Roark Drone Detection as a Service Device

Data Sheet & Installation Instructions

June 2025

version 1.3

1.0 Introduction

The Roark DdaaS is a purpose built device, manufactured by Roark Aerospace in both the UK & US.

The primary function of the device is to scan specific radio frequencies, detect data packets as identified by their unique markers, download and decode the data packets and use the data contained within to plot a live map of class 1-3 drone activity.

The secondary function of the device is to use a custom passive radar system featuring an illuminator and reference antenna to identify class 1-3 drones by their unique radar cross section and use the reference antenna to determine the likely position of said drone.

2.0 Components

The main physical components of the Roark DdaaS are as follows:

CPU- AMD Ryzen 5825U32GB DDR4 1TB M.2 2280 PCIex4 SSD

RF Board 1- Featuring Xilinx Zynq SoC with dual-core ARM Cortex A9 and Artix-7 FPGA (XC7Z020) and

- Analog Devices AD9361 RFIC direct-conversion transceiver
- 1 Gigabit Ethernet port
- External PPS/10M reference input
- 2 transmitters and 2 receivers, half or full duplex
- Flexible rate, 12-bit ADC and DAC
- Integrated RF frontend (AD9361: 70 MHz - 6 GHz, AD9363: 325MHz - 3.8GHz)
- Variable analog bandwidth (AD9361: 200 kHz - 56 MHz, AD9363: 200KHz – 20MHz)

RF Board 2-

• Dual tuner provides independent coverage from 1kHz to 2GHz using 2 antenna ports simultaneously

• 14-bit ADC silicon technology

• Up to 10MHz visible bandwidth (single tuner mode) or 2 slices of 2MHz spectrum (dual tuner mode)

• 3 software-selectable antenna ports (2 x 50Ω and 1 x 1kΩ high impedance balanced/unbalanced input)

• High impedance antenna port (1kHz to 30MHz) with selectable MW notch filter and choice of 2 pre-selection filters

• Software selectable AM/FM and DAB broadcast band notch filters for the 2 SMA antenna (1kHz to 2GHz) antenna ports

• External clock input and output enables easy synchronisation to multiple RSPs or external reference clock

TI USB cc2652P Arm Cortex-M4F

WiFi Adapter1200Mbps, 5GHz / 2.4GHz USB (Monitor Mode)

GPS GNSS Sensor

2.1 Antenna

The following are the standard antenna provided, these can be changed for higher gain and outdoor models:

RF Board 1: Dual Band Aerial 9dBi 2.4GHz 5G 5.8GHz RP-SMA

RF Board 2 : 1090MHz 7dBi SMA Male Antenna & FM Antenna 75 ohm SMA

TI USB CC2652P : Zigbee SMA Interface Antenna

WiFi Adapter : 2 x 5 dBi external antenna dual band 2.4/5.8GHz

3.0 Software

The Roark DdaaS device uses a custom built operating system known as RoarkOS.

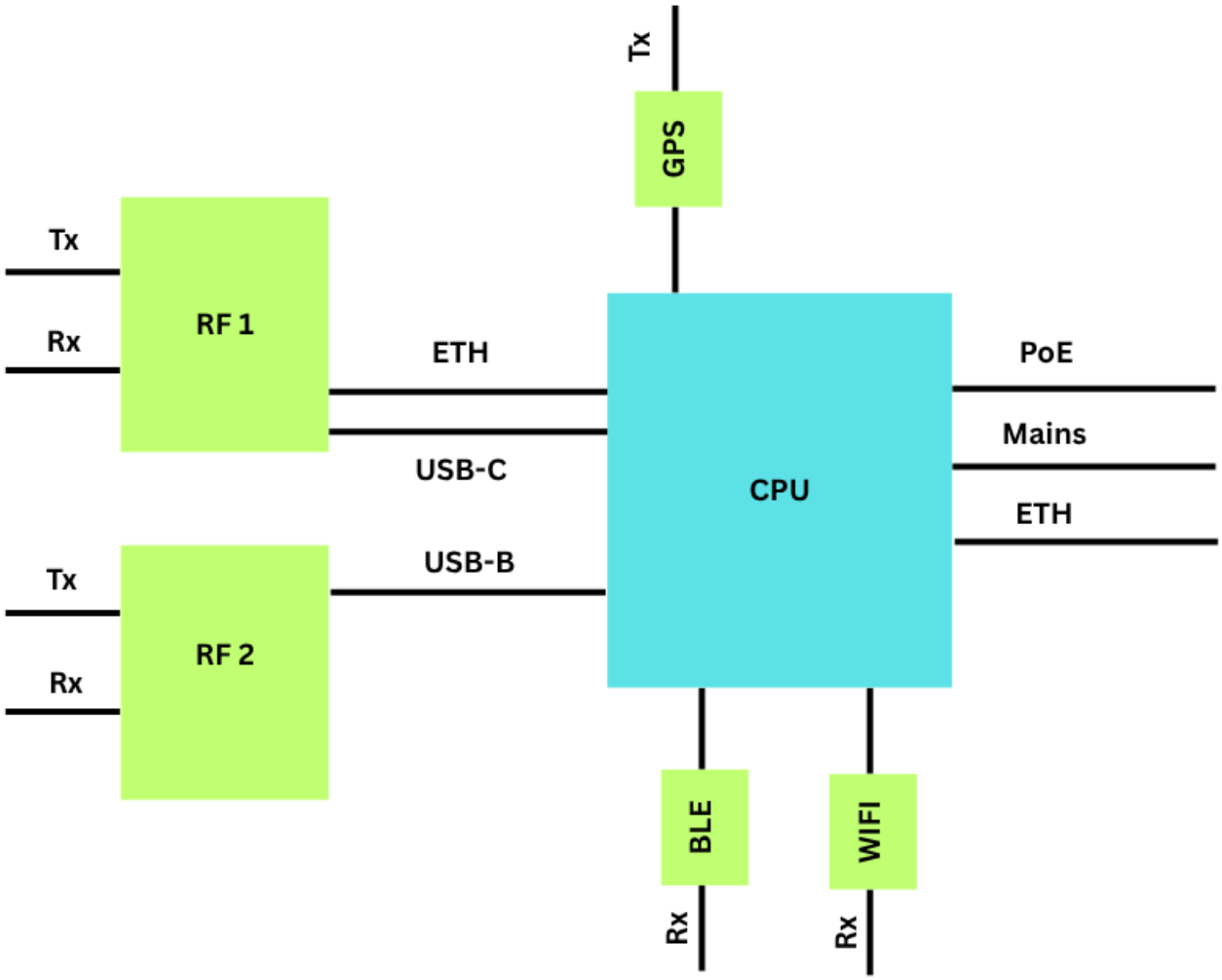
RF Board 1 boots from an integrated SD card running a custom python script

RoarkOS makes use of the following open-source software under license:

ZeroMQ

ATAK Server

4.0 Block Diagram



5.0 Installation

The Roark DdaaS comes pre-programmed with RoarkOS and will deploy all necessary scripts on the first boot.

Step 1- Connect the Roark DdaaS device via ethernet directly to your router, you can change to WiFi later if required.

Step 2- Connect power and turn on device

Step 3- Access the Roark DDaaS Companion application on your phone or desktop whilst connected to the same WiFi network as the device, follow the on-screen instructions to locate and add your device to our network.

Step 4- To verify that your device is working, navigate to localhost:8078 on a device connected to the same WiFi Network, you will see a map if all is working correctly.

Step 5- To view the performance of your device you can navigate to localhost:8443

Switching to WiFi

If you wish to switch to WiFi instead of ethernet you will need to use a monitor connected via HDMI (not provided) to the device.

Step 1- With the ethernet still connected and your monitor turned on you will first be prompted to create a password.

Step 2- Navigate to the top right hand side of the screen and select “Network Settings”. Here you should see your WiFi network. Click your network and then enter the required information.

Step 3- Remove the ethernet cable and verify that the device is connected to the internet.

Step 4- Reboot the device

Step 5- Navigate back to the Roark DdaaS Companion Application and verify that the IP address of the device has changed. Use this IP address with :8078 or :8443 to view your data from a device connected to the same network.

Notifications

In the Roark DdaaS Companion App you will see a section for “notifications”. This allows you to set notifications on your mobile/desktop device or via email relating to if your device has gone offline.

6.0 The Process

An overview of that is occurring on the internal mechanisms within the Roark DdaaS Device:

- RF Board 1, BLE and WiFi USB’s are constantly scanning Rf channels looking for data packets.
- When a data packet is found it is downloaded and decoded using ZeroMQ.
- The decoded data is then made available to our remote TAK server on a specific port in CoT format. This data is then used to populate our network. BLE, WiFi (RemoteID) and DJI Drone ID are all served on different ports. The data transfer is via UDP
- The decoded data is also stored in JSON format locally on your device and it is this data that is used to populate your own device specific map.

7.0 Safety Information

SAFETY PRECAUTIONS

Observe the precautions listed below to prevent injuries to you or other personnel or damage to property.

Before using the product, read these safety precautions carefully to ensure proper use.

These precautions contain serious safety instructions that must be followed.

After reading through this manual, be sure to always keep it handy.

Warnings

If an unpleasant smell, smoking or failure occurs, disconnect the power supply.

If the product is used as is, a fire or electric shock may occur.

Do not disassemble, repair or modify the product. Otherwise, a fire or electric shock may occur due to a short circuit or heat generation.

Do not place the product on unstable locations. Otherwise, it may drop or fall, resulting in injury to persons or failure.

Do not touch the product with a metallic object. Otherwise, a fire or electric shock may occur.

Do not place the product in dusty or humid locations or where water may splash on the internal components Otherwise, a fire or electric shock may occur.

Do not get the internal components wet or touch it with a wet hand. Otherwise, the product may break down or it may cause a fire, smoking or electric shock.

8.0 Compliance

USHTS 8517620090

JPHTS 851762090

TARIC 8517620000

ECCN 5A992.C

9.0 Conformity

EU

Manufacturer Name: Ro-Ark Aerospace Limited

Address: Monomark House, 27 Old Gloucester Street, London, WC1N 3AX, UK

We hereby declare under our sole responsibility that the following apparatus:

Product Description: Roark DdaaS Device

Model Number(s): Roark DdaaS Device V1

Product Category: Electrical equipment for measurement, control, and laboratory use.

Complies with the essential requirements of the following applicable European Directives:

Electromagnetic Compatibility (EMC) Directive 2014/30/EU
RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU

Conformity is assessed in accordance to the following standards:
EMC: Emissions
EN 61326-1:2013, Class A
EN 55011:2016/A1:2017/A11:2020, Group 1, Class A
Immunity
EN 61326-1:2013, Basic

Environmental Affairs: EN IEC 63000:2018
Articles manufactured on or after the Date of Issue of this Declaration of Conformity do not contain any of the restricted substances in concentrations/applications not permitted by the RoHS Directive

Dated 1st May 2025

CE

UK

Manufacturer Name: Ro-Ark Aerospace Limited
Address: Monomark House, 27 Old Gloucester Street, London, WC1N 3AX, UK

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Complies with the essential requirements of the following applicable UK Regulations:

Electromagnetic Compatibility (EMC) Regulations 2016
The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

Conformity is assessed in accordance to the following standards:
EMC: Emissions
BS EN 61326-1:2013, Class A
BS EN 55011:2016/A1:2017/A11:2020, Group 1, Class A
Immunity
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