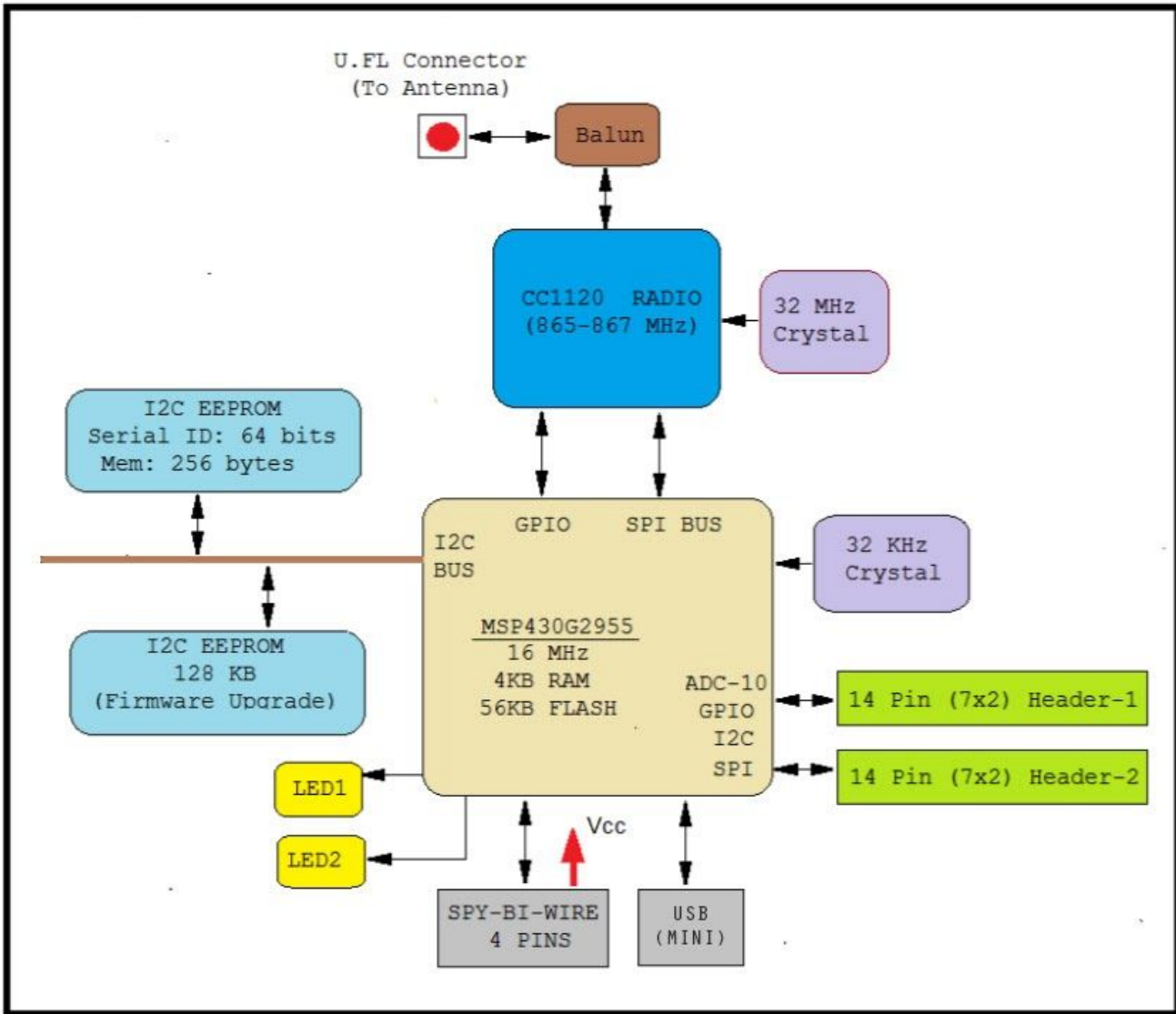
The module consists of two separate PCBs.

- The PCB on the top hosts the CC1120 radio.
- The PCB on the bottom hosts the microcontroller.

Standards Compliance

Region	Operating Frequency Range	Certification
India	865-867 MHz	WPC (Self Certified)

HARDWARE ARCHITECTURE



Microcontroller PCB

- MSP430G2955 Ultra-low-power 16 bit microcontroller from TI
 - 56 KB flash, 4KB SRAM
 - Standby current (in LPM3) as low as 1 microamp.
 - Operating voltage: 1.8 V – 3.6 V
 - Multiple On-chip 10 bit ADC channels
 - On-chip power supply voltage measurement
 - On-chip temperature sensor
- 2 pin Spy-Bi-Wire protocol for development (Programming and debugging).
- SPI/GPIO interface to the radio module
- UART/I2C/SPI/1-wire/GPIO/ADC interface to sensors
- Onboard serial (I2C) EEPROM (AT24MAC602) with hardwired and globally unique 48-bit and 64-bit addresses.
- Onboard 128 Kilo-Bytes EEPROM (M24M01) for over the air firmware upgrade. EEPROM can store two full images.
- Onboard high accuracy 32 kHz crystal
- 1 USB-Mini port for power and serial connectivity to external host such as a Raspberry PI or a Laptop/PC.
- 1 four-pin right-angled header (Spy-Bi-Wire) – Vcc, Gnd, Test, Reset
- 2 LEDs
- 2 2x7 headers which expose most of the MSP430G2955 pins.
- Dimensions: 42 mm x 42 mm

Radio PCB

- CC1120 Transceiver (TI)
 - Low-cost sub-1 GHz transceiver designed for narrowband and very low-power wireless applications. The narrowband operation provides the link budget required to operate long-range links (1 KM and above).
 - Programmed by WiSense stack to operate in the 865-867 MHz license-free band in India.
 - Operating voltage: 2.0 V – 3.6 V
 - Sensitivity: -123 dBm @ 1.2 kBaud (865-867 MHz)
 - Modulation: 2-FSK, 4-FSK, GFSK, and MSK supported as well as OOK and flexible ASK shaping. Default programmed modulation is 2-GFSK.
 - Programmable output power up to +13 dBm for all supported frequencies
 - Programmable data rate from 0 to 200 kbps. Lower the data rate, the higher the range. The default baud rate is 38.4 kbps.
- Onboard high accuracy 32 MHz crystal
- Antenna options (mutually exclusive)
 - U.FL antenna connector. Can use U.FL to SMA cable assembly to connect to the antenna outside the weatherproof enclosure.
 - PCB antenna.
- Interface
 - Two 1x7 2.54 mm pitch headers for mating with the microcontroller board.
- Dimensions
 - 37.61 mm x 37.61 mm

The WSN1120CL comes pre-programmed out of the box to operate as a WiSense mesh network coordinator node operating in the 865-867 MHz license-free band (in India). The coordinator node is responsible for setting up and maintaining a single instance of a WiSense LPWMN. It allocates a unique 16-bit address to each registering node. It also serves as the gateway for the entire network. All communication between the nodes in the network and the outside world happens through the coordinator node.

WiSense provides a Linux/Cygwin based CLI to configure and query the WSN1120CL and associated LPWMN (Low Power Wireless Mesh Network).

```
$ ./gw.exe /dev/ttyS27 mon
Serial port </dev/ttyS27> configuration done ...
Waiting for events / data traffic from the LPWMN ...

Received Event <6>
-----
Timestamp (Wed Dec 25 19:41:22 2019)
Event - Beacon Request received (# 1)
RSSI <-45> / LQI <17>
From <0xfc:0xc2:0x3d:0xff:0xfe:0x0d:0x93:0xa4>
-----

Received Event <20>
-----
Timestamp (Wed Dec 25 19:41:22 2019)
Event - Beacon Tx Done(# 1)
-----

Received Event <1>
-----
Timestamp <Wed Dec 25 19:41:27 2019>
Event <Node Registered>
Short Addr <1139> / Ext Addr <fc:c2:3d:ff:fe:0d:93:a4>
-----

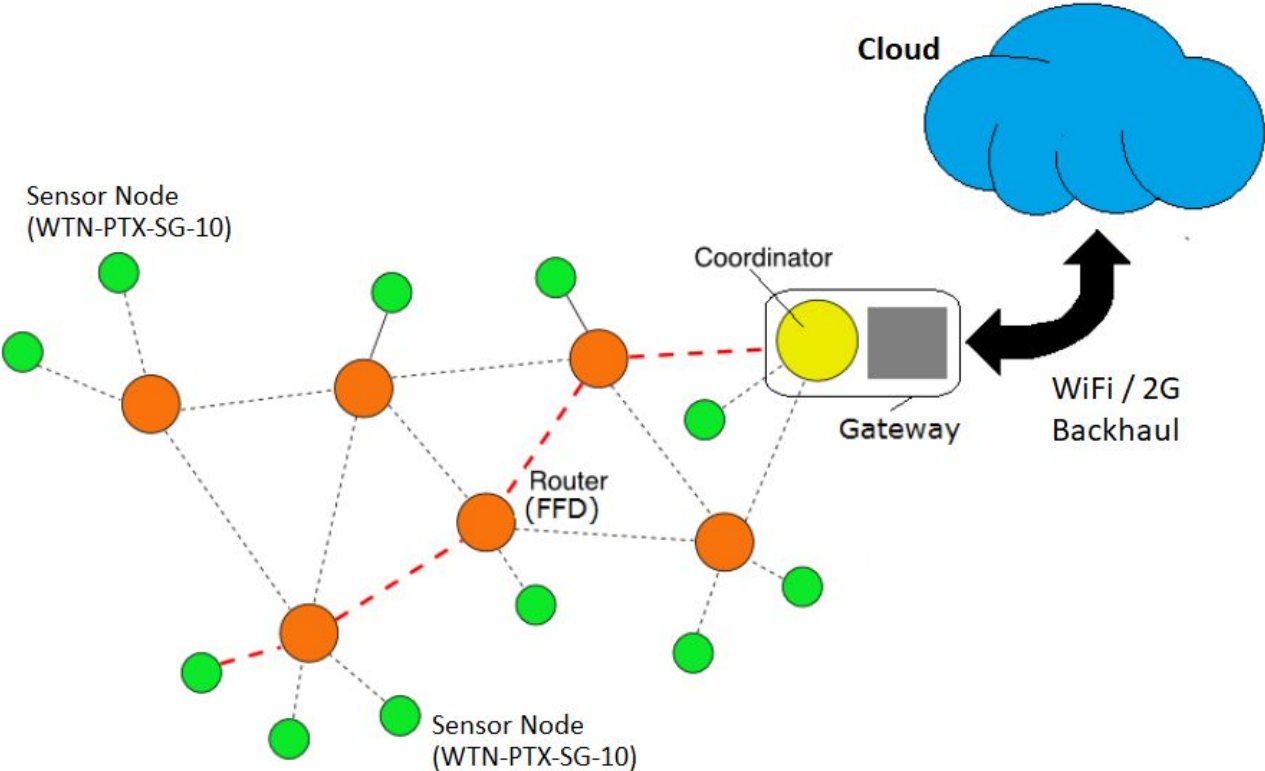
Timestamp (Wed Dec 25 19:41:32 2019)
[1] Received msg from node <01139 / fc:c2:3d:ff:fe:0d:93:a4>
RSSI -45 dBm / LQI 21
+[Node_Voltage] <2.805000 Volts>
+[Temp_TMP75C] <28.500000 Deg C>
-----
```

The Linux/Cygwin based CLI can be used (for example) to:

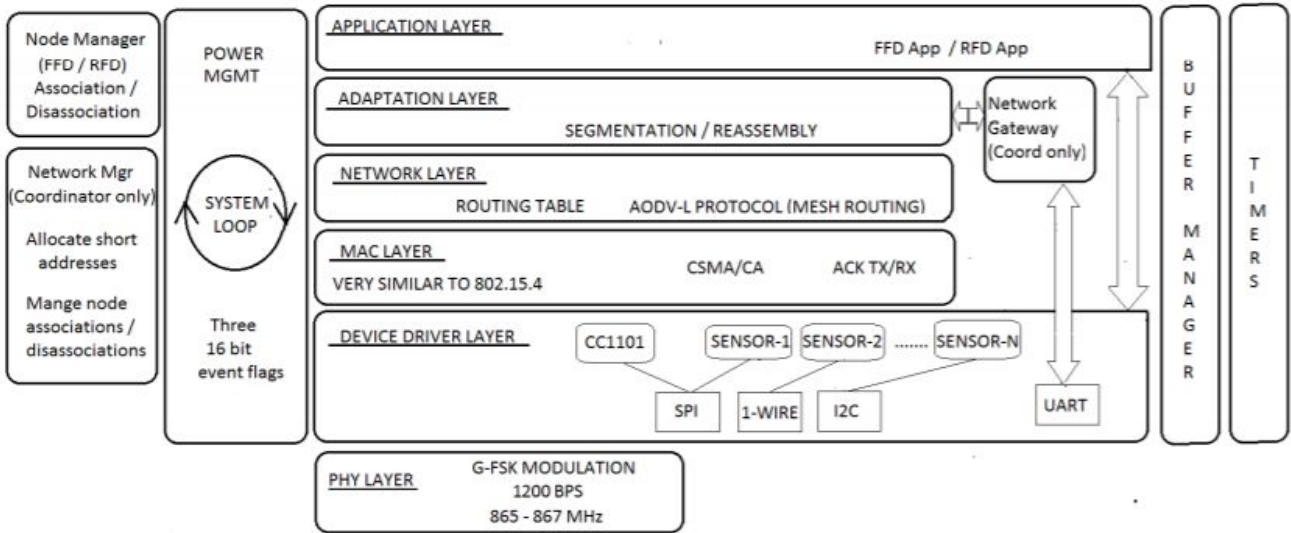
- Set the RF channel (channel 1 to channel 9) on which the LPWMN will operate.
- Set the 16-bit LPWMN identifier (LPWMN Id).
- Configure the baud rate.
- Add node to white-list / remove nodes from white-list / display white-list
- Add node to black-list / removed node from black-list / display black-list
- List all the nodes in the network.
- Get routing information
- Get/Set attributes on the Coordinator and other nodes in the network.
- Request the coordinator to reboot itself.
- Request any node in the network to reboot.
- Upgrade the firmware running on the Coordinator.
- Upgrade the firmware on any node in the network (over the air upgrade).
- Get information on the version of firmware running on the coordinator or any other node in the LPWMN.
- Monitor sensor data messages received from any node in the network
- Command any node in the network (coordinator or not) to generate an unmodulated or modulated continuous wave (CW) signal for the test, debug and certification purposes.

Configurable parameters are signal frequency (channel index), signal transmit power (in dBm) and transmit duration (in seconds). At the end of the specified duration, the node will reboot and resume operation as configured (Coordinator, FFD or RFD).

WiSense Wireless Mesh / Star Network Architecture



WiSense Network Stack Layers



For queries, contact:

rkris@wisense.in

WiSense Technologies Pvt Ltd,
No. 553/A , 9th A Main,
1st Floor, Indiranagar 1st Stage,
Bengaluru 560038

Web: <https://www.wisense.in>

Blog: wisense.wordpress.com