Datasheet

CENTAURI 200

Version: 3.2

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Revision History

Date	Version	Details of change	Author	Reviewers
5-Aug-19	1	Initial draft	JB	KB
8-Feb-20	2	- Updated the document as per the latest rev2.0 of the schematics and layout. - Removed "Regulatory Statements" section. - Updated the document with standard document template.	SD	KB
19-Mar-20	2.1	- Updated all the tables, Images, added thermal & Range test data.	YP	KB
25-06-20	2.2	- Updated PoE source specification in section 3.10	SD	KB
27-08-20	3.0	- Updated as per FCC requirement	SD	KB
02-11-20	3.2	- Added FCC/IC Statement and antenna gain table	YP	YP

Table 1 : Revision History

1 INTRODUCTION

1.1 Purpose

This document describes the ACL Digital' Centauri 200 enterprise/industrial IoT Gateway. Targeted for multiple use cases in various segments of IoT such as Smart Home, Buildings and Industries. Core features are its Hardware Design with Multi-Radio Connectivity such as Wi-Fi, BLE/BT, LTE, Thread, Zigbee® and Z-Wave. Apart from multiple radio connectivity options, the Centauri 200 also is capable of Power over Ethernet (PoE) and standard industrial interfaces like RS-232/RS-485 and CAN.

This document mainly describes Centauri 200 from a Hardware point of view, there are separate software development manuals that can be also consulted.

For any further support contact ACL Digital support services at: centauri.support@volansys.com

1.2 Scope

The scope of this document is to detail out aspect of CT200 Gateway product design, specifications, Features etc.

This document, henceforth, is to be used as a direct reference by end customers that uses this product. CT200 Gateway team will also use this document to review, approve and accept the product design for showcase purpose.

1.3 Acronyms & Abbreviations

Terms	Definition
SoC	System on Chip
CPU	Central Processing Unit
BLE	Bluetooth Low Energy
IoT	Internet of things
RST	Reset
UART	Universal asynchronous receiver-transmitter
LED	Light Emitting Diode
GPIO	General Purpose Input/output
TBD	To Be Determined
Etc	Et Criteria

Table 2 : Acronyms & Abbreviations

1.4 References

Sr No	Reference Document Title	Provided by	Remarks
1	Schematics design	ACL Digital	Primary reference
2	Layout design	ACL Digital	N/A

Table 3 : References

2 PRODUCT OVERVIEW

ACL Digital' Centauri 200 is all-in-one gateway development kit, which is based on NXP's power efficient i.MX6ULL/ i.MX6UltraLite/ i.MX6ULZ applications processor featuring ARM® Cortex®-A7 core CPUs.

Centauri 200 has a wide range of interfaces available like USB, Ethernet, RS232/485, CAN. It supports various wireless connectivity protocol as Thread, BLE, Zigbee®, Z-Wave, Wi-Fi b/g/n, LTE. Centauri 200 has standard MikroBus compatible socket header which enables a user to use any standard MikroBus add on modules. The figure below shows the complete Centauri 200 unit and internal view depicting all its interfaces.

CENTAURI 200 IoT Gateway platform is specifically crafted to satisfy all the needs of the Enterprise/Industrial IoT Gateway Solution. Gateway is built on secure, power-efficient, and cost-optimized ARM® Cortex®-A7 based i.MX6UL/6ULL/6ULZ SoC. This enables a greater amount of flexibility in providing various RF connectivities and peripherals to make a tailor-made solution according to end-user needs. ACL Digital also offers a CENTAURI Software Framework for all OEMs to quickly build applications. CENTAURI Gateway platform is pre-integrated with well-known cloud & app platform providers to help OEMs with faster application development. OEMs can build Zigbee gateway, Z-Wave gateway, BLE gateway and Thread gateway-based solution on the platform with any two radios supported at a time. CENTAURI Gateway platform is available under OEM offerings to reduce time to market so that you can focus more on creating values in end-user applications.

Figure 1: Centauri 200 Unit
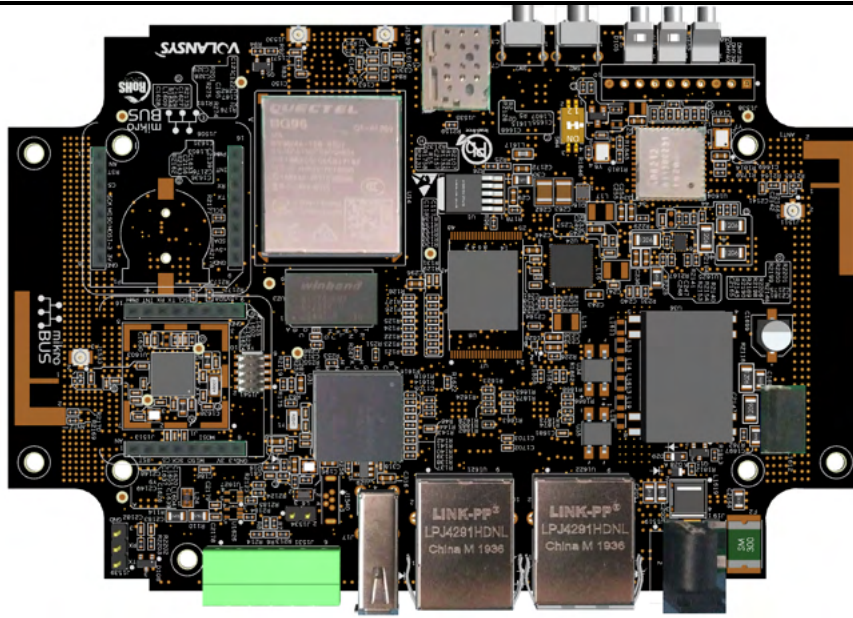
Figure 2: Centauri 200 PCBA

2.1   System Block Diagram
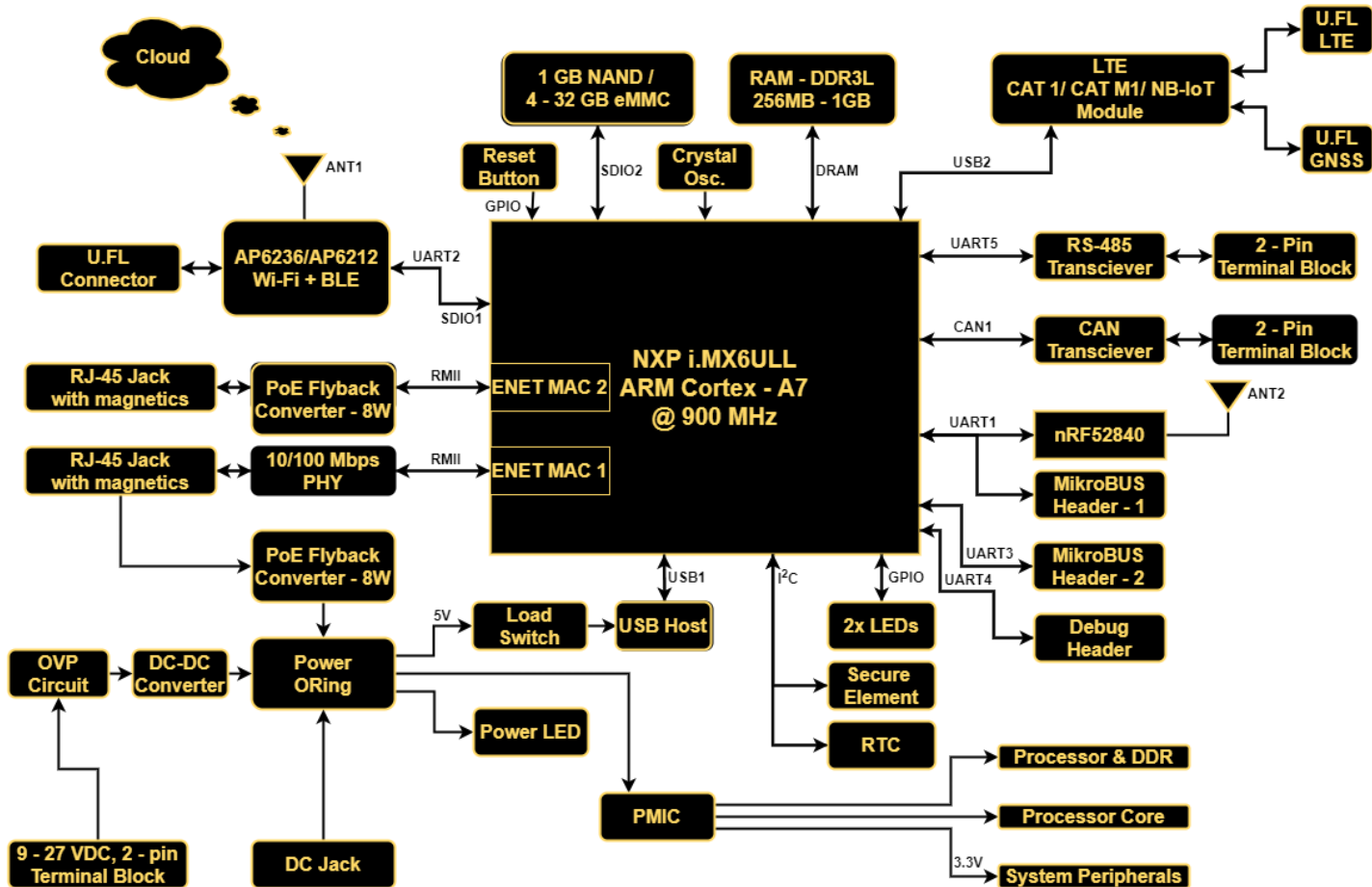
Figure 3: Centauri 200 - System Block Diagram

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2.2 Features and Functionality

The table below lists major features and function of the Centauri 200.

Sr No	Block	Feature Parameter	Specification
1	CPU	Core & Frequency	i.MX 6ULZ (900 MHz) ARM Cortex A7
			i.MX 6ULL (528 MHz) ARM Cortex A7
			i.MX 6UltraLite (528MHz) ARM Cortex A7
2	Memory	RAM Memory Type	DDR3L
		RAM Size	up to 1 GB
		Emmc	up to 32 GB
3	Interfaces	Ethernet	2 x 10/100Mbps (1 support POE)
		USB	1 x USB2.0 (Host/Device)
		MikroBUS header	2x standard MikroBUS headers
		Wi-Fi + BLE	BLE 4.2, Wi-Fi 802.11 b/g/n
		LTE	CAT1(4G), CAT M1, NB-INT
		Serial Communication	RS485
4	User Interface/ IO	Switch	2x user configurable switches
		Eds	1x power LED
			2x user configurable Eds
		Debug Port	1x UART port for debug

Table 4: Features and Function

3 MAJOR COMPONENTS ON CENTAURI 200

Sr No	Processor Series	i.MX6 UltraLite	i.MX6 ULL	i.MX6 ULZ
1	Mfg. Part	MCIMX6G2CVM05AB	MCIMX6Y2CVM05ABR	MCIMX6Z0DVM09AB
2	Core	Single-core ARM Cortex-A7	Single-core ARM Cortex-A7	Single-core ARM Cortex-A7
3	Maximum Clock Frequency	528 MHz	Commercial - 528/900 MHz	900 MHz
			Industrial - 528/792 MHz	
4	Memory Type	DDR3, DDR3L, eMMC, Flash, LPDDR2	NAND Flash, NOR Flash, DDR3, LPDDR2	DRR3, DDR3L, Flash, LPDDR2
5	Applications	Consumer/Industrial products	Consumer/Industrial products	Consumer products
6	Peripherals	14 x 14 mm, 0.8 mm pitch, BGA	14 x 14 mm, 0.8 mm pitch, MAPBGA	14 x 14 mm, 0.8 mm pitch, MAPBGA
		Consumer: -40 to 95 °C	Consumer: -40 to 95 °C	-40 to 95 °C
		Industrial: -40 to 105 °C	Industrial: -40 to 105 °C	
		CAN x 2	CAN x 2	---
		Ethernet x 2	Ethernet x 2	---
		USB OTG x2	USB OTG x2	USB OTG x2
		ADC x 2	ADC x 2	---
		UART x 8	UART x 8	UART x 8
		SAI x 3	SAI x 3	SAI x 3
		---	ESAI x 1	ESAI x 1
		Timer x 4	Timer x 4	Timer x 4
		PWM x 8	PWM x 8	PWM x 8
		I2C x 4	I2C x 4	I2C x 4
		SPI x 4	SPI x 4	SPI x 4

Table 5: Applications Processor Comparison

Base Board

Below are some of major features and interfaces of Centauri 200 base board:

- 2x MikroBus Compatible Header. (Supports MKW41Z Thread, JN5179 Zigbee®, ZGM130S Z-Wave module)

- 1x Wi-Fi b/g/n + BT/BLE Combo module with U.FL connector to support external antenna.

- On board nRF52840 BLE module with optional external antenna.

- 1x 4FF (Nano) SIM card connector for LTE.

- 1x JTAG header.

- 1x USB 2.0 port (host/device configurable).

- 2x 10/100 Ethernet port.

- 1x CAN port.

- 1x RS232/485 port.

- 3x LED's (1x power + 2x user configurable).

- 2x user configurable switches.

- DC power jack (5V, 3A) or terminal block (9-27V).

Note: Other MikroBUS compatible modules can be added to the Centauri 200 via its MikroBUS compatible headers.
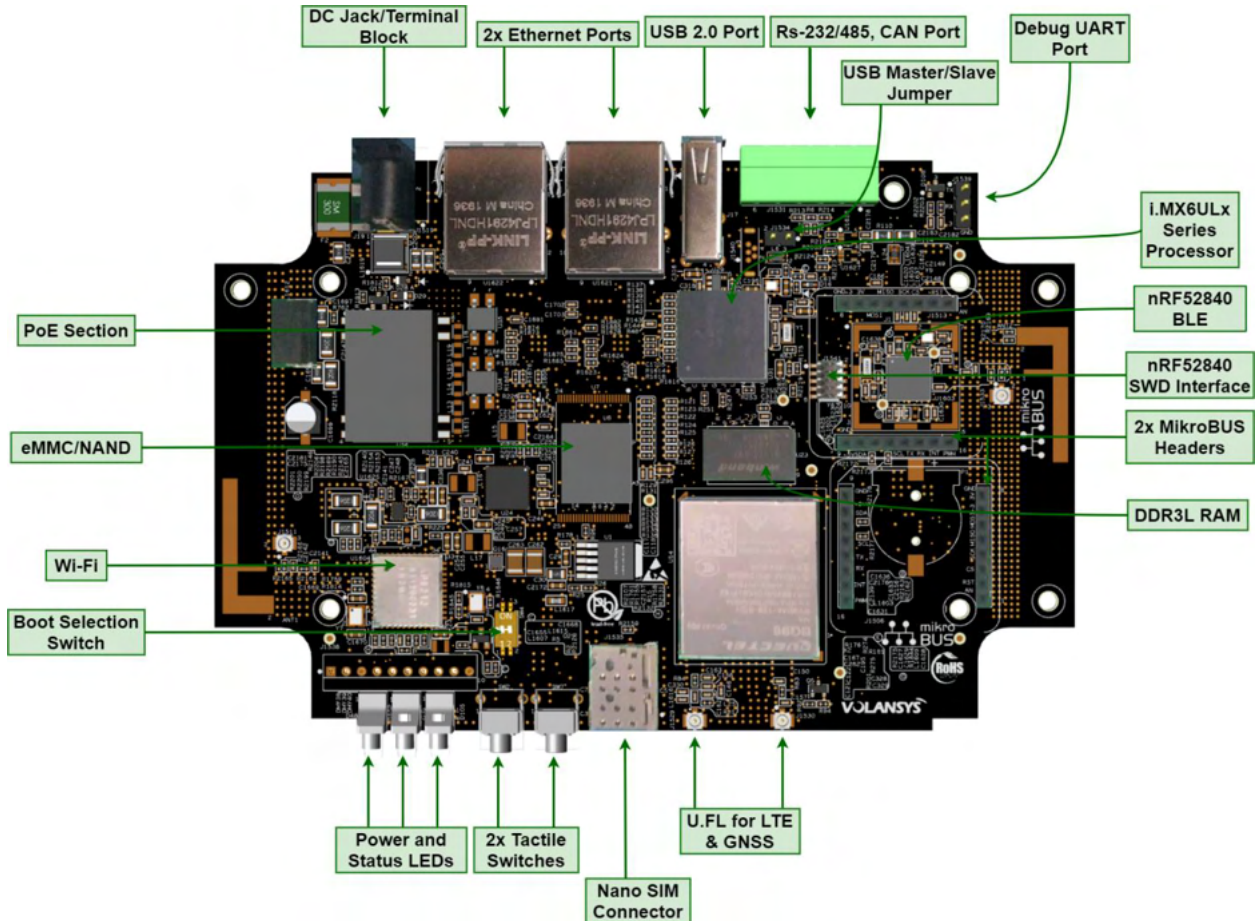
Figure 4: Centauri 200 - Base Board

3.1   Secure Element

Centauri 200 has a built-in secure element IC providing device to device authentication, key storage and data protection, etc features based on NXP's A71CH chip.

The A71CH is a ready-to-use solution providing a root of trust at the IC level and proven, chip-to-cloud security right out of the box. It is a platform capable of securely storing and provisioning credentials, securely connecting IoT devices to cloud services and performing cryptographic node authentication.

More information regarding this chip can be found at the link below:

https://www.nxp.com/docs/en/data-sheet/A71CH-SDS.pdf

3.2   Wireless Connectivity

Centauri 200 has on board AP6212/6236, MKW41Z, JN5179, ZGM130S, nRF52840 and EG91/BG96 wireless modules. Below are major features of each wireless peripheral. More information regarding the wireless modules can be obtained from their respective websites and data-sheets.

3.3   Wi-Fi + Bluetooth Combo Module

The Centauri 200 uses an Ampak AP6236/6212 Wi-Fi + Bluetooth combo module. AP6236/6212 is a single chip 2.4 GHz WLAN IEEE 802.11 b/g/n single band radio and Bluetooth V4.0(HS) with integrated class 1.5 PA and Low Energy (LE) support. The Cenaturi 200 comes with two antenna options for the Wi-Fi/BLE viz. Internal CHIP antenna and external high gain chip antenna.

Below image shows the RF specification of the Wi-Fi/BT module.

Sr	Feature	Description
1	WLAN Standard	IEEE 802.11b/g/n, WiFi compliant
2	Frequency Range	2.400 GHz ~ 2.4835 GHz (2.4 GHz ISM Band)
3	Number of Channels	2.4GHz：Ch1 ~ Ch11
4	Modulation	802.11b : DQPSK, DBPSK, CCK
		802.11 g/n : OFDM /64-QAM,16-QAM, QPSK, BPSK
5	Output Power (Burst Average Power)	802.11b /11Mbps : 7.5 dBm ± 1 dB @ EVM £ -9dB
		802.11g /54Mbps : 7.5 dBm ± 1 dB @ EVM £ -25dB
		802.11n /65Mbps : 7.5 dBm ± 1 dB @ EVM £ -28dB
6	Receive Sensitivity (11n,20MHz) @10% PER	MCS=0 PER @ -85 dBm, typical
		MCS=1 PER @ -84 dBm, typical
		MCS=2 PER @ -82 dBm, typical
		MCS=3 PER @ -80 dBm, typical
		MCS=4 PER @ -77 dBm, typical
		MCS=5 PER @ -73 dBm, typical
		MCS=6 PER @ -71 dBm, typical
		MCS=7 PER @ -68 dBm, typical
7	Receive Sensitivity (11g) @10% PER	6Mbps PER @ -86 dBm, typical
		9Mbps PER @ -85 dBm, typical
		12Mbps PER @ -85 dBm, typical
		18Mbps PER @ -83 dBm, typical
		24Mbps PER @ -81 dBm, typical
		36Mbps PER @ -78 dBm, typical
		48Mbps PER @ -73 dBm, typical
		54Mbps PER @ -71 dBm, typical
8	Receive Sensitivity (11b) @8% PER	1Mbps PER @ -90 dBm, typical
		2Mbps PER @ -88 dBm, typical
		5.5Mbps PER @ -87 dBm, typical
		11Mbps PER @ -84 dBm, typical
9	Data Rate	802.11b : 1, 2, 5.5, 11Mbps
		802.11g : 6, 9, 12, 18, 24, 36, 48, 54Mbps

10	Data Rate (20MHz ,Long GI,800ns)	802.11n: 6.5, 13, 19.5, 26, 39, 52, 58.5, 65Mbps
11	Data Rate (20MHz ,short GI,400ns)	802.11n : 7.2, 14.4, 21.7, 28.9, 43.3, 57.8, 65,72.2Mbps
12	Maximum Input Level	802.11b : -10 dBm
		802.11g/n : -20 dBm
13	Antenna Reference	Small antennas with 3.2 dBi peak gain

Table 6 : Wi-Fi RF Charactrics

Sr No	Feature	Description
1	Bluetooth Standard	Bluetooth of 1, 2 and 3 Mbps.
2	Host Interface	UART
3	Antenna Reference	Small antennas with 0 dBi peak gain
4	Frequency Band	2402MHz ~ 2480MHz
5	Number of Channels	79 channels
6	Modulation	FHSS, GFSK, DPSK, DQPSK
7	Output Power (Flame Average Power)	BDR : 7.5 ± 1 dB
		EDR : 3.5 ± 1 dB
8	Sensitivity @ BER=0.1% for GFSK (1Mbps)	-86 dBm
9	Sensitivity @ BER=0.01% for π/4-DQPSK	-86 dBm
10	Sensitivity @ BER=0.01% for 8DPSK	-80 dBm
11	Maximum Input Level	GFSK (1Mbps):-20dBm
		π/4-DQPSK (2Mbps) :-20dBm
		8DPSK (3Mbps) :-20dBm

Table 7 : BLE RF Characteristic

3.4 Thread + BLE 4.2 Module (Optional)

Thread connectivity can be added to Centauri 200 using ACL Digital' MKW41Z module. The MKW41Z module is a MikroBUS complaint module. It supports BLE 4.2 and thread connectivity. Salient points of the module are listed as below.

● Based on NXP's Kinetis MCU family.

● 32-bit ARM Cortex M0+ MCU (48MHz) with 64K SRAM and 512K Flash.

● Compliant to BLE 4.2 & IEEE 802.15.4.

● On-board chip antenna with optimum RF performance.

● Max output power: +3.5 dBm.

● RX Sensitivity BLE: -96 dBm.

● RX Sensitivity 802.15.4: -100 dBm.

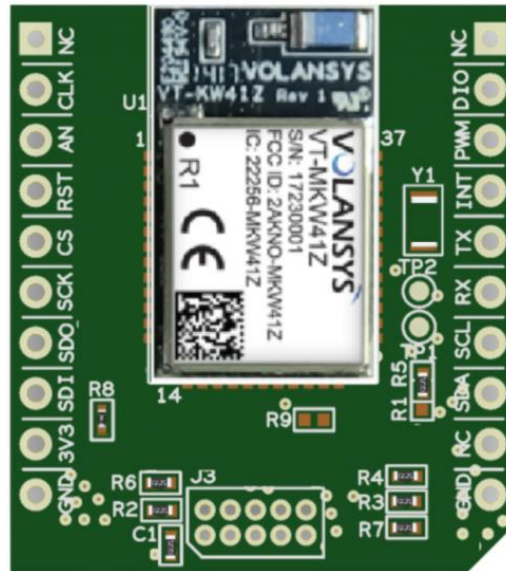● Host interface: UART.

● MikroBUS complaint.

Figure 4 : MKW41Z MikroBUS Module

3.5   ZigBee Module (Optional)

ZigBee connectivity on Centauri 200 is possible using NXP's JN5179 module. JN5179 is an ultra-low powered, high performance wireless MCU optimized as a platform for ZigBee 3.0 applications. Following are the features of the module.

- ARM Cortex M3 (32MHz) MCU with 512kB flash, 32kB RAM, 4kB EEPROM.

- Compliant to 2.4GHz IEEE 802.15.4

- On-board PCB antenna.

- Max output power: +10 dBm.

- RX Sensitivity: -96 dBm.

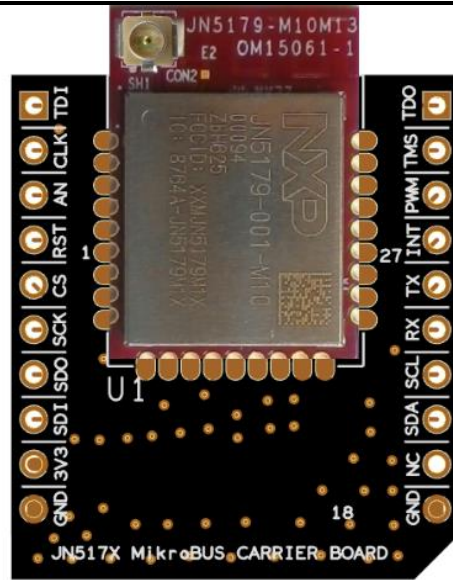- Host interface: UART.

- MikroBUS compliant.

Figure 5 : JN5179 MikroBUS Module

3.6 Bluetooth Low Energy (BLE)

The Centauri 200 implements a Nordic semiconductor nRF52840 multiprotocol transceiver chip on board. The nRF52840 is fully multiprotocol capable of full protocol concurrency. It has protocol support for Bluetooth 5.0, Bluetooth mesh, Thread, Zigbee, 802.15.4, ANT and 2.4 GHz proprietary stacks. This chip also comes with inbuilt sophisticated power management system for low energy consumption.

The Centauri 200 provides a PCB trace antenna on board for operation of this section and has U.FL connector for providing support to external 2.4 GHz antenna depending upon the use case.

Figure 4-5 depicts implementation of the nRF52840 on the Centauri 200 board.
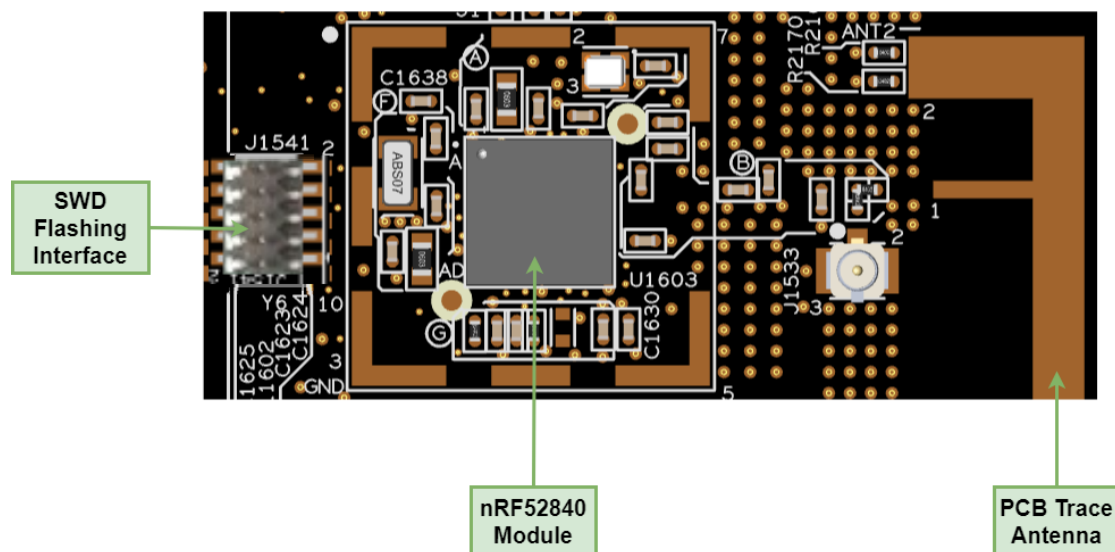

Figure 6 : nRF52840 BLE Module

3.7   nRF52840 BLE Module (Optional)

The Centauri 200 implements a Nordic semiconductor nRF52840 multiprotocol transceiver chip on board. The nRF52840 is fully multiprotocol capable of full protocol concurrency. It has protocol support for Bluetooth 5.0, Bluetooth mesh, Thread, Zigbee, 802.15.4, ANT and 2.4 GHz proprietary stacks. This chip also comes with inbuilt sophisticated power management system for low energy consumption.

The module is MikroBUS complaint and comes in two variants with respect to antenna.

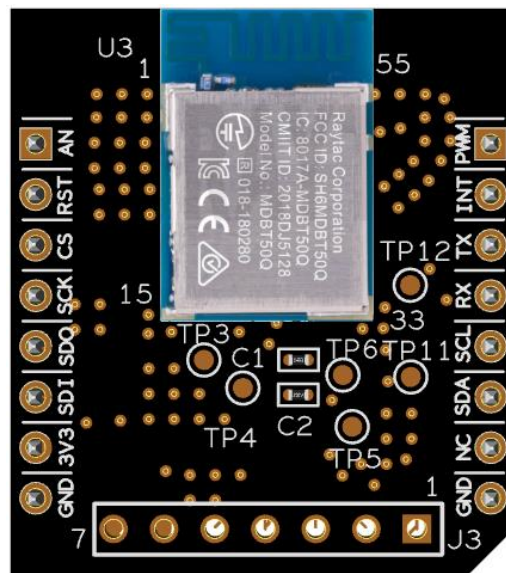1.   PCB trace antenna

2.   External antenna on a U.FL connector

Figure 7: nRF52840 BLE MikroBUS Module

3.8   ZWave 700 Module (Optional)

ZWave 700 connectivity is possible on Centauri 200 using ACL Digital' ZWave 700 module. It is developed using the Silicon Labs Z-Wave 700 Zen Gecko SiP Module, ZGM130S. The ZGM130S is a fully integrated Z-Wave module, enabling rapid development of Z-Wave solutions. A base band controller, Sub-GHz radio transceiver, crystal, decoupling, and matching is included to provide a complete Z-Wave System-in-Package module requiring only an external antenna. An ideal solution for smart home control and sensing applications such as sensors, door locks, light switches, security networks as well as gateways.

Following are the features of the Zwave 700 module:

●   ITU G.9959 compliant.

●   Supports all ZWave bands (865.2 MHz - 926.3 MHz).

●   ARM Cortex-M4 Floating Point Unit.

●   39 MHz clock speed.

- 64 Kb application flash.

- 8 Kb application RAM.

- MikroBUS compliant.
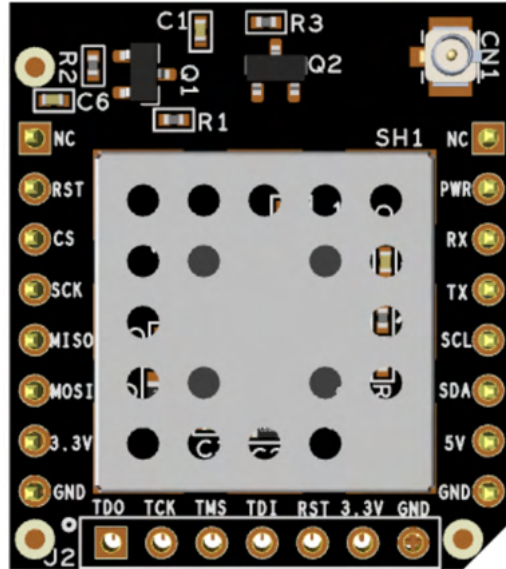
Figure 8 : ZWave 700 MikroBUS Module

3.9   Long Term Evolution (LTE) Module

Centauri 200 supports on-board LTE cellular connectivity LTE CAT1(4G), CAT M1, NB-IOT and WCDMA (3G) to provide compatibility with multiple geographic regions like North America, Europe, etc. Centauri 200 uses external antenna for LTE wireless connectivity. Besides LTE, Centauri 200 also supports GNSS/GPS using an external antenna interface.

Centauri 200 has a Nano(4FF) SIM card socket. The socket is user accessible and thus, SIM card can be changed without opening the Centauri 200 enclosure.

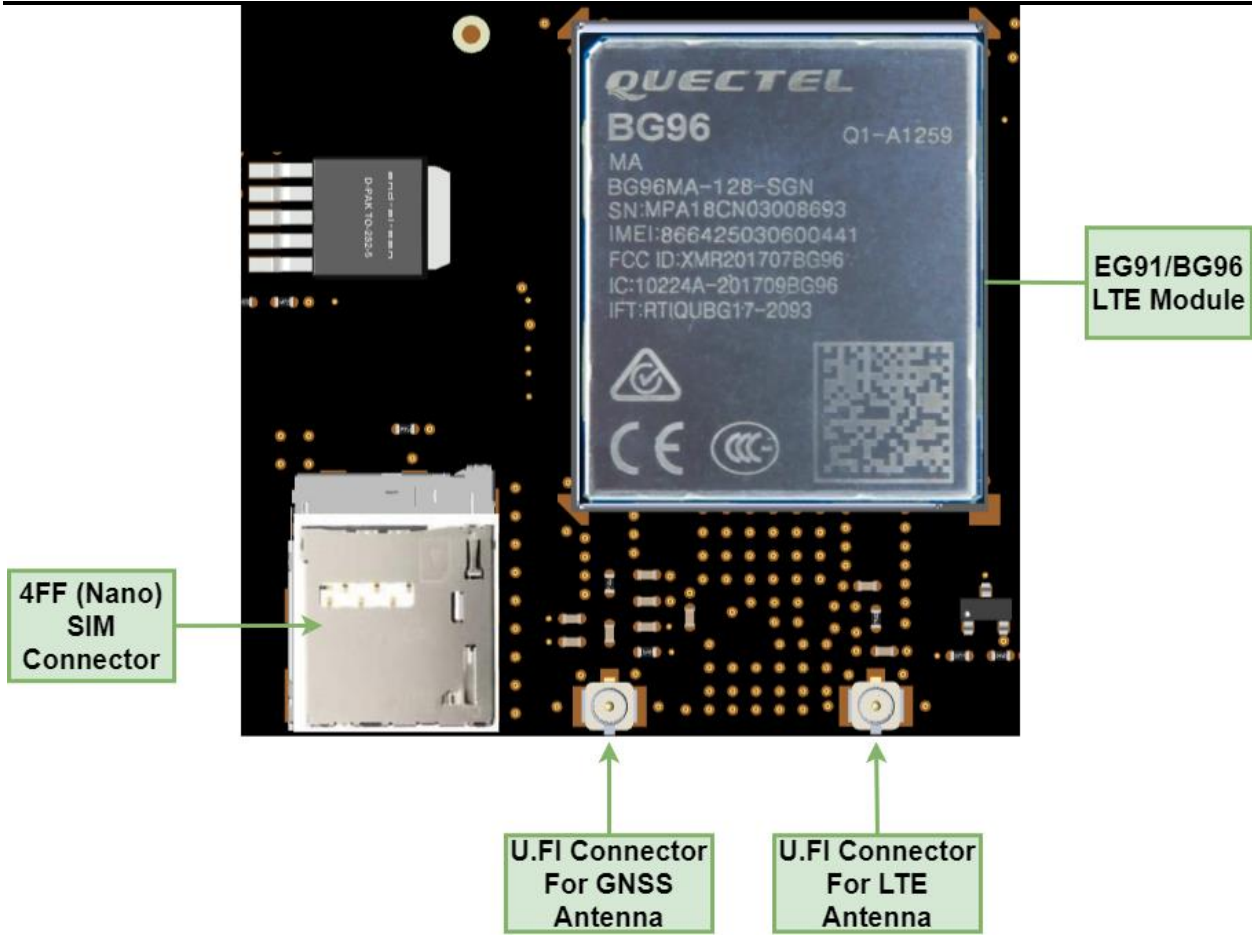Figure 9 : LTE Module

3.10 Power Supply

The Centauri 200 has the following power options:

- **DC Jack**: Uses a 5V, 3A DC power adaptor.

- **Terminal Block**: Uses a 9-27V, 1.6-0.6A DC power adaptor

- **Power over Ethernet** (PoE): Uses the Power over Ethernet RJ45 jack. (LTE will not be supported if the Centauri 200 is being powered using the PoE. The PoE source such as a PoE switch or PoE power injector should be compliant to IEEE 802.af (48V, 15W) for use with CENTAURI 200.

3.11 Antenna details

Sr	Radio	Description	Manufacturer	Part No	Gain
1	LTE 4G	LTE 4G Antenna with	Shengdacom	SDD15	4 dBi
2	BLE	BLE 2.4 Ghz	Custome Design	Custome Design	0 dBi
3	BLE	2.4GHz WLAN Whip, Tilt	Inventek Systems	W24-ASMA-4 dBi	5 dBi
4	WiFi	BLE 2.4 Ghz	Pulse Larsen	W3006	3.2 dBi
5	WiFi	2.4GHz WLAN Whip, Tilt	Inventek Systems	W24-ASMA-4 dBi	5 dBi

Table 8 : Antenna Details

4 PERIPHERAL INTERFACES

This section describes interfaces of Centauri 200. Below figure shows the available interfaces of Centauri 200. Figure 5-1 describes the peripheral interfaces of Centauri 200 pictorially.
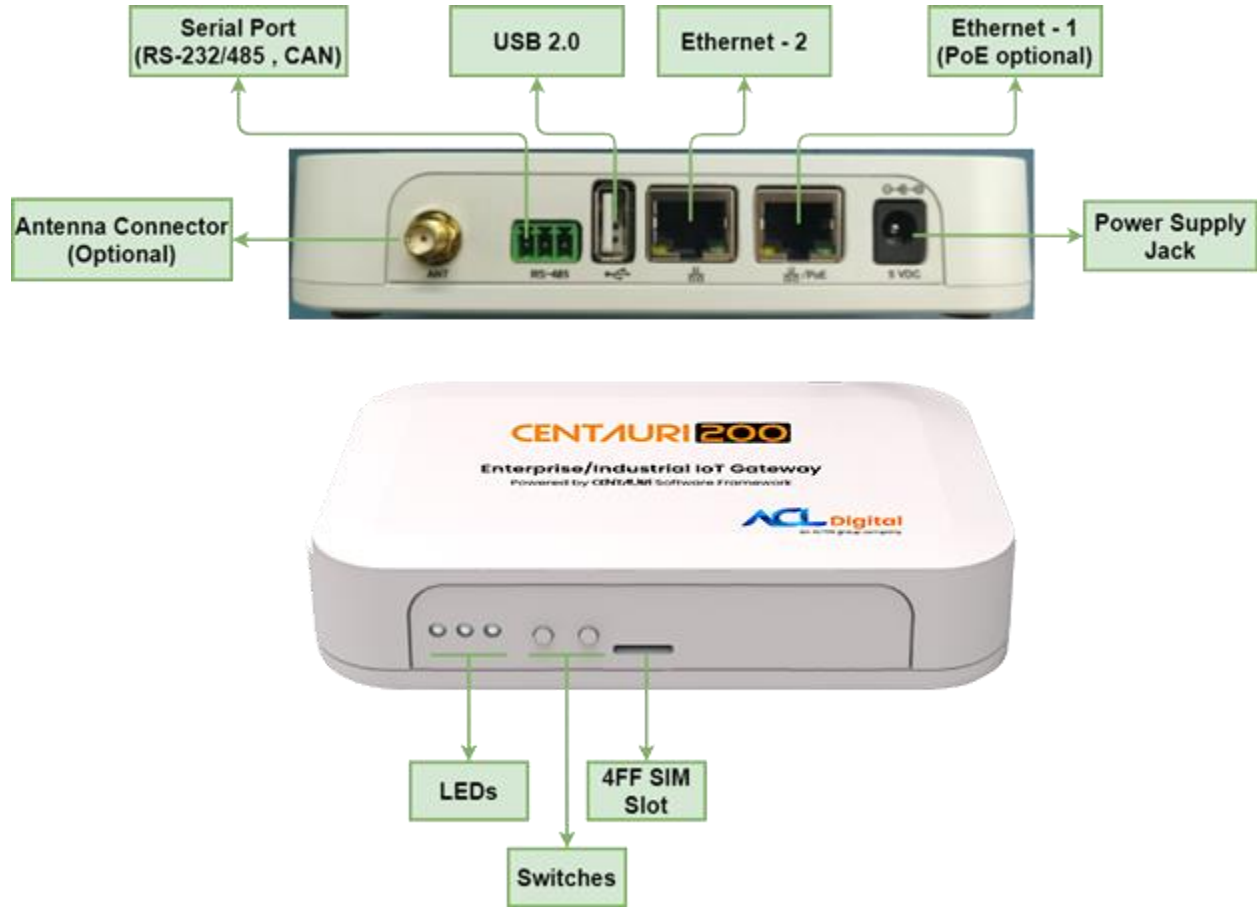

Figure 10 : Interfaces on Centauri 200

4.1 Ethernet

The Centauri 200 has 2 x 10/100Mbit/s Ethernet ports with one of them capable of providing Power over Ethernet (PoE) support.
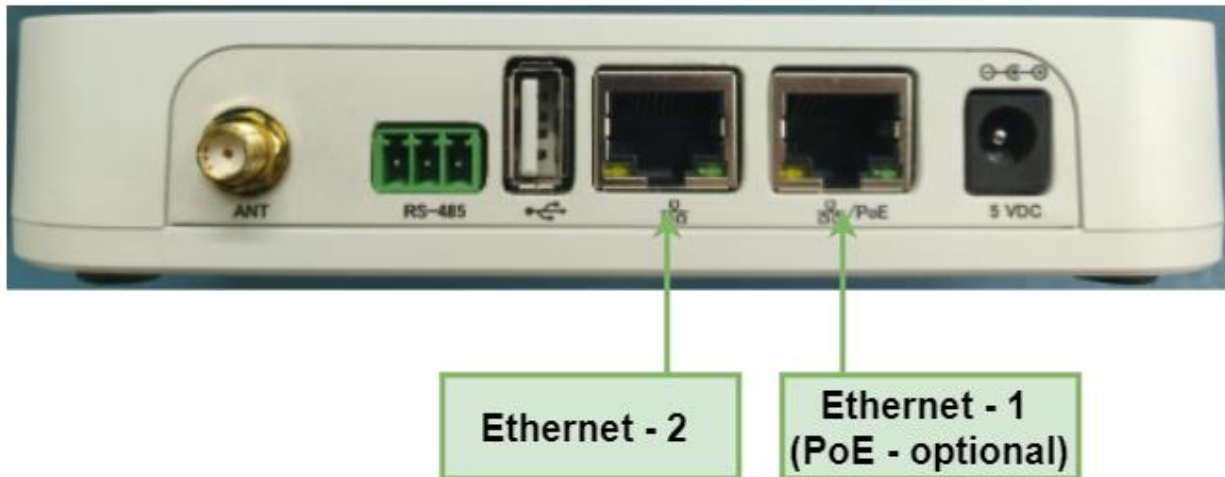
Figure 11 : Ethernet Ports

Ethernet MAC features:

● Implements the full 802.3 specification with preamble/SFD generation, frame padding generation, CRC generation and checking, supports zero-length preamble.

● Dynamically configurable to support 10/100-Mbit/s operation.

● Supports 10/100 Mbit/s full-duplex and configurable half-duplex operation.

● Compliant with the AMD magic packet detection with interrupt for node remote power management.

● Seamless interface to commercial Ethernet PHY devices via one of the following:

● A 4-bit Media Independent Interface (MII) operating at 2.5/25 MHz.

● A 4-bit non-standard MII-Lite (MII without the CRS and COL signals) operating at 2.5/25 MHz.

● A 2-bit Reduced MII (RMII) operating at 50 MHz.

● Simple 64-Bit FIFO user-application interface.

● CRC-32 checking at full speed with optional forwarding of the frame check sequence(FCS) field to the client.

● CRC-32 generation and append on transmit or forwarding of user application provided FCS selectable on a per-frame basis.

● In full-duplex mode:

● Implements automated pause frame (802.3 x31A) generation and termination, providing flow control without user application intervention.

● Pause quanta used to form pause frames — dynamically programmable.

- Pause frame generation additionally controllable by user application offering flexible traffic flow control.

- Optional forwarding of received pause frames to the user application.

- Implements standard flow-control mechanism.

- In half-duplex mode: provides full collision support, including jamming, back-off, and automatic re-transmission.

- Supports VLAN-tagged frames according to IEEE 802.1Q

- Programmable MAC address: Insertion on transmit; discards frames with mismatching destination address on receive. (except broadcast and pause frames)

- Programmable promiscuous mode support to omit MAC destination address checking on receive.

- Multicast and unicast address filtering on receive based on 64-entry hash table, reducing higher layer processing load.

- Programmable frame maximum length providing support for any standard or proprietary frame length.

- Statistics indicators for frame traffic and errors (alignment, CRC, length) and pause frames providing for IEEE 802.3 basic and mandatory management information database (MIB) package and remote network monitoring (RFC 2819).

- Simple handshake user application FIFO interface with fully programmable depth and threshold levels.

- Provides separate status word for each received frame on the user interface providing information such as frame length, frame type, VLAN tag, and error information.

- Multiple internal loopback options.

- MDIO master interface for PHY device configuration and management supports two programmable MDIO base addresses, and standard (IEEE 802.3 Clause 22) and extended (Clause 45) MDIO frame formats.

- Supports legacy FEC buffer descriptors.

- Interrupt coalescing reduces the number of interrupts generated by the MAC, reducing CPU loading.

IP protocol performance optimization features:

- Operates on TCP/IP and UDP/IP and ICMP/IP protocol data or IP header only, enables wire-speed processing, Supports IPv4 and IPv6.

- Transparent passing of frames of other types and protocols.

- Supports VLAN tagged frames according to IEEE 802.1q with transparent forwarding of VLAN tag and control field.

- Automatic IP-header and payload (protocol specific) checksum calculation and verification on receive.

- Automatic IP-header and payload (protocol specific) checksum generation and automatic insertion on transmit configurable on a per-frame basis.

- Supports IP and TCP, UDP, ICMP data for checksum generation and checking.

- Supports full header options for IPv4 and TCP protocol headers.

- Provides statistics information for received IP and protocol errors.

- Configurable automatic discard of erroneous frames.

- Configurable automatic host-to-network (RX) and network-to-host (TX) byte order conversion for IP and TCP/UDP/ICMP headers within the frame.

- Configurable padding removes for short IP datagrams on receive.

- Configurable Ethernet payload alignment to allow for 32-bit word-aligned header and payload processing.

- Programmable store-and-forward operation with clock and rate decoupling FIFOs.

4.2   IEEE features:
- Supports all IEEE 1588 frames.

- Allows reference clock to be chosen independently of network speed.

- Software-programmable precise time stamping of ingress and egress frames.

- Timer monitoring capabilities for system calibration and timing accuracy management.

- Precise time stamping of external events with programmable interrupt generation.

- Programmable event and interrupt generation for external system control.

- Supports hardware- and software-controllable timer synchronization.

- Provides a 4-channel IEEE 1588 timer. Each channel supports input capture and output compare using the 1588 counter.

4.3   USB
Centauri 200 has one USB 2.0 Type A port on back side and is configured as a host device by default. Below are major features of USB interface:

- High-Speed/Full-Speed/Low-Speed support.

- High Speed, and Full Speed operation in Peripheral mode (with UTMI transceiver).

- Hardware support for OTG signaling, session request protocol, and host negotiation protocol.

- Up to 8 bidirectional endpoints.

- Low-power mode with local and remote wake-up capability.

- Serial PHY interfaces configurable for bidirectional/unidirectional and differential/single ended.
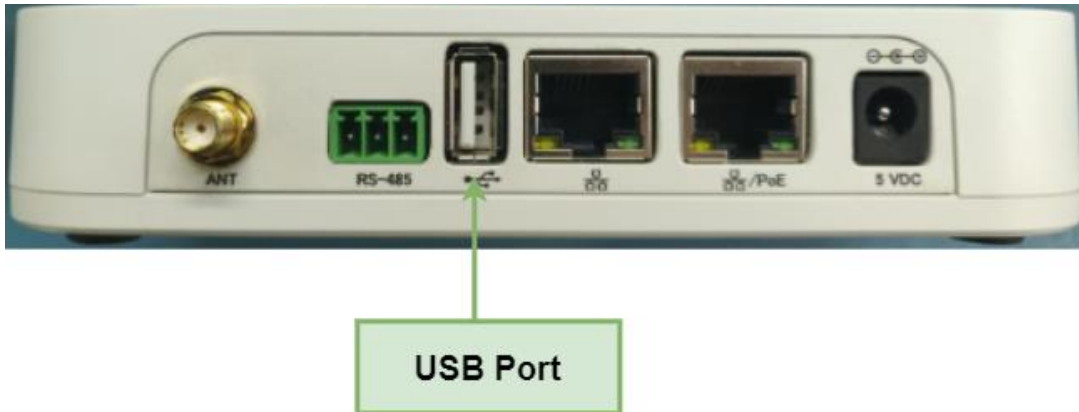
- Embedded DMA controller.

Figure 12 : USB Port Selection Jumper

The Centauri 200 can also be configured as a USB slave device. This is done by closing the selection jumper using a jumper shunt. The location of the selection jumper is on the Centauri 200 PCBA. Figure 5-3 shows the jumper on a Centauri 200 PCBA.

4.4   Serial Ports

Centauri 200 supports RS-232/485 ports. Serial port access is possible through terminal block connector on the back side of the Centauri 200 unit. Either RS232 or Rs485 anyone can be used at a time as per the variant. Centauri 200 also supports CAN interface on board. CAN interface can be accessed through terminal block on the back of the Centauri 200 unit.
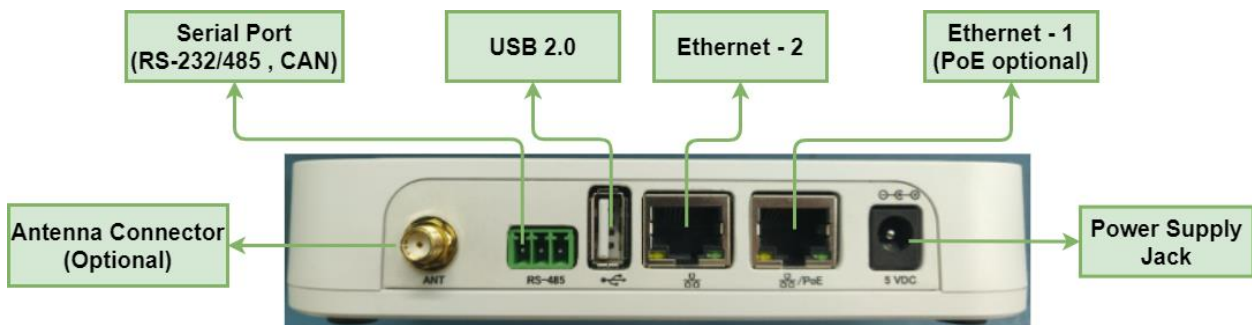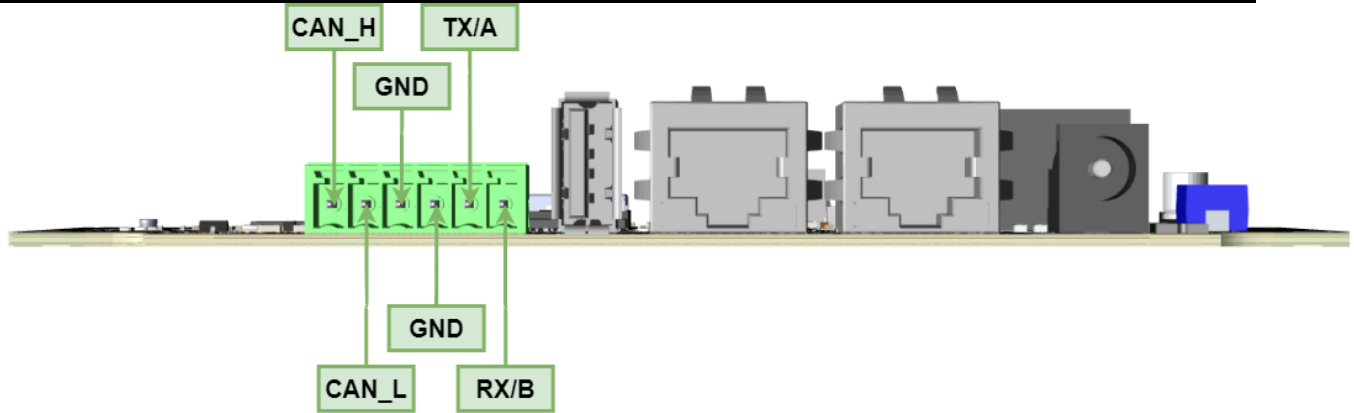
Figure 13 : Serial Ports

4.5   Debug Port

The Centauri 200 has an inbuilt debug UART port with three pins. Debug is only possible if the user can access Centauri 200 PCBA. It is to be noted that the UART signaling occurs at 3.3V logic levels and the pins are not 5V tolerant. A user can enter the debug prompt on a PC/Mac using a normal 3.3V logic USB to UART converter.

These are the parameters to establish debug UART connection with Centauri 200:

- Baud rate: 115200

- Data bits: 8

- Parity: None

- Stop bits: 1

- Flow control: None

Figure 14 : Debug Port

4.6 eMMC

For storage of data, Centauri 200 utilizes eMMC. Note that Centauri 200 also has an eMMC as per the variant. The table below describes eMMC storage densities possible on Centauri 200.

Sr No	Memory	Density
1	eMMC	Up to - 32 GB

Table 17: Storage Options

4.7 DDR (Double Data Rate) RAM

The Centauri 200 uses a DDR3L memory operating at 1866 MT/s . The standard density of the DDR RAM for Centauri 200 is 256 MB. The table below shows the possible densities possible with Centauri 200.

Sr No	Memory	Density
1	DDR RAM	Up to - 1 GB

Table 18: DDR Options

4.8 Switches

The Centauri 200 has two tactile switches on the front panel. These switches are completely user configurable and users can use it as per their use case. Figure 5-6 describes switches on Centauri 200.

Figure 15 : User Configurable Switches

4.9 LED's

The Centauri 200 has three inbuilt LED's. One LED is used to indicate whether the Centauri 200 is powered ON or OFF and the remaining two are user configurable. The user can use these two LED's as per their use case. Figure 5-7 shows the location of these LED's on the Centauri 200.

Figure 16 : LED's on Centauri 200
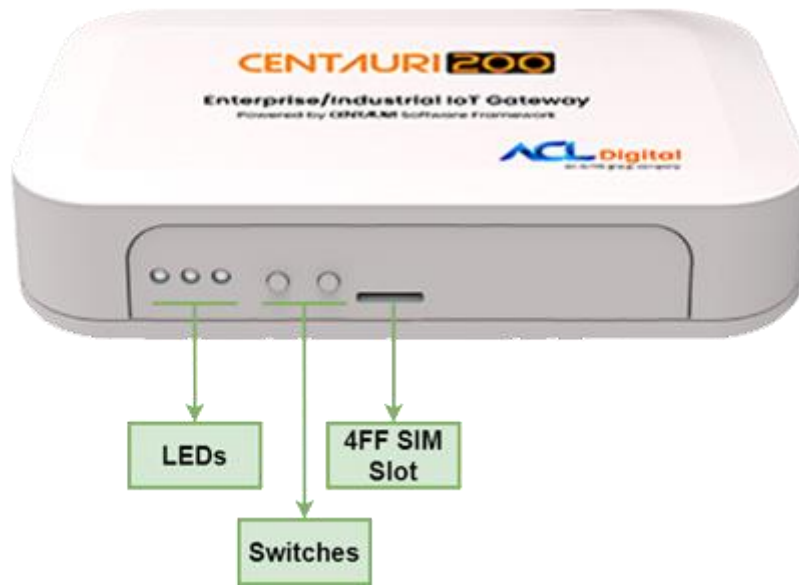
Sr No	LED	LED Colour	Function
1	PWR	Green	ON: Centauri 200 powered ON
			OFF: Centauri 200 powered OFF
2	LED1 & LED2	Bi-colour	Status: User configurable

Table 9: LED's

5 ELECTRICAL THERMAL & ANTENNA RANGE CHARACTERISTICS

5.1 Recommended Operating Conditions

Sr No	Description	Value			Unit
		Minimum	Typical	Maximum	
1	Operating voltage	4.75	5	5.5	V
2	Current consumption	-	-	3	A
3	Operating temperature range (ambient)	0	25	55	°C

Table 10: Recommended Operating Conditions

5.2 Thermal Analysis data

Thermal analysis of CT200 was done with 4 different configuration as per below table.

Sr. No.	Objective	Processor Temperature	Ambient Temperature
1	CPU Runs in normal Condition	81 °C	65 °C
2	CPU run at 33%	84 °C	65 °C
3	CPU run at 66%	86 °C	65 °C
4	CPU run at 100%	92 °C	65 °C

Table 11 : Thermal Analysis

Note : The CPU threshold limit of the processor is 100 °C. As CPU temperature increased to 100 °C then processor will shutdown the PMIC and all the interfaces are down till the temperature reaches to 25 °C.

5.3 Range for CT200

Range of CT200 device for BLE and Wi-Fi interface. The below table shows the range test data.

Sr. No.	RF Module	RF Power (dBm)	Max Range (m)	Antenna
1	Wi-Fi (AP6212)	14	200	Internal
2	BLE (nRF52840)	8	145	Internal
3	Wi-Fi (AP6212)	14	200	External WHIP Antenna
4	BLE (nRF52840)	8	145	External Patch Antenna

Table 12 : Range Test

6 MECHANICAL DIMENSIONS

The dimensions of Centauri 200 are 100 x 150 x 32 mm (L x W x H). Figure 7-1 shows the dimensions in more detail.

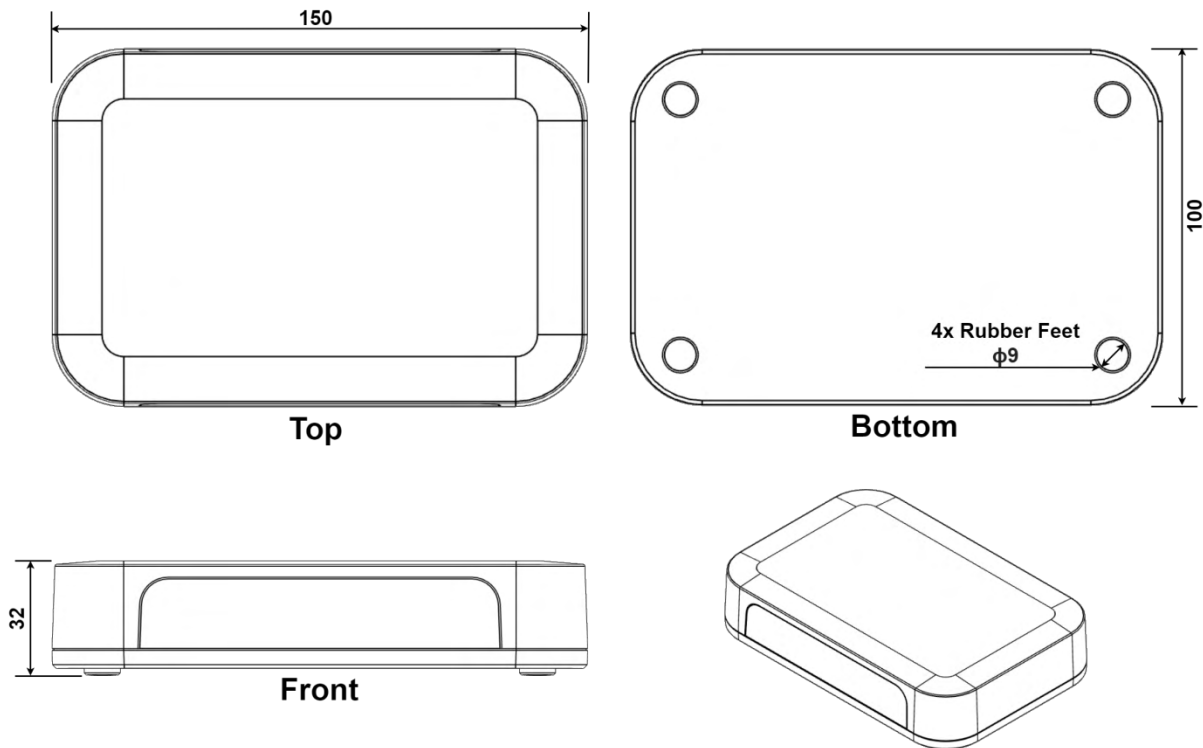Note: All dimensions are in millimetre (mm), unless otherwise specified.

Figure 0 : Centauri 200 Dimensions

APPLICATION NOTES

Safety Precautions

These specifications are intended to preserve the quality assurance of products as individual components.

Before use, check and evaluate the module's operation when mounted on your products. Abide by these specifications when using the products. These products may short-circuit. If electrical shocks, smoke, fire, and/or accidents involving human life are anticipated when a short circuit occurs, then provide the following fail safe functions as a minimum:

1. Ensure the safety of the whole system by installing a protection circuit and a protection device.

2. Ensure the safety of the whole system by installing a redundant circuit or another system to prevent a single fault causing an unsafe status.

Design Engineering Notes

1. Heat is the major cause of shortening the life of the modules. Avoid assembly and use of the target equipment in conditions where the product's temperature may exceed the maximum allowable.

2. Failure to do so may result in degrading of the product's functions and damage to the product.

3. If pulses or other transient loads (a large load applied in a short time) are applied to the products, before use, check and evaluate their operation when assembled onto your products.

4. These products are not intended for other uses, other than under the special conditions shown below. Before using these products under such special conditions, check their performance and reliability under the said special conditions carefully, to determine whether or not they can be used in such a manner.

5. In liquid, such as water, salt water, oil, alkali, or organic solvent, or in places where liquid may splash. In direct sunlight, outdoors, or in a dusty environment. In an environment where condensation occurs. In an environment with a high concentration of harmful gas (ex. salty air, HCl, Cl2, SO2, H2S, NH3, and NOx).

6. If an abnormal voltage is applied due to a problem occurring in other components or circuits, replace these products with new products because they may not be able to provide normal performance even if their electronic characteristics and appearances appear satisfactory.

7. Mechanical stress during assembly of the board and operation must be avoided.

8. Pressing on parts of the metal cover or fastening objects to the metal cover is not permitted.

Storage Conditions

1. The module must not be stressed mechanically during storage.

2. Do not store these products in the following conditions or the performance characteristics of the product, such as RF performance, may well be adversely affected:
   - Storage in salty air or in an environment with a high concentration of corrosive gas, such as Cl2, H2S, NH3, SO2 or NOx.
   - Storage (before assembly of the end product) for more than one year after the date of date of delivery even if all the above conditions have been met, should be avoided.

7 FCC/IC STATEMENT

This equipment complies with FCC and IC radiation exposure limits set forth for an uncontrolled

environment. This equipment should be installed and operated with minimum distance of 20 cm

between the radiator and your body. This transmitter must not be co-located or operating in

conjunction with any other antenna or transmitter.

This device complies with part 15 of the FCC rules and RSS-247 of Industry Canada. 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.

Le présent appareil est conforme aux CNR d'Industrie 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, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le

brouillage est susceptible d'en compromettre le fonctionnement.

This Class B digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe B est

conforme à la norme NMB-003 du Canada.