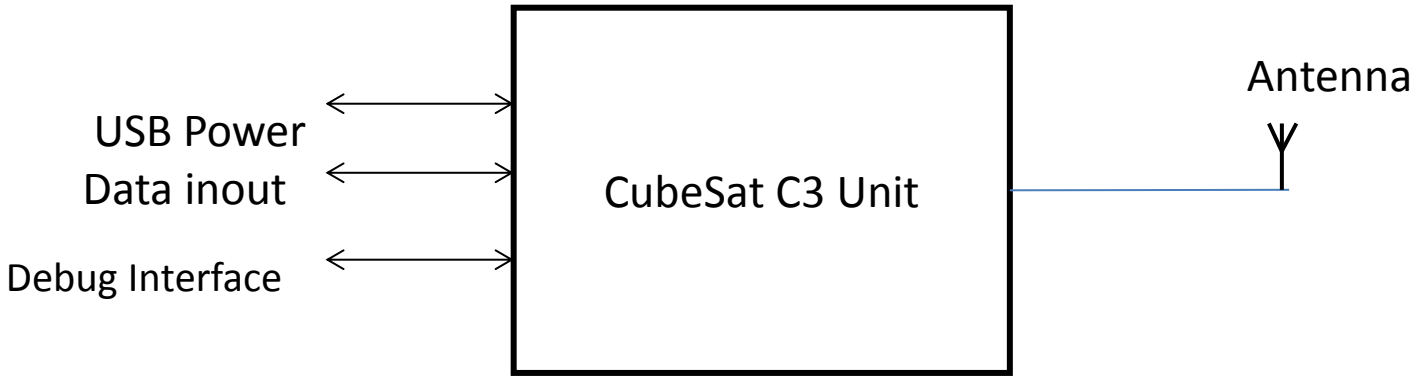
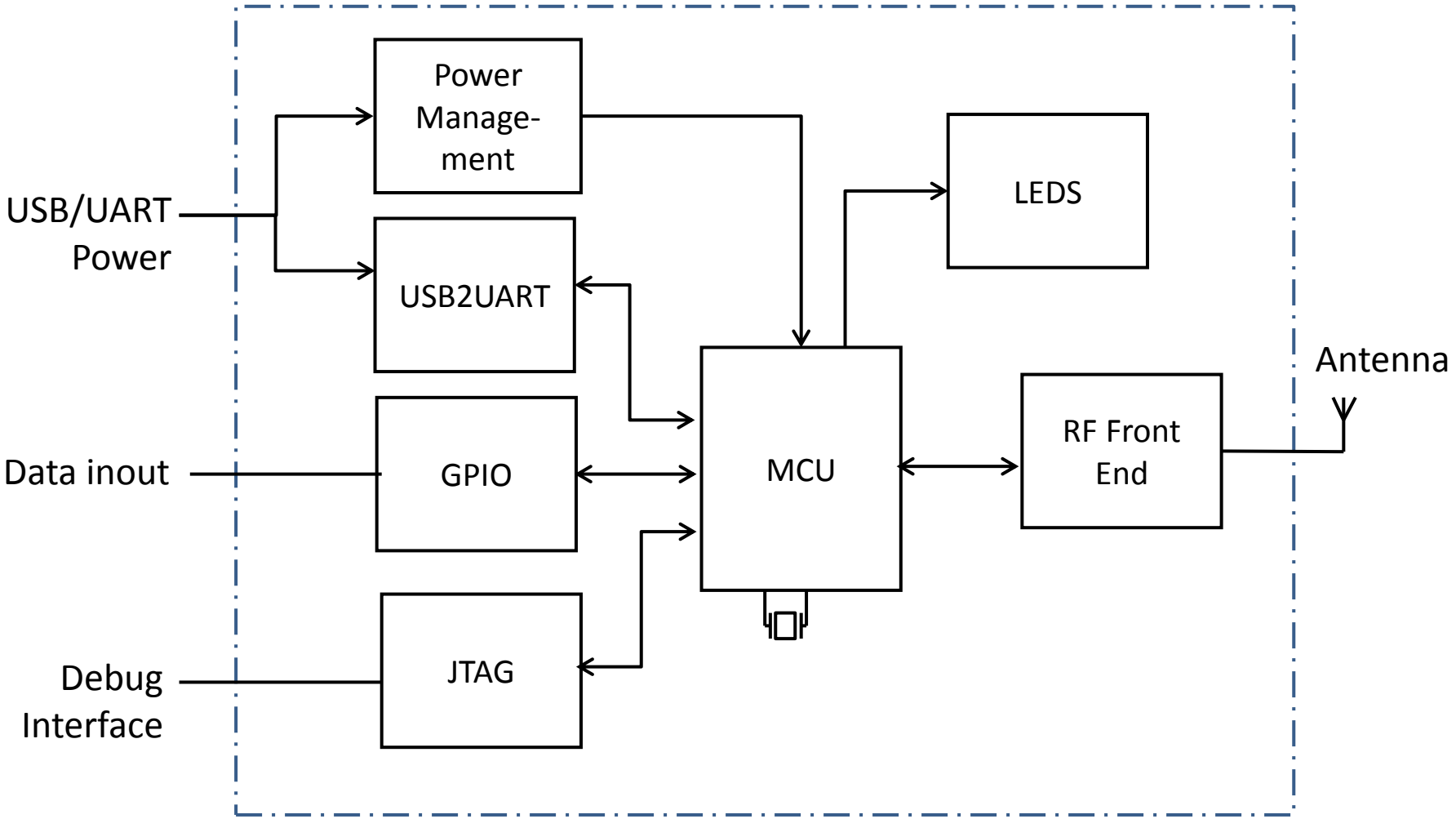
CubeSat C3 Unit Level 0

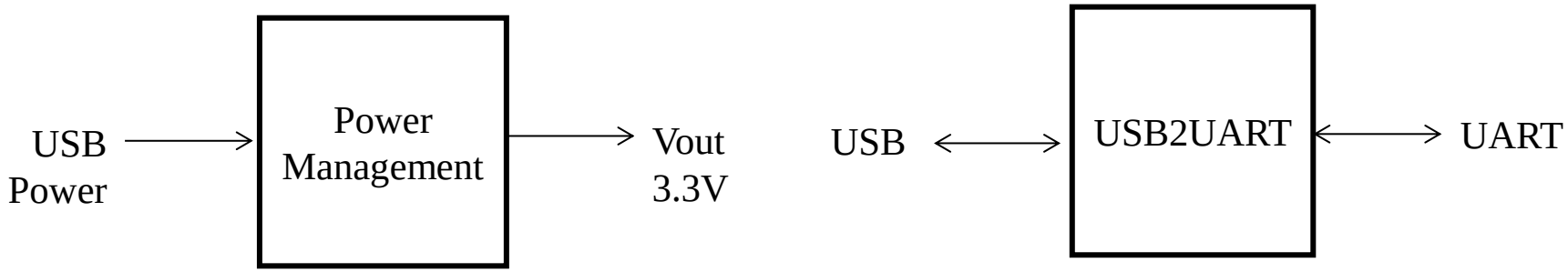


Module	**CubeSat C3 Unit**
Bi-directional (Input-Output)	1) USB Power : supplies 4.5V-5.5V to the board and feeds data into and out of the system 2) Debug Interface : Debug with JTAG interface 3) Peripherals: Connection via GPIO to other components, for e.g. LEDs, audio-channel etc. 4) RFIO: Radio input-output channel at 436.5 MHz passband ; uses an antenna
Functionality	This module is a subsystem of a larger satellite CubeSat system. The main function of this subsystem is to receive and transmit high frequency data signal using Wi-Fi protocol. At the heart of this module is a microcontroller that takes commands via USB, GPIO, and JTAG configurations and uses radio frequency to communicate messages from and to another similar module.

CubeSat C3 Unit Level 1



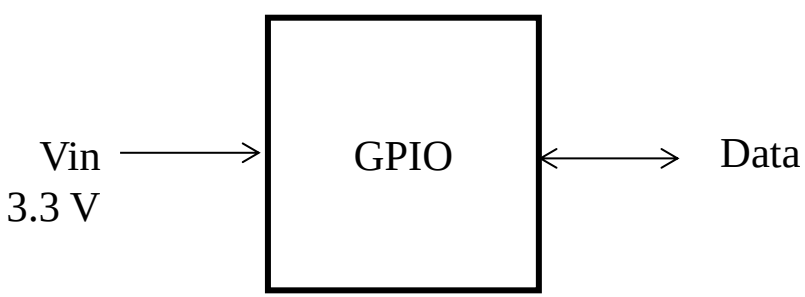
Level 1 Breakdown

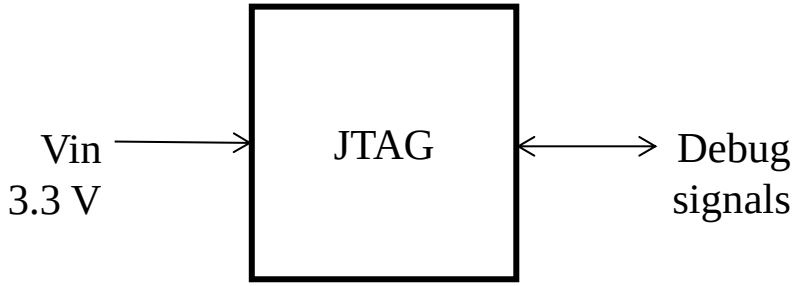


Module	**Power Management**
Input	USB Power : supplies 4.5V-5.5V DC through USB connection
Output	Vout: Outputs 3.3 V DC
Functionality	The function of this unit is to manage the power system. It is powered through USB connection. It consists of voltage regulator and a battery pack that stores voltage and outputs constant 3.3V.

Module	**USB2UART**
Bidirectional (Input –Output) Output	USB : Data via USB connection (D+ and D-) UART: Data via UART (RX and TX)
Functionality	This unit consists of USB-to-UART Bridge controller that converts USB signals to RS-232 and vice-versa.

Level 1 Breakdown

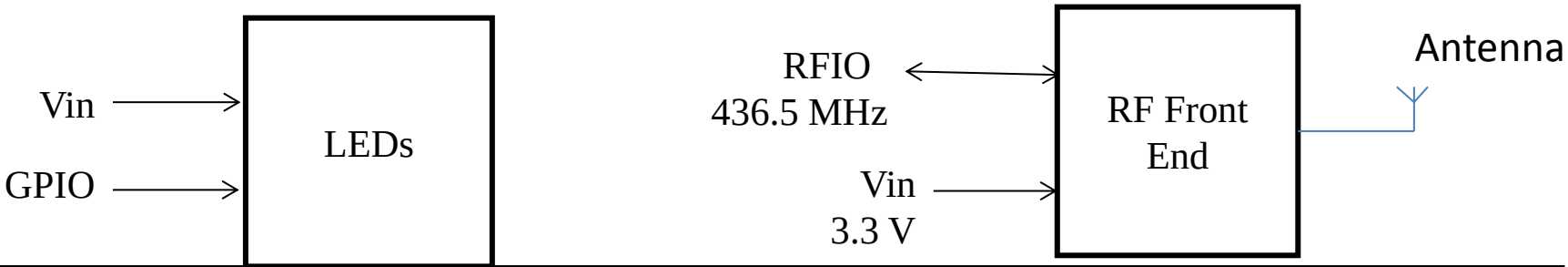




Module	**GPIO**
Input	Vin: 3.3 V DC
Bi-directional (input-output)	Data: common channel for data in and out using GPIO connection
Functionality	This modules provides an interface between microcontroller units other peripherals.

Module	**JTAG**
Input	Vin: 3.3 V DC
Bi-directional (input-output)	Debug signals: Common channel to transfer data between microcontroller and environment.
Functionality	This consists of a 10-pin JTAG connector system that allows to debug the chip.

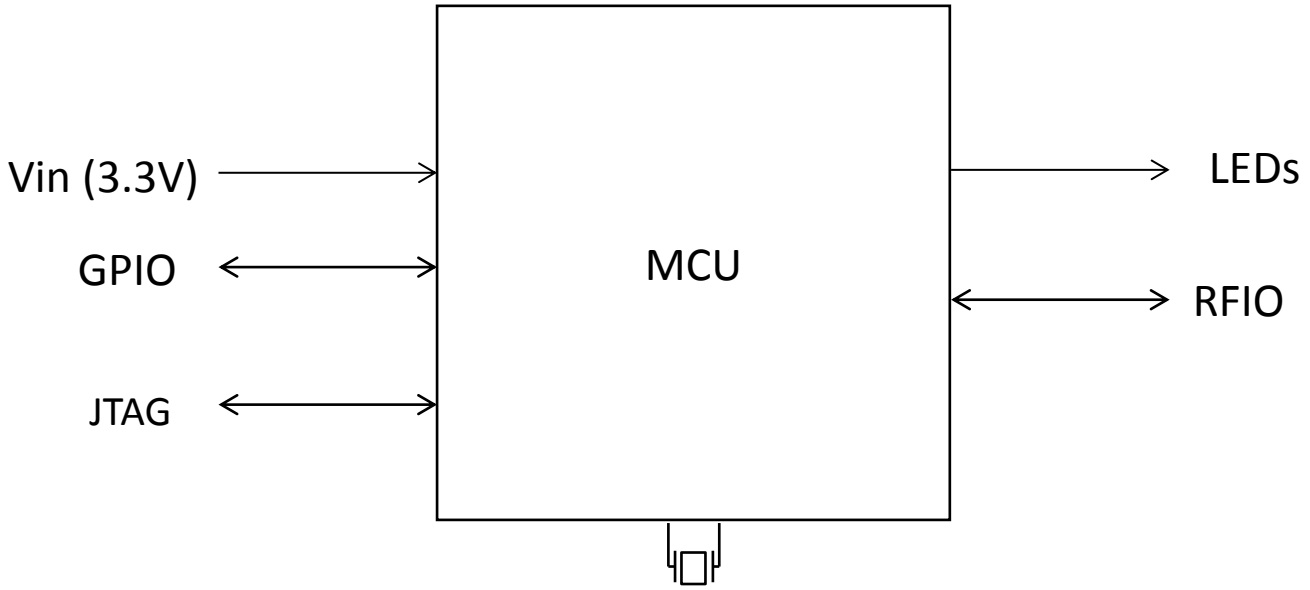
Level 1 Breakdown



Module	**LEDs**
Input	Vin: 3.3 V voltage supply GPIO: GPIO pins connection
Functionality	There are total 7 LEDs: 1 single and 3 tri-colored LEDs indicate battery connection; 3 other tri-colored LEDs are used as Status indicator of connection of JTAG, and receive and transmit of RF signals.

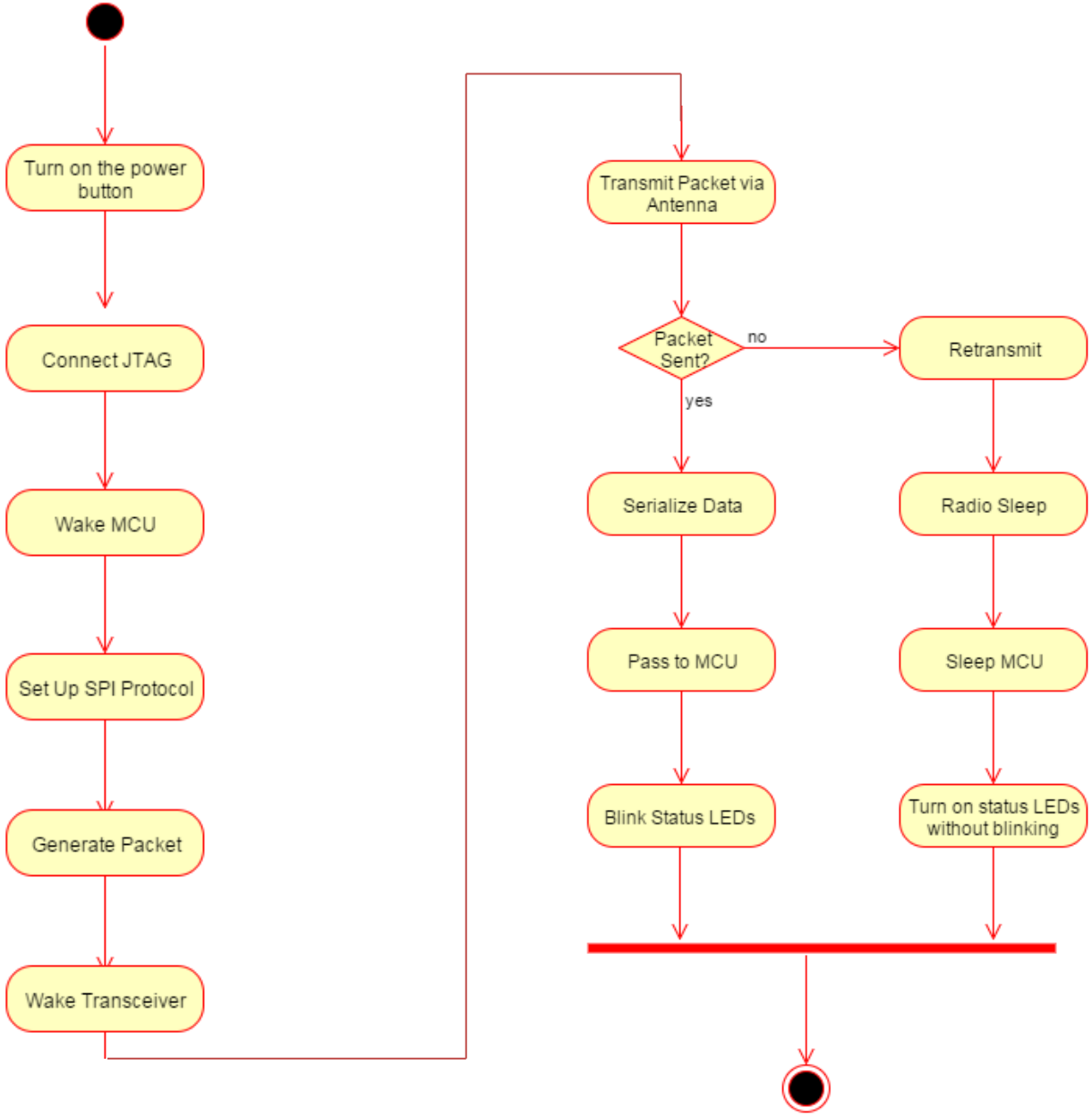
Module	**RF Front End**
Input	Vin: 3.3 V supply
Bidirectional (Input –Output)	RFIO: 0-13dB power signals at 436.5 MHz
Antenna	It is used for both to transmit and receive signals
Functionality	The main purpose of this module is to receive and transfer radio signals at a passband frequency of 436.5 Hz.

Level 1 Breakdown



Module	**MCU**
Input	Vin: supplies 4.5V-5.5V
Output	LEDs : Tri-colored LEDs (RGB)
Bi-directional (Input-Output)	1) GPIO: Connection to peripherals via GPIO 2) JTAG: connection to 10-pin JTAG interface 3) RFIO: Radio input-output channel at 436.5 MHz passband
Functionality	This is the main microcontroller unit in the system. It uses a real-time operating system.It has a resonator connected to it that clocks at 32MHz. This unit monitors radio signals, as well as provides multiple interfaces , for eg.GPIO, JTAG, SPI, I2C etc., to transmit and receive data.

UML Activity View of CubeSat C3 Unit



UML Sequence Diagram
View of CubeSat C3 Unit