ORBiT Avionics II System Requirement

Sys-Req

Rev: A01

Jinzhi Cai

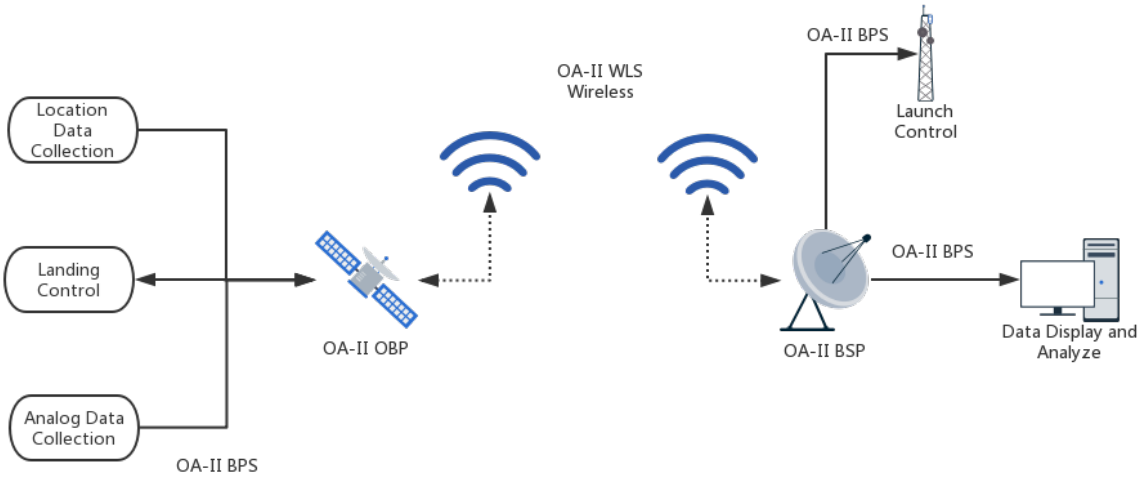
2019–06–24

Table of Contents

1 Introduction to ORBiT Avionics II System (OA-II)

1.1 Introduction

ORBiT Avionics II System is a new generation avionics system for Orange Rocket Ballistics Team rocket. It include twq major part, the On Board part, and the Base Station part. All the component in the OA-II system are inter connect with a unique backplane system and wireless system.



On Board Part (OBP)

The OA-II OBP is use to collecting information about the rocket and deliver it to the OA-II BSP for further analysis. In the same time, it also will back up all the information to a on board storage in case wireless connection failure.

Base Station Part (BSP)

The OA-II BSP is use to receive the information delivered by OA-II OBP via wireless connection and perform basic analyze on roket status. The OA-II BSP provide live for rocket status and location and data storage for further analysis. The OA-II BSP also help to indetify the rocket location after it is landed for reclaim personnel to locate the rocket.

Backplane System (BPS)

The OA-II BPS is a unique, muti-level information exchange system that link different part in the OA-II BSP and the OA-II OBP. It provide different speed mode for different component.

Wireless System (WLS)

The OA-II WLS is a wireless communication system which provide communication between OA-II BPS and OA-II OBP. In the same time, it also provide landing locating signal.

1.2 Requirement

On Board Part (OBP)

Reqire feature

- Three dimension linear kinematics data. P(position), V(velocity), A(acceleration) data.
- Three dimension Rotational kinematics data. θ(angle), ω(angular velocity), α(angular acceleration) data.
- Air pressure data.
- Sound frequency level ADC($Samplefrequency \geq 40kHz$)
- Power manage (convert from 24V)
- High power driver ($PeakPower \geq 50W$)
- 720p 24Hz RGB Camera $\times$4
- Landing location broadcast (up to 2 hours, 3km range, low power consumption)

Addtional feature

- Radio frequency level ADC($Samplefrequency \geq 4GHz$)
- 1080p 60Hz RGB Camera $\times$4

Base Station Part (BSP)

Reqire feature

- Receving Data from rocket.
- Display Rocket Status informaiton.
- Basic Data analyzation(Normal/Warning/Error Status).
- Locate rocket after landing.

- Ignition control system
  Rocket engine fual injection and ignition
  Critical cutoff
  Fire control

Addtional feature

- Rocket Tracking(via camera or radio)
- Launch Pad Control
- Automatic system check

Backplane System (BPS)

- Provide different speed mode with ms level delay
  Info level($\leq 3MB/s$)
  Data level($\approx 50MB/s$)
  Stream level($\geq 100MB/s$)
- Tolerance high vibration and EMP
- Tolerance high temperture ($\leq 75°C$)

Wireless System (WLS)

- Provide high speed data connection within 10km
  It might need to increase speed to 10MB per Second level
- Provide low speed, ultra low power consumption data connection and location detection (time-of-flight) within 3km and individual power supply.

2 Revision History

Rev#	Editor	Delta	Time
A01	Jinzhi Cai	Initialize	2019-6-21
	Jinzhi Cai	Add Radio requirement	2019-6-24

Table 1: Summary of Revision History