



Sky Pulse v3 User Guide Manual

Version 1.1.8

DigiQ RF

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1 Introduction

DigiQ RF Sky Pulse is a low-latency and high-performance digital communication system for unmanned aerial vehicles (UAVs). It incorporates video, telemetry, and control data stream transmissions and is suitable for small- and large-segment multicopter and wing drones. The combination of proprietary hardware and software solutions makes it tolerant of operating in conditions of substantial radio-electronic interference and opens the door to the most challenging missions. Depending on the target applications, Sky Pulse is supplied in civil or industrial hardware revisions.

2 Main features

- Sky Pulse supports up to four external cameras with multiple encrypted Full HD streams
- Plug-n-Fly: no need for manual camera configuration - radio performs automatic stream detection to save your time
- 5, 10 and 20 MHz bandwidth is supported to address different extents of radio interference
- MAVLink, CRSF, and S.Bus UAV control protocols are available out of the box. Internal protocol conversion is supported to widen the variety of supported flight controllers
- Extended frequency range for industrial needs allows operation in non-standard parts of the radio spectrum
- Super compact - the Air Unit is just 79x63mm, with a mass of 110g
- Radio silence mode supports stealthy access to the most protected and challenging environments
- **Mobile application (Android)** and web interface allow remote device tuning without direct access to the drone
- Easy integration of your custom hardware through the dedicated network ports
- LTE modems can be used for additional radio link redundancy

3 Hardware capabilities

Sky Pulse is powered by a high-performance CPU, dedicated network acceleration, and advanced radio frequency (RF) processing, ensuring exceptional wireless and network transmission quality. Its integrated security mechanisms provide robust protection for sensitive data, making it ideal for secure and mission-critical operations.

The RF system features an advanced 2x2 MIMO digital radio and a built-in spectrum analyzer that enhances signal processing and decision-making during operation. Precision RF control ensures full compliance with regional standards.

Designed for versatility, the radio natively supports 8 - 26 V power input and can operate up to 59 V when paired with a Power Extension Board. Professional-grade latching power and signal connectors guarantee stable operation, while integrated ESD protection and onboard fuses safeguard the device against electrical surges – ensuring long-term reliability even in demanding environments.

Parameter	Min	Typ	Max
Supply voltage range	8 V	12 V	59 V
Wireless output power	50 mW	1 W	2 W
Total power consumption	5 W	–	13 W
Frequency range	5050 MHz	–	6100 MHz
Channel bandwidth	-	5, 10, 20 MHz	-

Table 1: Hardware Specifications

3.1 Hardware revisions

You may find the main differences between the Civil and industrial revisions in table [Table 2](#):

Feature	Civil	Upgraded	Industrial
Power supply	Battery	Battery	Battery or PoE
Peak output power	1 W	1 W	5 W
Frequency range	5180–5825 MHz	5050–6100 MHz ¹	5050–6100 MHz
Frequency shifters	No	No	6500–8000
Redundant radio	Yes ²	Yes	Yes
LTE modem support	No	Yes	Yes
Jamming evasion	No	Yes	Yes
Wireless bridge	No	Yes	Yes
Firmware encryption	Yes	Yes	Advanced (per-user) ³

¹ Without the Frequency Shifter module

² Additional radio for the control link redundancy

³ The owner is the only person who can initiate the radio, your unique industrial features cannot be copied or used by anyone else

Table 2: Hardware options

3.2 Module dimensions

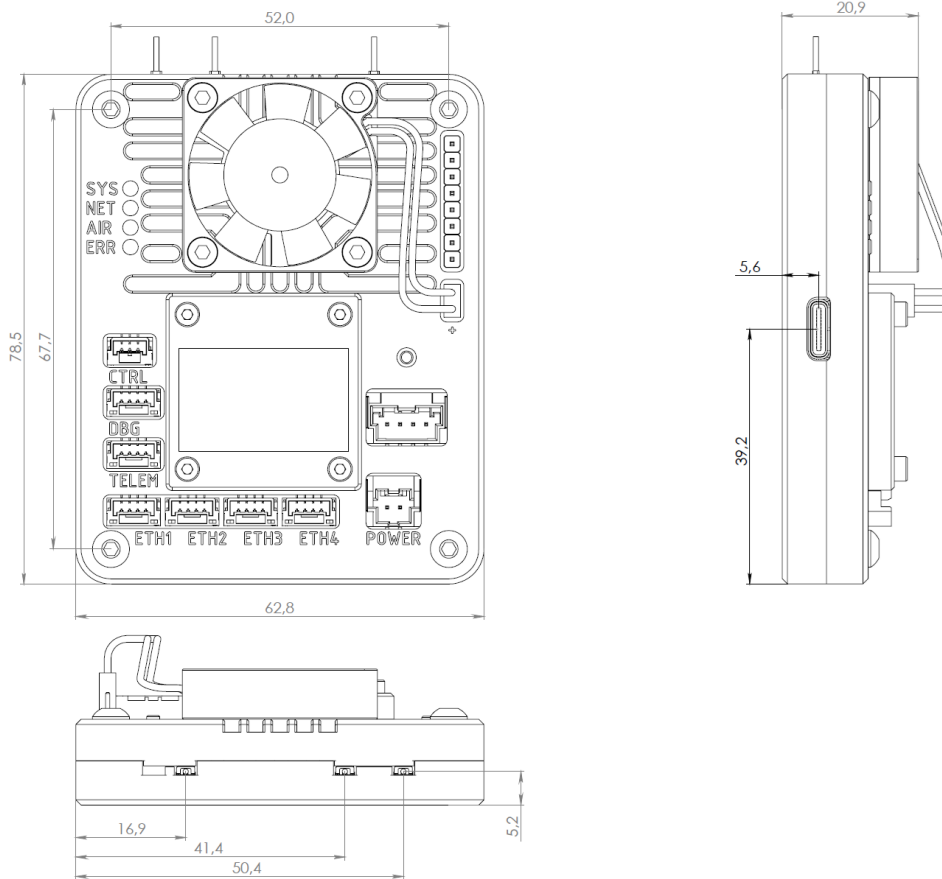


Figure 1: Top view and the module dimensions

4 Hardware extensions

4.1 Redundant radio

Sky Pulse is a reliable system; however, to further enhance operational reliability for the most critical missions, the module supports the installation of external radios.

The primary option is to integrate a secondary **DigiQ Connection Unit**, which actively monitors the **S.Bus** or **CRSF** control signal. In potential scenarios where a power failure or a system reset occurs, the external connection seamlessly provides backup functionality. This redundancy feature is available in

all hardware revision.

4.2 Frequency shifters

Frequency shifters are used to implement a **Frequency Hopping Spread Spectrum (FHSS)** communication link in less expected parts of the radio frequency band, ensuring robust performance under demanding radio interference conditions. The system supports frequency shifting within the **6.5 to 8 GHz** range, enhancing resilience against jamming and interference.

This functionality is provided in the **Industrial** hardware revision or by a dedicated **industrial** RF module installed as an add-on to the Sky Pulse system.

4.3 External Power Amplifiers

The DigiQ Team offers external power amplifiers designed to extend the operational range of base radios. The module is positioned in close proximity to the radio and interfaces with the primary unit via a dedicated connector. Due to standard regulatory restrictions that prohibit this configuration, the feature is exclusively enabled in **Industrial** mode.

4.4 LTE modems

For advanced or industrial applications, Sky Pulse supports integration with commercially available LTE modems to provide an additional redundant video link through the local cellular network. Detailed information is not provided in this section; please contact the [DigiQ Support Team](#) for guidance on implementation and installation procedures.

5 Operation modes

5.1 Air Unit overview

The Air Unit is a key airborne component of the UAV's communication system, responsible for controlling the UAV and transmitting critical telemetry data and video feeds to the **Ground Unit**. The supported protocols are listed in [Table 3](#).

Protocol	Baud rate	Data bits	Parity	Stop bits
MAVLink	115200	8	No	1
CRSF	115200	8	No	1
Fast CRSF	400000	8	No	1
S.Bus	100000	8	Even	2
Fast S.Bus	200000	8	Even	2

Table 3: Air Unit control protocols

The Air Unit supports **up to four** IP cameras, enabling a potentially unlimited number of RTSP video streams. These streams can be selectively accessed during flight through the Remote Control (RC) device for real-time video monitoring. The software automatically detects IP cameras as long as they:

- Support the **ONVIF protocol**
- Have **no security**.

This is known as **DigiQ Plug-n-Fly** feature. Alternatively, up to five statically-defined video streams can be configured manually via the Web UI. Without additional extensions, Air Unit provides **up to two watts of power**, depending on the regulatory restrictions and the relevant configuration. Refer to [subsection 10.1](#) for more information. In the **Industrial** version, power output can be augmented through additional amplifiers, thereby extending communication and control capabilities in challenging operational environments.

As mentioned in [subsection 4.1](#), additional DigiQ radio module can be installed alongside the primary module as a backup control link in the event of an in-flight malfunction.

5.2 Ground Unit overview

The **Ground Unit** is responsible for sending commands to the UAV and receiving telemetry data and video streams in real time. Like the **Air Unit**, the

Ground Unit supports the same list of control protocols listed in [Table 4](#), which ensure compatibility with a wide range of UAV systems.

Protocol	Baud rate	Data bits	Parity	Stop bits
MAVLink	115200	8	No	1
CRSF	115200	8	No	1
Fast CRSF	400000	8	No	1
S.Bus	100000	8	Even	2
Fast S.Bus	200000	8	Even	2

Table 4: Ground Unit control protocols

The **Ground Unit** can output the video feed to third-party UAV control software, such as **QGroundControl**, enabling operators to utilize advanced flight planning and monitoring tools.

In the **Tactical** version, the **Ground Unit** is equipped with a **Power over Ethernet (PoE)** module, which includes two pairs for Ethernet connectivity and two pairs for downlink telemetry and UAV control. This configuration ensures a robust and secure connection for mission-critical operations with no need for a dedicated power source near the radio.

5.3 Wireless bridge overview

Sky Pulse is capable of operating in Wireless Bridge mode, serving as an airborne connector that links different parts of the UAV system and extends the application range. This capability is particularly valuable in multi-drone operations, where one UAV may relay control signals, telemetry, or video streams to extend the communication range or bridge gaps between the ground station and other UAVs. In the context of wireless bridges, Sky Pulse leverages advanced wireless communication technologies to form a reliable and secure link between UAVs, enhancing operational efficiency and enabling more complex missions. The Wireless Bridge mode enables better resource

coordination and real-time data exchange, facilitating larger-scale operations where connectivity across multiple systems is essential.

6 Interfaces

6.1 Connectors

6.1.1 Power port

This is used as the main power supply for the radio module. The supply voltage range is **8-26 V** when plugged directly, and **12-59 V** when used with an external power extension module. The system includes overvoltage and polarity protection; however, incorrect usage will void the warranty and may require replacing the device's fuse.

6.1.2 Power passthrough port

For ease of installation, Sky Pulse features a power passthrough port that provides additional access to the main power supply, enabling users to connect external voltage converters, and additional 5 V source. There is a limit of **1 A** for the **input power passthrough** and **500 mA** limit for the **5 V power supply source**.

6.1.3 Ethernet ports

The module supports four 10/100 Mbps Ethernet ports, which can be used for video streaming or custom data transmission. For custom data transmission, the UDP port **5600** is available at the Air Unit. When using this option, ensure that the link capacity is sufficient to handle all your data. It is highly recommended to leave some room and avoid exceeding 60% of the available bandwidth.

6.1.4 Telemetry port

On the Air Unit, connect this port to the flight controller for MAVLink telemetry forwarding. On the Ground Unit, connect this port to the remote control (RC) device to send commands to the drone. Ensure that telemetry forwarding is enabled in the system configuration for both radio modules. If the device is

configured to use MAVLink control, use this port to connect to the ground station control utility (e.g., QGroundControl) via USB-to-UART adapter. Otherwise, the telemetry will be available through the Ethernet cable. Signal-wise, this port is compatible with both **3.3 V and 5 V** voltage levels, allowing for seamless integration with different hardware. Power-wise, this port provides **3.3 V** output with **750 mA** output current.

NOTE! The power in this port is output only. Using this port to power the device is prohibited.

6.1.5 Control port

On the Air Unit, this port is used to send control frames to the flight controller. The supported protocols are:

Protocol	Baud rate	Data bits	Parity	Stop bits
CRSF	115200	8	No	1
Fast CRSF	400000	8	No	1
S.Bus	100000	8	Even	2
Fast S.Bus	200000	8	Even	2

Table 5: Air Unit control protocols

The port is unused on the Ground Unit.

NOTE! The power in this port is output only. Using this port to power the device is prohibited.

6.1.6 Debug port

The debug port is used for internal purposes and is currently unavailable to customers. It is important to leave it unconnected: streaming unauthorized data to this port will reset the board.

6.1.7 USB

The USB Type-C port is used for internal purposes and operates in Host mode, but it can also serve as a redundant 5 V power source for flight controllers. The maximum output current capacity is limited to **500 mA**.

NOTE! While this is a functional scenario, we do not recommend using the USB as the flight controller's primary power supply due to the potential risk of contact opening during flight.

6.2 Display

The device provides a structured set of diagnostic and operational data across multiple display tabs. These tabs present real-time system statistics, wireless parameters, network activity, and system health status, facilitating debugging and performance monitoring.

6.2.1 Wireless Information

The wireless status is divided into three sections:

- **Wireless (1)**
 - Operating frequency in MHz
 - Bandwidth settings (5, 10 or 20 MHz)
 - Transmission power level in dBm
- **Wireless (2)**
 - Received Signal Strength Indicator (RSSI) per antenna
 - Transmission power level in dBm per antenna
- **Wireless (3)**
 - **TxBW:** Transmit bandwidth in Kbps
 - **RxBW:** Receive bandwidth in Kbps
 - **Link Usage:** Percentage of the total channel capacity currently in use

6.2.2 Network Status

The **Network** tab provides information on:

- **TxBW:** Transmit bandwidth in Kbps
- **RxBW:** Receive bandwidth in Kbps

6.2.3 Serial Communication

The **Serial** tab displays:

- **TxBW:** Transmit bandwidth in Kbps
- **RxBW:** Receive bandwidth in Kbps

6.2.4 Control Information

The **Control** tab provides essential details regarding the control link:

- **Mode:** Indicates whether the device is operating as a Ground Unit, Air Unit or Wireless Bridge
- **Control Protocol:** Displays the selected control protocol (S.Bus, CRSF, or CRSF-S.Bus)
- **Total Frames:** The total number of control frames received

6.2.5 System Status

The **System** tab provides system-wide health information:

- **Memory:** Displays OK if sufficient memory is available, or LOW if memory is running low
- **Subsystems:** Displays OK if all subsystems are functioning correctly, or WARN if an issue is detected
- **Interference:** Indicates if interference has been detected during operation

NOTE! If a warning occurs at least once, the relevant flag will remain active until the device is reset.

6.2.6 About

The **About** tab provides firmware and hardware details:

- **Hardware Revision:** Displays the hardware version (e.g., v3.0, v3.1, or other)
- **Firmware Version:** Displays the installed firmware (peripheral) version. The firmware cannot be upgraded by the user and is flashed on the factory.
- **Software Version:** Displays the installed software (system) version. This version is available for upgrade on a release basis.

6.3 Tactile switch

The tactile switch is used to control tab switching or to initiate emergency image recovery if required. For more information, refer to [subsection 17.1](#). Alternatively, the device can be manually reset by holding this switch for 5+ seconds.

6.4 Connectors pinout

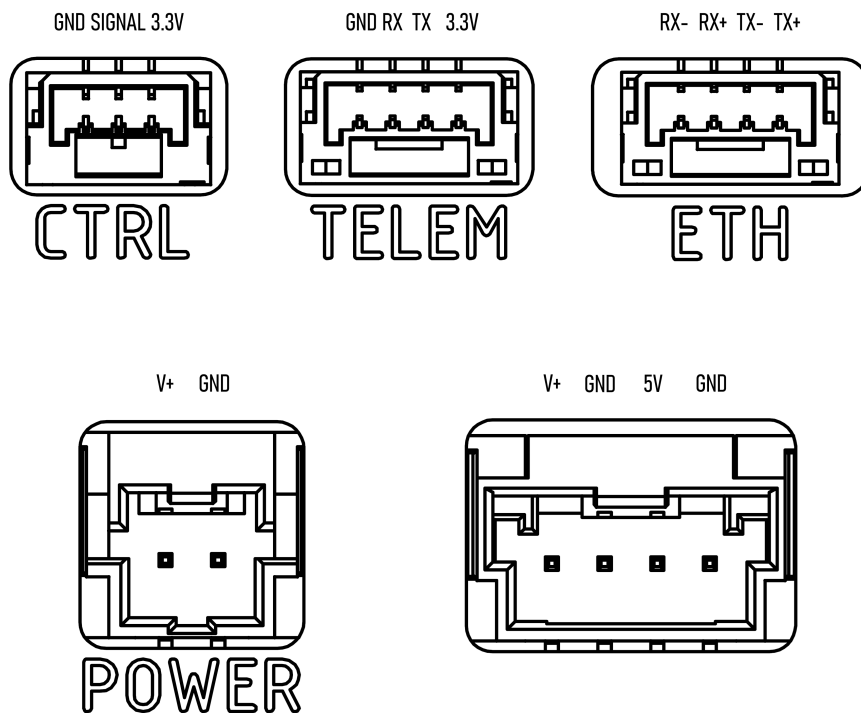


Figure 2: Pin description of the connectors

NOTE! The 3.3 V pin functions as an output only. Connecting any voltage to it – including 3.3 V, any other voltage or power from a flight controller – is strictly forbidden!

The manufacturer part numbers for the connectors used are listed in [Table 6](#)

The radio interface employs U.FL (also known as IPX1) connectors on the board side, with SMA Male or RP-SMA Female connectors provided on the antenna side. Please contact your supplier for additional details.

Port	PCB part number
Control port	BM03B-GHS-TBT(LF)(SN)
Telemetry port	BM04B-GHS-TBT(LF)(SN)
Ethernet port	BM04B-GHS-TBT(LF)(SN)
DC Power AUX	5600200420
Power	5600200220

Table 6: Connector part numbers

6.5 Package box cables

Type	Where used	Colors
CRSF / S.Bus	Control port	Black, White
Telemetry	Telemetry port	Black, Green, White
Board-Board Ethernet	Ethernet ports	Green, Yellow, White
Board-PC Ethernet	Ethernet ports	Single black PVC
Power	Power input	Black, Red
Power AUX	Power AUX input	Black, Red, Blue

Table 7: Cables in the package box

7 Data streams

Sky Pulse supports four streaming modes, allowing users to optimize bandwidth allocation based on operational requirements:

- **Control**
- **Telemetry**
- **Video**
- **Custom data**

These modes can be operated simultaneously to provide maximum flexibility. Different mode combinations have specific bandwidth recommendations, which can be referenced in [Table 8](#). Practical channel capacities, depending on the configuration, are listed in [Table 10](#).

For improved tolerance to RF interference, it is recommended to avoid excessively wide bandwidths when transmitting a small amount of data.

Recommended settings:

- When using the **Control** or **Telemetry + Control** mode, or in case of low-resolution **Video stream**, a **5 MHz** bandwidth is advised.
- If a Full HD video transmission is required, a **10 MHz** bandwidth is preferred. If the radio bandwidth is not enough and increasing data rate isn't an option, consider using a **20 MHz** mode.

Parameter	Value
Low-resolution video	5 MHz
Control + Telemetry only	5 MHz
Full resolution video	10 / 20 MHz
Video + Telemetry + Control	20 MHz

Table 8: Recommended bandwidths for different stream modes

7.1 Video / Data

By default, at system startup, Sky Pulse scans for attached cameras to detect available RTSP video streams. To ensure successful detection, all cameras must meet the following requirements:

- **Open access** with no authentication
- Support the **ONVIF protocol**

If the camera can't be detected, it is also possible to set up the static RTSP stream via the Web User Interface (Web UI). Please refer to the Web UI [subsection 10.1](#) below.

7.1.1 UDP Data Streaming

If no video link is required, Sky Pulse supports direct downlink UDP data streaming from the UAV to the Ground Unit. For this purpose, the **UDP 5600** port is reserved on the board. If both video and custom data transmission are required, users can **allocate additional traffic IDs** with the needed UDP ports in the Web UI interface (refer to [subsection 14.4](#)). For correct operation, the TIDs and ports must match on both paired radio modules. Apart from that, DigiQ provides an option to request a custom system image tailored to specific needs and traffic processing.

7.1.2 Bandwidth Considerations

The video resolution must be configured according to the maximum available channel capacity. As video cameras differ in resolution, compression methods, and frame rate (FPS), it is the user's responsibility to ensure that the link can accommodate all data transmissions. We advise configuring cameras according to the bandwidth and mode used.

Recommendation: Due to the potential bandwidth spikes during streaming, it is highly advised to leave a margin and avoid exceeding **60%** of the total available bandwidth to maintain a stable connection and prevent data loss.

7.2 Telemetry

The module supports the **MAVLink** protocol and multiple serial port configurations. They are listed in [Table 12](#).

Baud rate	Data bits	Parity	Stop bits
9600	8	None	1
57600	8	None	1
115200	8	None	1

Table 9: Supported telemetry baud rates

On the **Ground Unit** side, telemetry data can be accessed via:

- **Network Stream** – The default mode for integration with third-party applications such as *QGroundControl*.
- **UART Bridge** – In this mode, telemetry is transmitted over a UART connection, while Ethernet is used exclusively for video streaming. UAV control is fully handled through MAVLink.

7.3 Control

If used not in the **UART bridge** mode, the telemetry port is used as a control input on the Ground Station. Supported protocols are listed in [subsection 6.1.5](#)

The **protocol conversion** feature enables legacy **S.Bus** connectivity while utilizing the advantages of the modern **CRSF** protocol. When this feature is enabled, the **CRSF channel list frame** is converted into an **S.Bus frame**, maintaining **CRC checks** to ensure data integrity.

In this mode, the converted **S.Bus frames** are transmitted at the standard S.Bus baud rate:

- **100000 baud/sec**, 8 data bits, even parity, 2 stop bits.

7.4 Channel capacity

This section provides an overview of the radio link's data transfer capabilities. Depending on the bandwidth, data density, and performance mode, the upper

radio and Ethernet channel capacities will be limited by a certain value. Below, [Table 10](#) specifies the available bandwidth for the different modes.

Bandwidth	Focus on	Data density	Channel capacity	Ethernet capacity
5 MHz	Robustness	Regular	1625 Kbps	731 Kbps
5 MHz	Robustness	Extended	3250 Kbps	1462 Kbps
5 MHz	Performance	Regular	1625 Kbps	974 Kbps
5 MHz	Performance	Extended	3250 Kbps	1950 Kbps
10 MHz	Robustness	Regular	3250 Kbps	1462 Kbps
10 MHz	Robustness	Extended	6500 Kbps	2925 Kbps
10 MHz	Performance	Regular	3250 Kbps	1950 Kbps
10 MHz	Performance	Extended	6500 Kbps	3900 Kbps
20 MHz	Robustness	Regular	6500 Kbps	2925 Kbps
20 MHz	Robustness	Extended	13000 Kbps	5850 Kbps
20 MHz	Performance	Regular	6500 Kbps	3900 Kbps
20 MHz	Performance	Extended	13000 Kbps	7800 Kbps

Table 10: Maximum practical channel capacities for 5, 10, and 20 MHz bandwidths, performance modes, and data densities

7.5 Dynamic resolution adjustment

In conditions of severe packet loss, additional latency may arise, contingent upon the percentage of frames lost and the volume of traffic processed. Sky Pulse incorporates a feature that automatically detects such scenarios

and reduces the stream resolution when the camera supports an additional low-resolution stream. This adjustment seamlessly decreases overall bandwidth usage, thereby mitigating the impact and enhancing overall latency performance.

7.6 Channel fallback

In scenarios where continuous packet decoding is not possible due to severe packet loss or the activation of the interference detection mechanism, the units will automatically switch to an alternative frequency. If one unit is subsequently restarted and reverts to the original channel, the counterpart will not re-establish the connection until it similarly falls back to that channel. This fallback occurs automatically after one minute following an unpair event.

8 Special features

8.1 Interference evasion

Interference Evasion is an advanced DigiQ feature designed to enhance operation in environments with substantial RF interference. A built-in spectrum analyzer continuously monitors the RF spectrum for anomalies. If significant interference is detected, the system evaluates whether continued operation on the current frequency is feasible. If not, the Air Unit alerts the operator about an impending channel switch. In such cases, third-party applications like QGroundControl will display a notification regarding the interference response. After a brief interval, the Air Unit and the control station will seamlessly reestablish the connection on a new frequency. This feature is unavailable in the **Civil** revision.

8.2 Radio silence

In scenarios requiring covert operation, the radio silence mode can be activated. When enabled by the pilot, the system ceases all video and telemetry downlink transmissions, restricting itself to a passive listening mode. This prevents other parties from detecting the UAV through its RF emissions. Upon deactivation of the radio silence mode, normal video and telemetry transmissions resume. Additionally, the system can be configured to transmit telemetry data at specified intervals N_{sec} , which can be useful for adjusting the trajectory of fixed-wing drones. This feature is unavailable in the **Civil** revision and can be disabled in the **Industrial** revision.

NOTE! Currently, this mode disables interference detection

9 Status indication

The system board is equipped with four LEDs to provide visual status updates for various operations:

1. **Green LED (System Status):** The Green LED indicates the overall system status. Upon boot-up, all LEDs gradually turn on and then turn off as the system begins initializing. Once the internal initialization process is complete, the Green LED starts blinking, indicating that the system is in

the initialization phase. After initialization is done, the Green LED stays continuously on, signaling that the system is fully operational. During a system upgrade, the Green LED will also blink to indicate the process is ongoing.

2. **Yellow LED (Network Status):** The Yellow LED represents the network status. It blinks when network traffic is ongoing, allowing the user to verify that Ethernet communication is happening properly. This LED can also be used to check for any potential cabling issues if traffic is expected but the LED does not blink.
3. **Blue LED (Wireless Transmission):** The Blue LED lights up only when there are active wireless transmissions. It does not blink on receive (Rx) activity, allowing users to easily verify when data is actively being transmitted on the wireless channel. Normally, this LED blinks slowly when the device is not paired and blinks frequently when it's paired and data is streaming.
4. **Red LED (System Error):** The Red LED indicates a system error, such as a broken or unauthorized system image. If the Red LED is on, the system has encountered a critical error, but it can be resolved by resetting the device or reverting to the factory reset image (further instructions for this process will be specified below in this document). If the system works fine, this LED may also reflect an important system warning, such as detected interference. This means the radio has engaged an interference avoidance mechanism.

These LEDs offer a simple yet effective way to monitor and troubleshoot the system's operational status and performance.

10 Device configuration

10.1 Web User Interface

The Web User Interface (UI) facilitates board configuration, real-time monitoring, troubleshooting, and firmware upgrades. This section details the UI functionality and configuration parameters.

10.1.1 Monitor

The Monitor tab is used for system monitoring and troubleshooting. It provides users with the most important statistics:

1. Radio link usage
2. Ethernet link usage
3. RSSI per antenna
4. Transmit power per antenna
5. Data frames lost per second
6. Temperature

Wireless/Ethernet Tx/Rx bandwidth:

- **Requirement:** Prior to flight, verify that all devices operate within valid channel capacities under all anticipated use conditions
- **Importance:** Essential for ensuring reliable radio connectivity

RSSI per antenna:

- **Purpose:** Enables visual analysis of sudden signal loss events
- **Applications:** Identifies causes such as pilot error or physical obstacles

Transmit power per antenna:

- **Purpose:** Verifies correct operation of radio chains
- **Measurement:** Performed by internal hardware
- **Accuracy:** Varies with frequency and packet volume
- **Recommendation:** Evaluate data under normal traffic conditions

Temperature:

- **Purpose:** Real-time monitoring of unit temperature
- **Limit:** Do not exceed 80°C

Video/Data lost per second:

- **Purpose:** Provides visual confirmation and real-time monitoring of radio link degradation.

- **Application in poor link conditions:** When link restoration procedures are unclear, the plot enables the pilot to assess UAV response trends (improvement or deterioration)

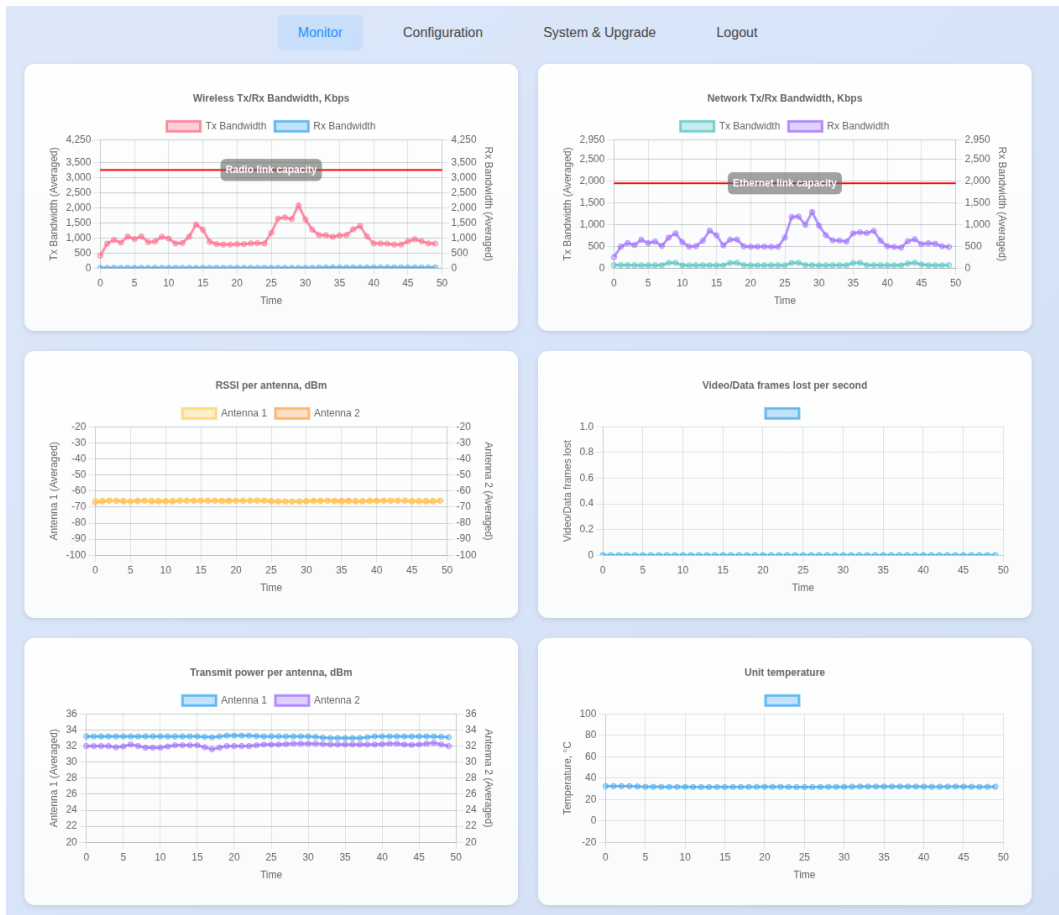


Figure 3: Example of the Monitor Web UI tab

10.1.2 Configuration

The screenshot displays the 'Configuration' tab of a web interface. It is divided into two main sections: 'Generic board config' and 'Stream config'. The 'Generic board config' section includes radio buttons for 'Ground Unit', 'Wireless bridge', and 'Air Unit' (selected). Below these are dropdown menus for 'Channel' (27 (6050 MHz)), 'Bandwidth' (20 MHz), 'Focus on' (Performance), and 'Data density' (Regular). There is a checked 'Developer mode' checkbox, a text input for 'Board IP address' (10.0.0.1), a 'Country' dropdown, and a 'Drone Key' button labeled 'Choose file'. The 'Stream config' section features checked checkboxes for 'Video/Data', 'Telemetry', and 'Control'. It includes radio buttons for 'Telemetry port protocol' (MAVLink selected) and 'Control port protocol' (S.Bus selected). Baud rate dropdowns are set to 115200 for 'Telemetry port' and 100000 for 'Control port'. There is a checked 'Control protocol conversion' checkbox, a checked 'Video stream switch' checkbox, and dropdowns for 'Switch RC channel' (12), 'Radio silence RC channel' (13), and 'Telemetry period' (10 sec). A 'Disable management traffic' checkbox is unchecked. The 'Default destination IP' is 10.0.0.5. Under 'Static RTSP Streams', there is one entry with 'RTSP URL 1' set to 'rtsp://10.0.0.50:8554/main.264', with 'Remove' and 'Add RTSP URL' buttons. A large blue 'Apply' button is at the bottom center.

Figure 4: Web UI Configuration tab

Generic board config

- **Board Usage Mode:** Selects operational role (Ground Unit, Air Unit, or Wireless Bridge). Refer to the [section 5](#) for the detailed mode description.
- **Channel:** Configures radio frequency channel (5050–6100 MHz); developer-only channels with non-standard frequencies (24–31) can be enabled via Developer Mode only (regulatory compliance required)

- **Bandwidth:** Sets channel bandwidth (5, 10, or 20 MHz). The user is responsible for wise bandwidth selection according to the operational requirements and/or the external hardware attached
- **Focus on:** Prioritizes robustness or performance via the redundancy level of transmitted data
- **Data Density:** Selects modulation coding scheme (Regular or Extended)
- **Developer Mode:** Enables experimental features and maximum transmit power (ensure regulatory compliance!)
- **Board IP Address:** Configures static IP of the unit. We recommend using different IP addresses between all nodes (10.0.0.1 for Air Unit, 10.0.0.2 for Ground Station, etc)
- **Country:** Sets regulatory domain. Locked unless Developer Mode active
- **Drone Key:** Uploads authentication key file (.key, 64 bytes). We recommend using the mobile application or the <https://www.random.org/bytes> to generate the key. Please refer to [subsection 10.2](#).

Stream config

- **Stream Enable:** Toggles Video/Data, Telemetry, and Control streams. These values are chosen depending on the user's requirements
- **Telemetry Protocol:** Selects CRSF, S.Bus, or MAVLink (MAVLink forced in the Air Unit mode)
- **Control Protocol:** Selects CRSF or S.Bus (Air Unit only)
- **Baud Rates:** Configures telemetry (9600–400000) and control (115200 or 400000) port speeds
- **Protocol Conversion:** Enables S.Bus compatibility in Air Unit mode
- **Video Stream Switch:** Allows remote control (RC) channel-based stream switching (Air Unit, Video enabled)
- **Switch RC Channel:** Defines remote control (RC) channel (1–16) for stream switching
- **Radio Silence Mode:** Disables all but periodic telemetry (Air Unit only)

- **Silence RC Channel:** Sets remote control radio silence trigger channel (1–16)
- **Telemetry Period:** Configures silence interval (10, 30, 60, or 120 sec). After its expiration, the board will turn on the data transmission for one second and switch back to silence
- **Disable Management Traffic:** Suppresses non-flight traffic after pairing. Setting this mode will affect the interference detection feature
- **Default Destination IP:** Sets video stream target and is used in the Ground Unit/Wireless Bridge modes.
- **Static RTSP Streams:** On the Air UNit, manually adds up to 5 RTSP URLs

10.1.3 System & Upgrade

- **Change Password:** Use this to update the unit credentials
- **Firmware Upgrade:** Uploads a release package for a software upgrade
- **Reset Configuration:** Restores factory defaults
- **Download Logs:** Retrieves system logs for the remote DigiQ troubleshooting

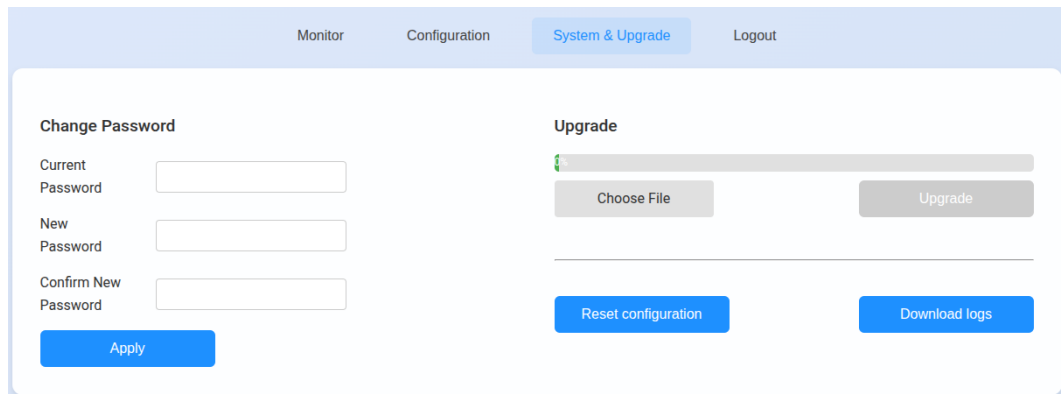


Figure 5: Web UI System & Upgrade tab

10.1.4 Version information

Version information can be found on the bottom-left of any Web UI tab and includes:

1. Software version (SW): The main binary package that can be upgraded by user on a release basis
2. Firmware version (FW): Factory-defined low-level firmware user can refer to during troubleshooting. This package is not upgradeable.
3. HW version (HW): hardware-defined revision of the unit, which depends on specific configuration (Civil or Industrial) and version

SW: 2.1.28 | FW: 0.3.0 | HW: 3.1 | Product ID: 00330044-4242500D-20333037

Figure 6: Web UI version information footer

10.2 Mobile application

In addition to the Web UI, the DigiQ mobile application enables contactless configuration of the UAV when the radio module is enclosed, eliminating the need to open the enclosure or risk module extraction. As of the release date of this document, the application is available exclusively for Android and can be downloaded from the provided link on the DigiQ website.

10.2.1 Device configuration

The application communicates with the module via Bluetooth Low Energy (BLE). To ensure reliable operation, confirm that the BLE antenna is free from obstruction by shielding materials. After installation, launch the application and tap the arrow on the right to access the scan menu. If no devices are detected, select the Re-scan button at the top and wait for the scan to complete. Once the target device appears, tap it to initiate the connection.

You will be prompted to enter a PIN code, which is printed on the sticker inside the product packaging. After successful pairing, the PIN will no longer be required for subsequent connections.



Figure 7: Device selection in mobile application

Upon successful verification, the application will display a VERIFICATION_COMPLETE status, indicating that configuration is now possible. If the connection fails for any reason, please verify the PIN code and, if the issue persists, restart the application.



and the statistics outlined in [subsection 6.2](#).

To modify settings, navigate to the Config tab at the bottom of the screen. Adjust parameters using the sliders and toggles, as described in [subsection 10.1.2](#).

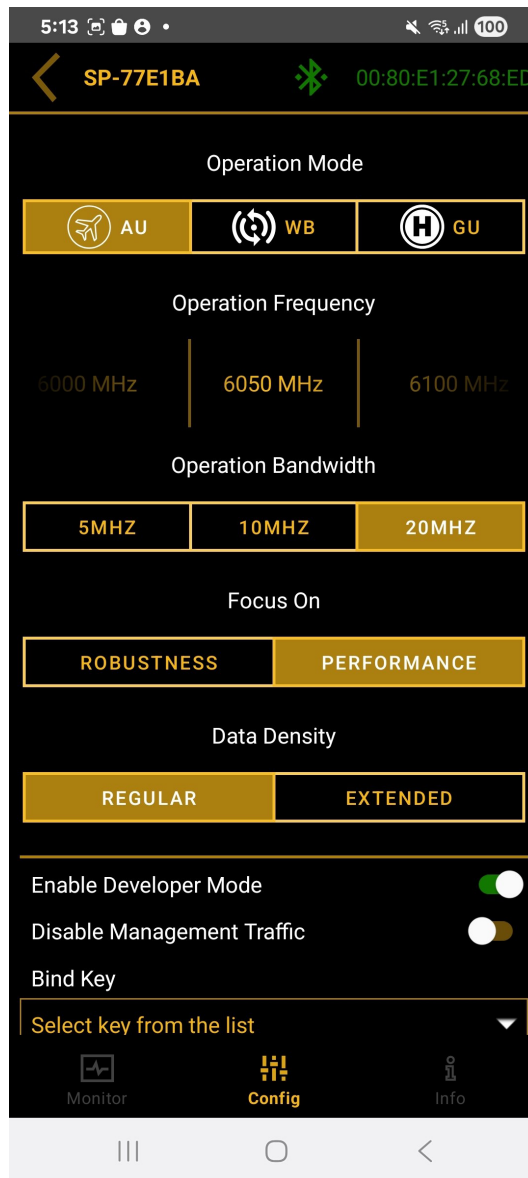


Figure 10: Device configuration menu

10.2.2 Bind key generation

To save time on bind-key configuration, use the mobile application to generate drone keys for multiple devices. Open the main window and tap the global settings menu. Then go to the 'Bind Keys' tab and add a new key by pressing the '+' button. This will generate a new bind key that you can now easily select when configuring any device.

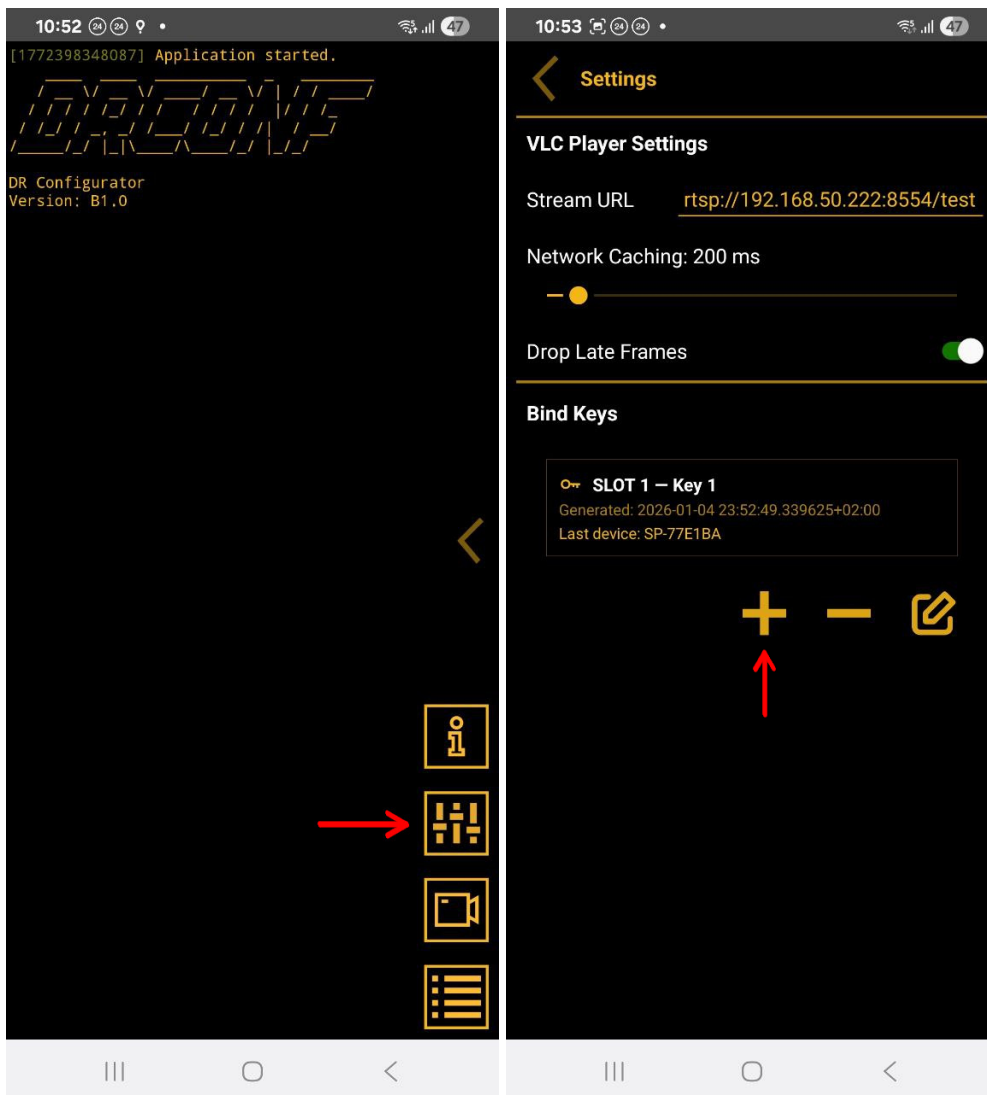


Figure 11: Access global settings in mobile application

Figure 12: Adding new key into the slot

10.3 Default parameters

When leaving the factory or in case of a configuration reset, the default configuration parameters are listed in [Table 11](#) below.

11 Supported cameras

Below is the list of tested RTSP cameras as of the release date of this document:

1. SIYI ZR10
2. Goke 7205V200
3. SIYI R1/R1M – **NOTE** – These cameras require static stream usage
4. SIYI A2 Mini – **NOTE** – User might need to change the static IP address via SIYI SDK
5. Hisilicon Hi3516EV200 – **NOTE** – Some cameras may require the audio streaming to be disabled

Support for additional RTSP cameras is anticipated, with compatibility testing to be conducted and documented in future revisions of this manual.

12 Software upgrade

New software releases are periodically distributed and are available on the DigiQ RF website. When the upgrade is released, the relevant notification appears in the Web UI. Proceed to the **System & Upgrade** tab and select the release file in the **Upgrade** subsection. If the file is valid, the upgrade begins. Upon completion, the board will automatically boot up and re-establish a connection.

Option	Default value
IP address	10.0.0.1
Web UI username	admin
Web UI password	Specified on the box
BLE pin code	Specified on the box
Focus On	Performance
Data density	Regular
Channel bandwidth	20 MHz
Radio channel	5180 MHz
Regulatory domain	Ukraine
Video stream	Enabled
Telemetry stream	Enabled
Control stream	Enabled
Custom streams	Disabled
Static RTSP streams	Disabled
Developer mode	Disabled
Telemetry profile	MAVLink @ 115200 8N1

Table 11: Factory reset board configuration parameters

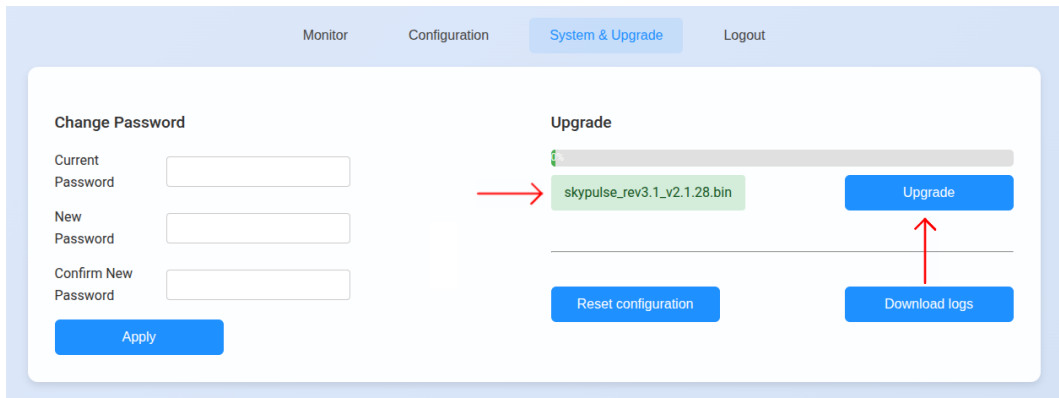


Figure 13: Device upgrade process via Web UI

Ensure that a stable power supply is maintained during the upgrade. If, by any chance, the power disappears, this breaks the active image, and factory restore functionality needs to be engaged. Luckily, this can be done in less than a minute; please refer to [subsection 17.1](#).

13 Integration recommendations

13.1 CAD 3D model

For a simplified integration, we provide a lightweight 3D model of the Sky Pulse module for developers. Use [this link](#) to download it. If you have additional questions or require another format, please email the [DigiQ Support Team](#).

13.2 Mount clips

Sky Pulse is supplied with two plastic mounting clips designed for secure attachment to flat surfaces or structural elements. These clips enable straight-forward installation on planar sections of the airframe, enclosure, or other suitable mounting areas. An example of a typical installation using the provided clips is shown in [Figure 14](#) and [Figure 15](#).

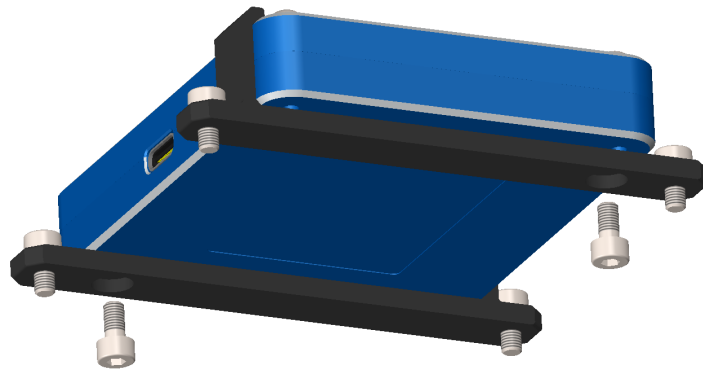


Figure 14: Attach the clips to the device with M3x6 bolts, then mount with M3 screws to your device

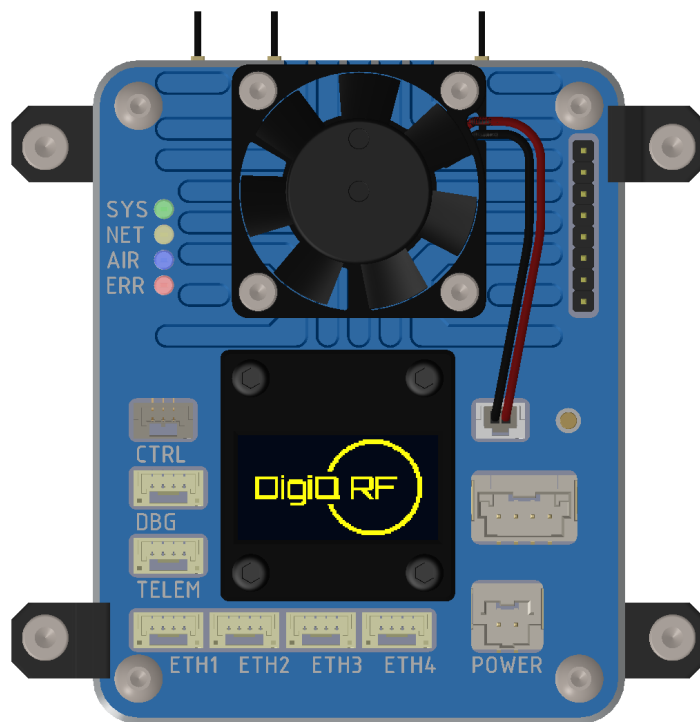


Figure 15: Top-view of the mounted device

13.3 Antenna placement

To ensure optimal communication performance and minimize interference, adhere to the following antenna usage guidelines:

- Use antennas with the **same polarization**. For example, if a **Left-Hand Circular Polarization (LHCP)** antenna is used on the Ground Unit, the Air Unit must also use the LHCP antenna.
- **Omnidirectional antennas** should be oriented **vertically**, while **patch antennas** should be positioned **horizontally**, facing the direction of the Ground Unit.
- Maintain a minimum distance of **5 cm** between antennas to avoid signal degradation.
- Avoid operating near high-frequency power feeders or other devices, **such as video transmitters**, that operate in the same frequency band. This can cause interference or even damage the radio system.
- For reliable mobile configuration, ensure that the BLE antenna **is not obstructed** by RF shielding elements

13.4 Usage considerations

- Always ensure the **unobstructed radio sight** before the flight
- When flying long distances, always keep in mind the impact of the **Fresnel zone**. Ensure your radio module is installed high enough to mitigate its negative effect
- Apart from the Fresnel zone, when using at low altitude, bear in mind the negative effect of the interference due to the **ground reflection**: this is especially important when operating near the water surface

14 Configuration examples

14.1 Air Unit wiring

The wiring diagrams and cable configurations shown below serve as reference examples and can be adapted for use with other flight controllers. Sky Pulse includes default/pre-wired cabling optimized for **Holybro Pixhawk 6C Mini**.

In certain flight controller models, the RC IN port is located on a side face rather than the top or front. For improved clarity, the illustrations below depict a Pixhawk-series model with a more visible RC IN port on the bottom.

14.1.1 Pixhawk 6C Mini

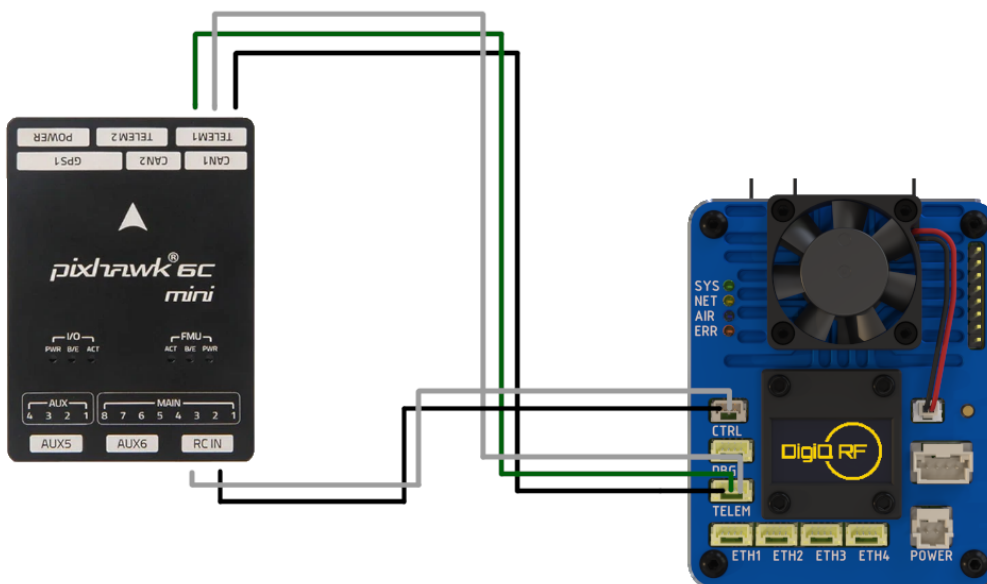


Figure 16: Wiring example #1: Pixhawk 6C Mini, with telemetry and control connected

14.1.2 Matek H743 Wing

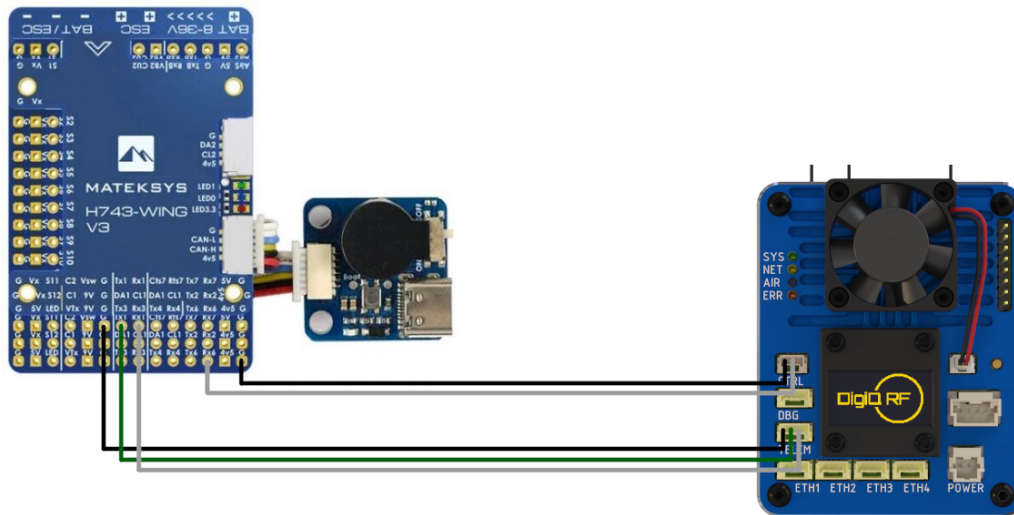


Figure 17: Wiring example #2: Matek H743, with telemetry and control connected

14.2 Ground Unit wiring

As described in [subsection 6.1](#), MAVLink telemetry can be transmitted via Ethernet (concurrently with the video stream) or via UART. Both configurations are illustrated below.

Important Restriction in UART Mode

When operating in UART telemetry mode, Control streaming from RC input is not supported. In this configuration, vehicle control must be provided via an alternative radio channel (e.g., ExpressLRS / ELRS or other compatible RC link). For Ethernet-based telemetry (recommended when simultaneous video streaming is required), use the default UDP link configuration in QGroundControl (no additional serial profile needed). Refer to the figures below for visual examples of both setups. This ensures reliable MAVLink communication while avoiding conflicts between telemetry and primary control paths.

14.2.1 Telemetry over Ethernet

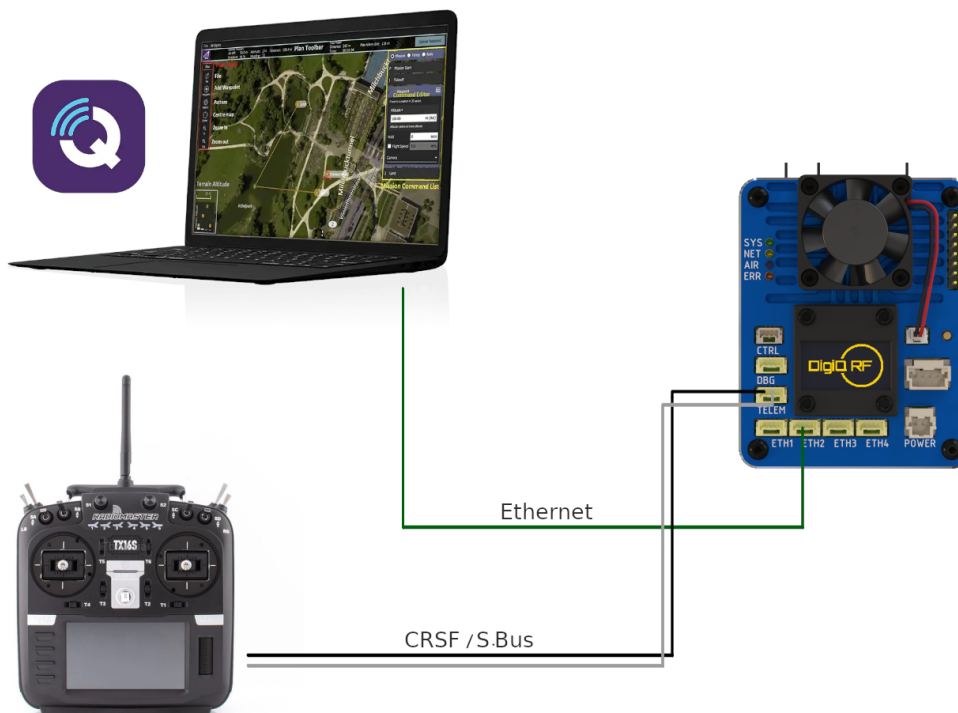


Figure 18: Ground Unit wiring example #1: MAVLink telemetry is sent over the Ethernet link

Connect to your PC via Sky Pulse Ethernet adapter. The relevant configuration of QGroundControl's 'Communication Links' and Web UI for the Ethernet telemetry mode is shown below.

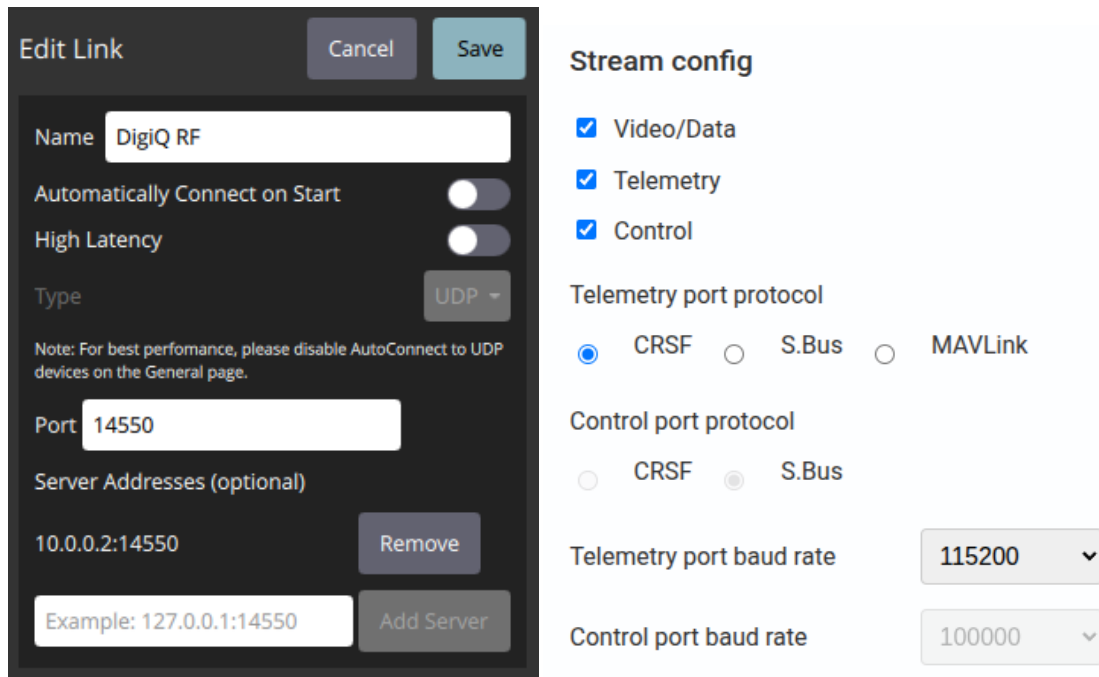


Figure 19: QGC Communication Link settings for MAVLink over Ethernet

Figure 20: Web UI settings for MAVLink over Ethernet (control is available)

14.2.2 Telemetry over UART

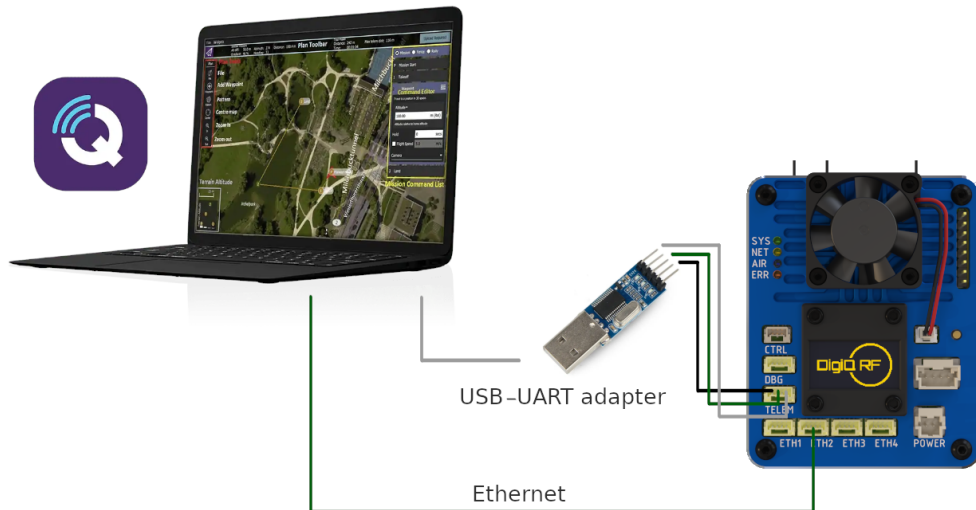


Figure 21: Ground Unit wiring example #2: MAVLink telemetry is sent over UART

Ensure correct UART connections as follows:

- Adapter TX pin → Telem RX pin
- Adapter RX pin → Telem TX pin

This implements the required crossover wiring between the adapter and telemetry port, as TX always connects to RX and vice versa. The corresponding setup in QGroundControl is performed via the Communication Links section (under Application Settings). Select Serial as the link type, specify the appropriate COM port for the adapter, and configure the baud rate to match the telemetry requirements. The examples of QGroundControl and Web UI configuration are shown below.

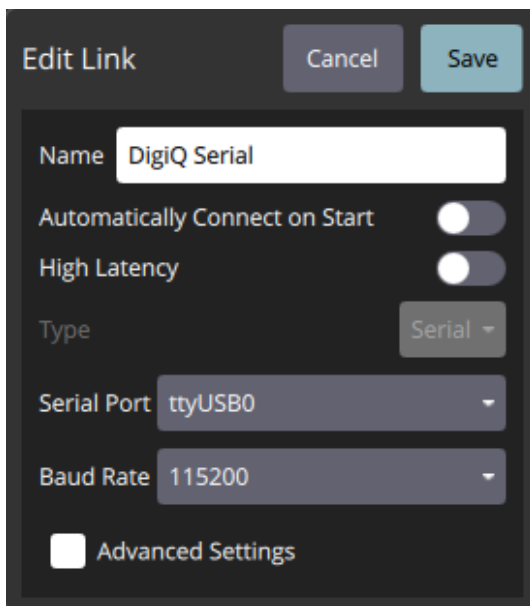


Figure 22: QGC Communication Link settings for MAVLink over UART

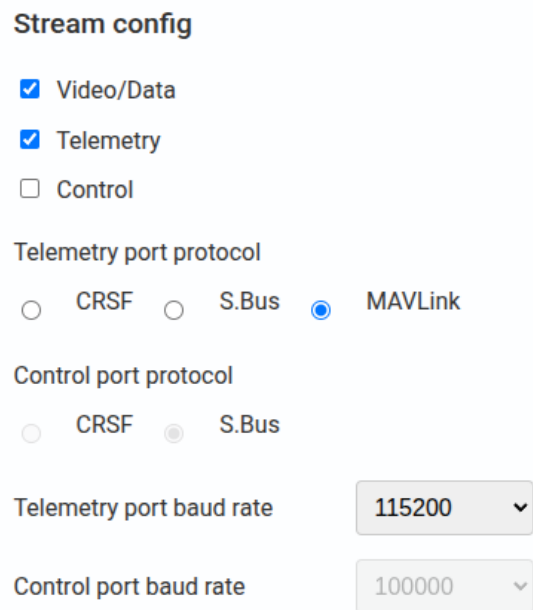


Figure 23: Web UI settings for MAVLink over UART (control is unavailable)

14.3 Regular setup with video, telemetry and control

Let's review the example of the basic configuration setup:

Requirements for the Air Unit:

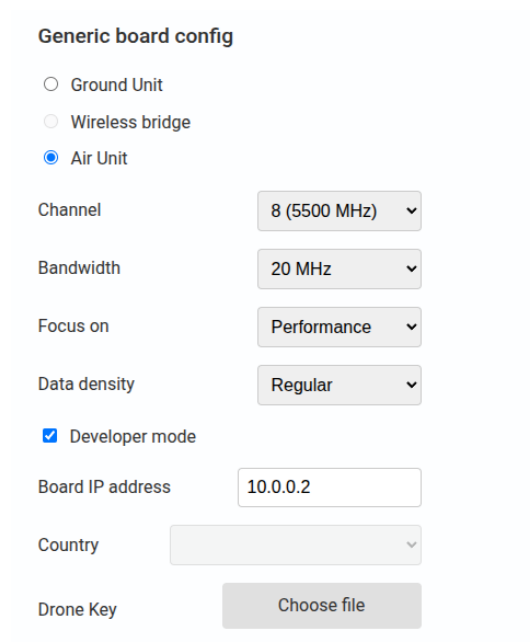
- Required streams: Video + Telemetry + Control
- Flight Controller: Holybro Pixhawk 6C Mini
- MAVLink speed: 115200 baud/sec
- Cameras: ZR10, R1M and Goke 7205V200
- Units operate at 5500 MHz in 20 MHz mode

Requirements for the Ground Unit:

- RC control: TX16S MKII
- Control is provided by CRSF @115200
- Unit connected to the QGroundControl via Ethernet

14.3.1 Air Unit configuration

1. Set the bandwidth '20 MHz' and channel 8, which corresponds to 5500 MHz



Generic board config

Ground Unit
 Wireless bridge
 Air Unit

Channel: 8 (5500 MHz) ▼

Bandwidth: 20 MHz ▼

Focus on: Performance ▼

Data density: Regular ▼

Developer mode

Board IP address: 10.0.0.2

Country: ▼

Drone Key: Choose file

Figure 24: Air Unit global mode configuration

2. Go to <https://www.random.org/bytes> and generate a drone key. Specify 64 bytes, the 'Download to file' option, and press the 'Get Bytes' button. Rename it to have a '.key' extension. This is your randomized drone key, which you will use on both Air and Ground units

Part 1: Required Fields

Generate random bytes (maximum 16,384).

How do you want your bytes displayed?

- Hexadecimal
- Decimal
- Octal
- Binary
- Download to file

Part 2: Go!

Board IP address	<input type="text" value="10.0.0.1"/>
Country	<input type="text" value=""/>
Drone Key	<input type="button" value="RandomNumbers.key"/>

Figure 25: Generation of the drone bind key

Figure 26: Bind key update on the Web UI

3. In 'Focus On', we use the values according to our needs, but make sure you have set 'Focus On' to the same value on the opposite (Ground) unit
4. Telemetry port is plugged into the Flight Controller's TELEM1 port. We specify '115200' as the baud rate and specify 'MAVLink' in the 'Telemetry port protocol'
5. The PX6C flight controller expects S.Bus at 100,000 baud. Since the Ground Unit outputs CRSF, protocol conversion is required. The general principle is to configure the input protocol to match the source (Ground Unit) and enable conversion to the target protocol. In our case, we set 'Control port baud rate' to '115200' (as specified by the Ground Unit), select 'CRSF' under 'Control port protocol', and enable 'Control protocol conversion'.
6. Now let's move on to the stream configuration. We are going to use all stream types, so check Video, Telemetry, and Control. Unchecked field disables the relevant stream.

Stream config

Video/Data
 Telemetry
 Control

Telemetry port protocol
 CRSF S.Bus MAVLink

Control port protocol
 CRSF S.Bus

Telemetry port baud rate ▼

Control port baud rate ▼

Control protocol conversion

Figure 27: Air Unit stream configuration (CRSF enabled)

7. We are nearly finished. To configure video stream switching, enable the feature by selecting the 'Video Switching' option and assigning the desired RC channel (e.g., RC Channel 13) to control stream selection
8. Finally, note that among the supported cameras, the SIYI R1M has the ONVIF protocol disabled. To integrate this camera, manually specify a static RTSP video URL in the field provided below.

The screenshot shows a configuration interface for static video streams. It includes several settings:

- Video stream switch
- Switch RC channel: 12
- Radio silence mode
- Radio silence RC channel: 5
- Telemetry period: 10 sec
- Disable management traffic
- Default destination IP: 10.0.0.5
- Static RTSP Streams**
- RTSP URL 1: rtsp://10.0.0.50:8554/main.264 (with a Remove button)
- Add RTSP URL (button)

Figure 28: Static video stream configuration

9. Apply the settings and wait for the unit to restart

14.3.2 Ground Unit configuration

1. Configure the same bandwidth, channel, and redundancy mode similarly to the Air Unit, and ensure you upload the same drone key
2. Specify a unique IP address of the Ground Unit. This will be important when we configure QGroundControl in [subsection 14.3.3](#).

Generic board config

Ground Unit
 Wireless bridge
 Air Unit

Channel

Bandwidth

Focus on

Data density

Developer mode

Board IP address

Country

Drone Key

Figure 29: Ground Unit global mode configuration

3. Enable all streams
4. Since video and telemetry are routed to QGroundControl, connect the CRSF RC input to the Telemetry port on the Ground Unit. Set 'Telemetry port protocol' to 'CRSF' and 'Telemetry port baud rate' to '115200'
5. Optionally, specify the IP address of the laptop running QGroundControl as the default traffic destination. This setting determines where traffic is forwarded by default; however, it is optional because the Ground Unit automatically detects traffic from QGroundControl and overrides this value during operation.

Figure 30: Stream configs on the Ground Unit: note that CRSF is enabled

Figure 31: Ensure that the default IP address is valid and doesn't have conflicts

6. Apply the settings and wait for the unit to restart and establish a connection. When the traffic starts, the blue LED should start blinking frequently

14.3.3 QGroundControl configuration

1. To configure video, go to 'Application Settings -> Video' and set 'Source' to 'UDP h.265 Video Stream' and 'Connection' to '0.0.0.0:5600'. Check 'Low Latency Mode' for the minimal video caching time
2. To establish the telemetry connection in QGroundControl, navigate to 'Application Settings -> Communication Links' and create a new link. Set the type to 'UDP', enter the Ground Unit's IP address (10.0.0.2), and retain the default port (14550). Optionally, check 'Automatically Connect on Start' and click 'Add Server' to generate the URL. Then save the configuration and return to the main screen – the video and telemetry should now be available.

3. On Windows, it is often required to open UDP ports in the firewall. Use any manual suitable for you, depending on your Windows version.

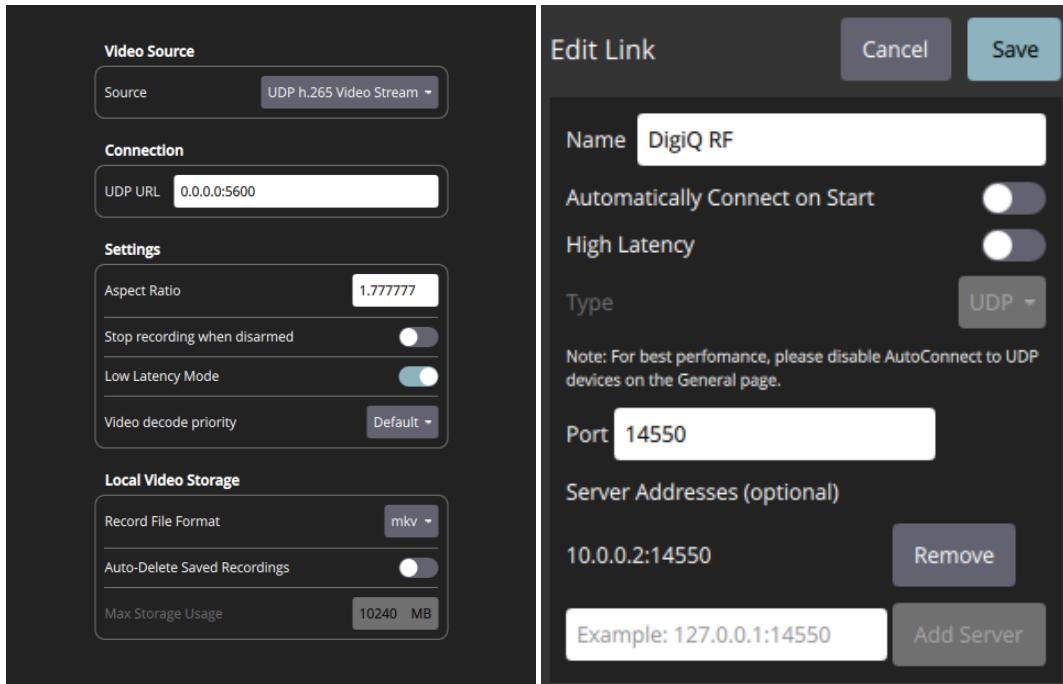


Figure 32: H.265 video stream configuration in QGroundControl

Figure 33: QGC Communication Link for telemetry over Ethernet

14.4 Connect your custom hardware

Sky Pulse v3 introduces dedicated traffic queues to support custom data streaming applications. These queues are configured via the Configuration Web UI by selecting the 'Add TID' button and specifying the desired UDP port. The same TID (Traffic Identifier) and associated UDP port must be identically allocated on the counterpart unit to establish bidirectional forwarding. Once configured, traffic received on the specified UDP port (e.g., 5001 or 5002) is transparently forwarded to the remote unit. At the remote side, it is then delivered to the default destination IP address and the same UDP port, following the standard forwarding behavior applied to all other traffic. A configuration example is provided below. This mechanism enables seamless integration of custom UDP-based streams without interfering with regular network traffic handling.

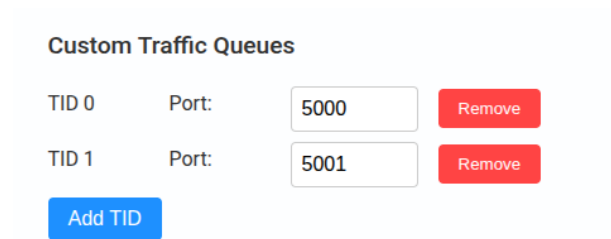


Figure 34: Example of the two additional traffic queues allocated

14.5 Wireless bridge range extension

The wireless mode is used if the ultimate operation range is required. For this mode, at least four units are used:

1. Ground Unit radio module
2. Wireless bridge Unit #1
3. Wireless bridge Unit #2
4. Air Unit radio module

Wireless bridge Units #1 and #2 are installed on the airborne platform or a high mast and pointed towards the Air Unit and Ground station, forming the dedicated, secured, and interference-resilient radio links. Each radio link pair operates with fully independent interference handling. This enables **adaptive frequency hopping** and seamless recovery of the individual radio link in the presence of interference. Furthermore, each radio link pair performs independent data recovery at the link layer. As a result, corrupted frames are not propagated or accumulated across multiple hops in the network topology. This per-link recovery mechanism introduces additional end-to-end latency, which must be taken into account during mission planning and drone flight control operations. Aside from the latency consideration, the system imposes no practical limitation on the number of wireless bridges (hops) that can be deployed in the network.

To configure a wireless bridge, you will need to assign proper IP addresses to all modules so they don't conflict with static camera IP addresses, if any are set. Please note, that the formed network doesn't form a classic interconnected IP network where all units are accessible. Moreover, to separate

different networks, IP addresses from different subnets can be used. Let's consider the following configuration:

Radio unit	IP address
Air Unit	10.0.0.1
Wireless Bridge Unit #1	10.0.0.9
Wireless Bridge Unit #2	10.0.0.10
Ground Unit	10.0.0.2

Table 12: Example IP configuration for the wireless bridge mode

14.5.1 Configuration procedure

1. Configure Air Unit and Ground Unit as usual, then move to the wireless bridge configuration
2. For the wireless bridge nodes, set the Wireless Bridge mode in the Generic Board Config tab
3. Set the device IP address, ensuring it doesn't conflict with any other addresses in the network
4. Set the destination IP to the neighboring wireless bridge node: in the example above, wireless bridge #1 specifies 10.0.0.10 as its destination IP address, and #2 specifies 10.0.0.9 on its side
5. Set identical drone keys for each radio link pair. We recommend setting unique keys for improved security
6. Ensure unique channels for each radio link pair
7. Connect any two ports of the wireless bridge nodes with an Ethernet cable from the package box
8. Apply the configuration and wait for the devices to reboot

Generic board config

- Ground Unit
- Wireless bridge
- Air Unit

Channel: 0 (5180 MHz) ▼

Bandwidth: 20 MHz ▼

Focus on: Performance ▼

Data density: Regular ▼

Developer mode

Board IP address: 10.0.0.9

Country: Ukraine (UA) ▼

Drone Key: Choose file

Custom Traffic Queues

[Add TID](#)

Stream config

- Video/Data
- Telemetry
- Control

Telemetry port protocol

- CRSF
- S.Bus
- MAVLink

Control port protocol

- CRSF
- S.Bus

Telemetry port baud rate: 115200 ▼

Control port baud rate: 100000 ▼

- Control protocol conversion
- Video stream switch

Switch RC channel: 12 ▼

- Radio silence mode

Radio silence RC channel: 13 ▼

Telemetry period: 10 sec ▼

- Disable management traffic

Default destination IP: 10.0.0.10

Figure 35: Example of the Wireless Bridge configuration on the Web UI

Similar procedure takes place when configured via the mobile application.

14.6 Static RTSP video test without camera

When configuring static RTSP streams for the first time, or when facing configuration issues, it is advised to verify the correct operation before integration. For reference testing of static RTSP video streams (without requiring a physical camera), a simple video server can be quickly set up on the host machine using the following Python script:

[Download \(clickable\)](#)

For the test script to function correctly, the following software packages must be installed on the host system:

Debian/Ubuntu:

```
1 sudo apt install \  
2   gir1.2-gstreamer-1.0 \  
3   gir1.2-gst-rtsp-server-1.0 \  
4   gstreamer1.0-plugins-base \  
5   gstreamer1.0-plugins-good \  
6   gstreamer1.0-plugins-bad \  
7   gstreamer1.0-plugins-ugly \  
8   gstreamer1.0-libav \  
9   gstreamer1.0-tools \  
10  libgstreamer1.0-dev \  
11  libgstrtspserver-1.0-dev
```

This approach allows reliable validation of the static stream path, URL format, network reachability, and compatibility with the Sky Pulse receiving side prior to connecting actual camera sources.

After packages are installed, start the script with:

```
1 python3 ./static_rtsp_video_test.py
```

Configure the static stream on the Web UI, set the correct usage mode, channel and bind key, then restart:

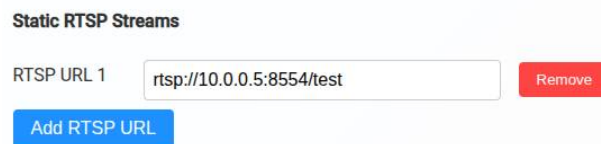


Figure 36: Static RTSP stream for a test without a real camera

If both units are configured properly, you will see the test stream on the QGroundControl or in your testing utility.

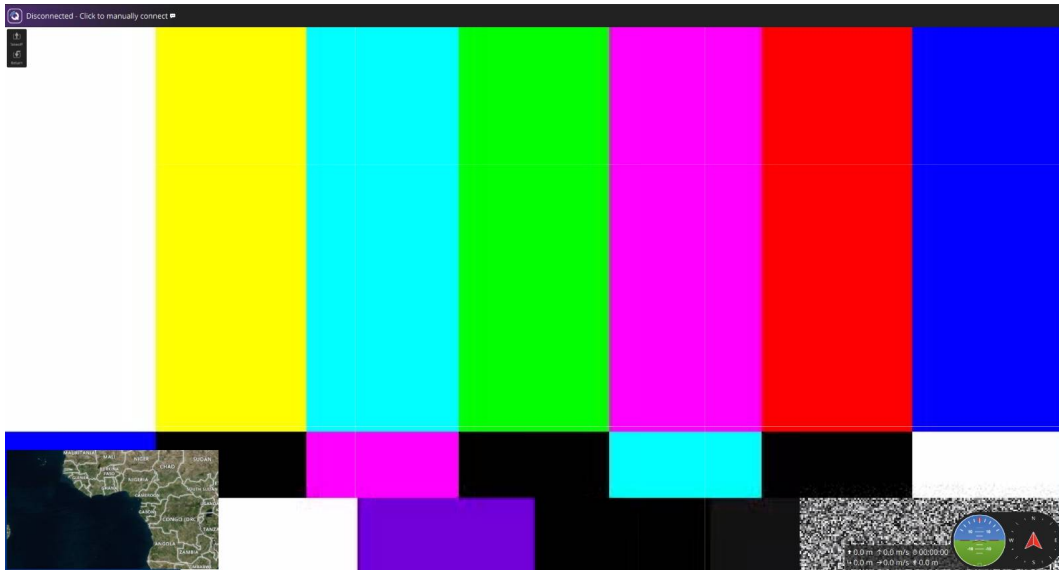


Figure 37: The view of the test RTSP stream in QGroundControl

14.7 Windows firewall configuration

When used on Windows, the system firewall may intercept incoming traffic intended for the QGroundControl / Mission Planner. This can lead to partial connectivity issues – for instance, receiving video stream while telemetry fails to connect, or no visible connection at all. To ensure full functionality, please verify your firewall settings and grant the necessary permissions before launching the application. Below are the recommended steps for Windows 11:

1. Enable private network

Go to your Network Settings, select the used Ethernet adapter, and choose **Private Network**. This will switch your connection to **trusted**. Then press **Configure firewall and security settings**

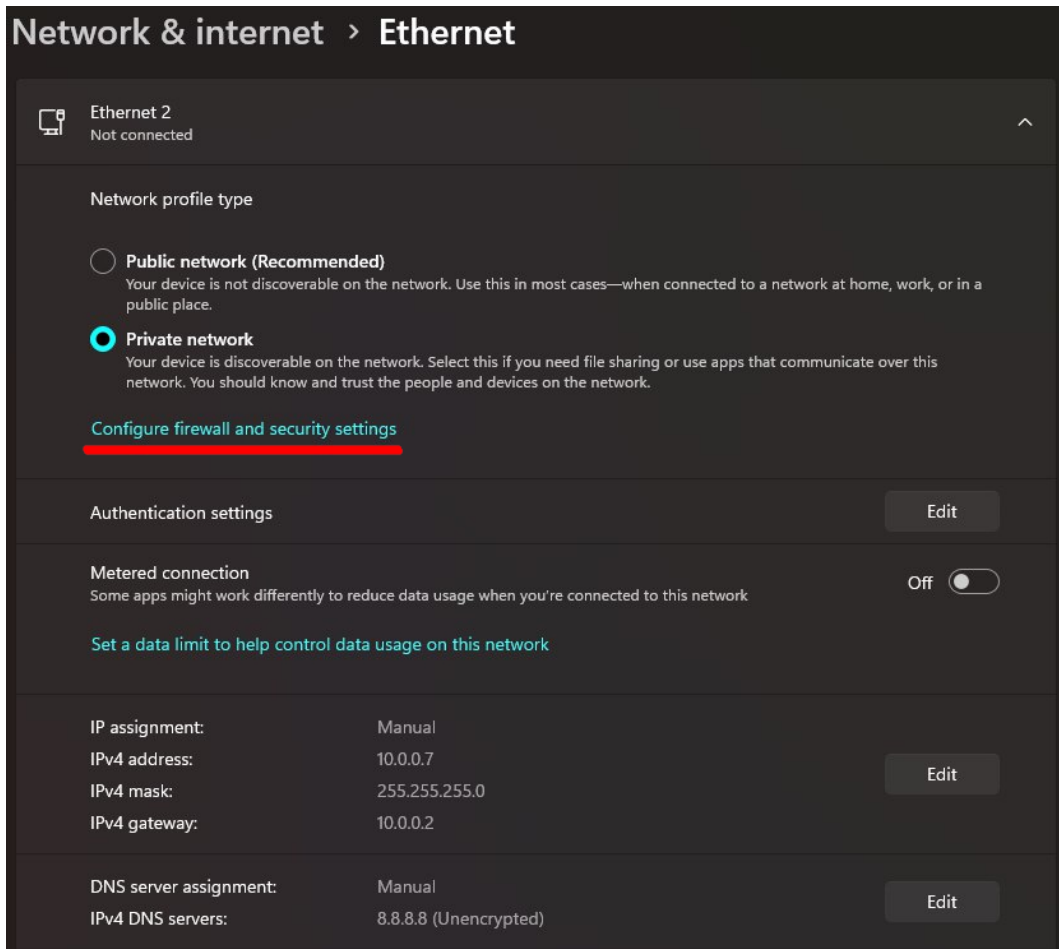


Figure 38: Network type configuration

2. Open Windows Defender rules

In the opened window, select **Advanced settings**. 'Windows Defender Firewall with Advanced Security' window with **Inbound** and **Outbound** tabs will open

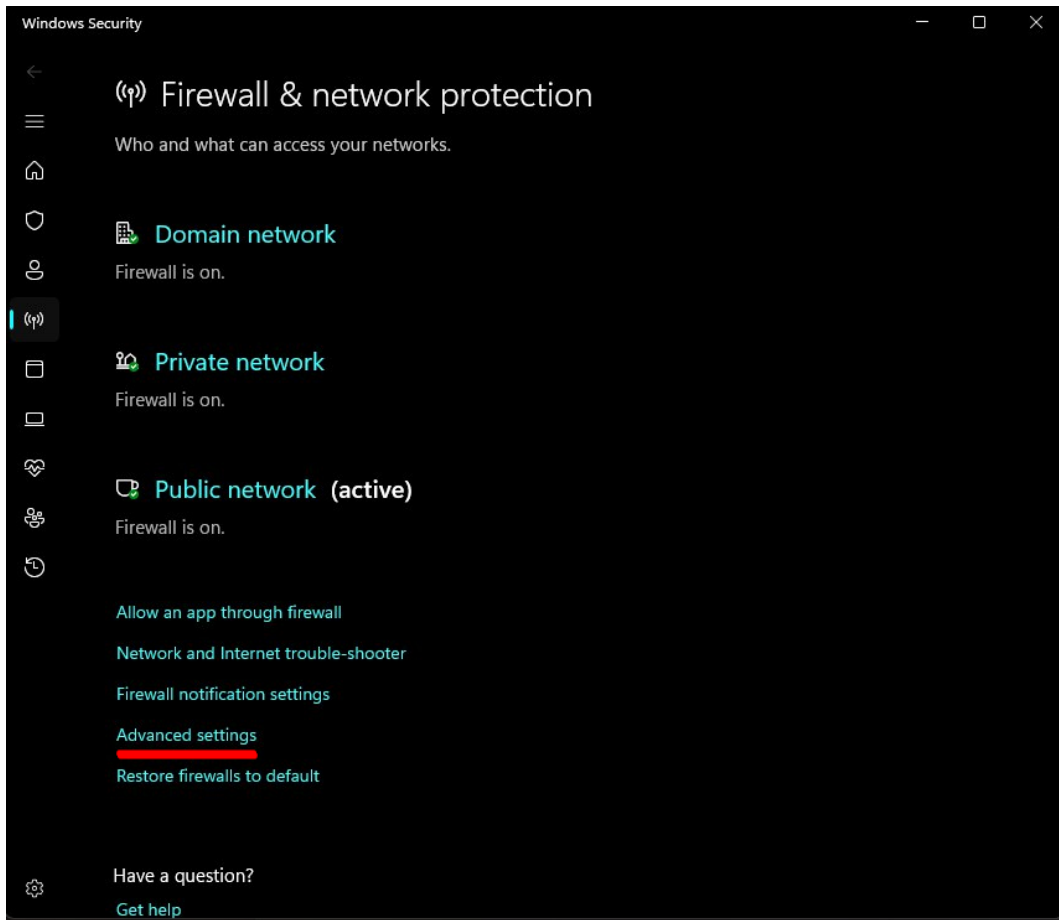


Figure 39: Open the Inbound/Outbound rules configuration window

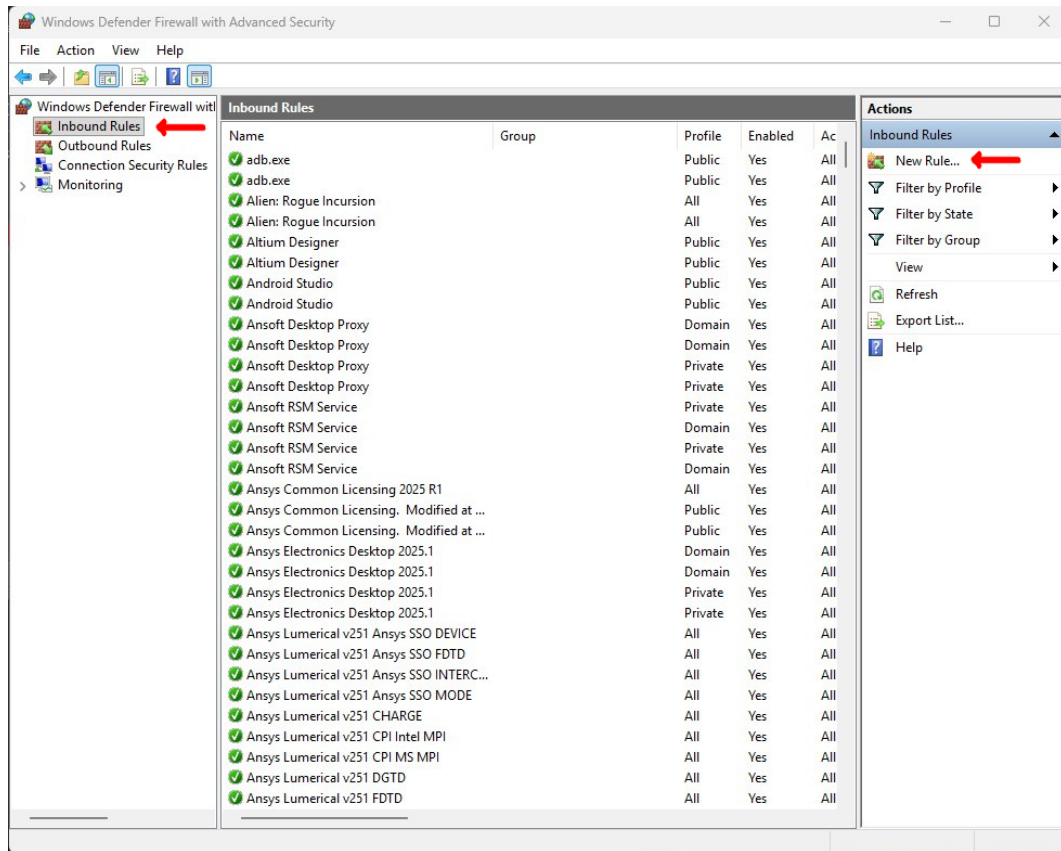


Figure 40: Create the new rule

3. Add the new Inbound rule

In Inbound Rules, select **New rule**. Select rule type **Port** and select **UDP** as the protocol

4. Specify your ports

The following ports should be added: **14550** (MAVLink telemetry), **5600** (Video/Data). If any Custom TIDs are configured, please also include their ports to the list

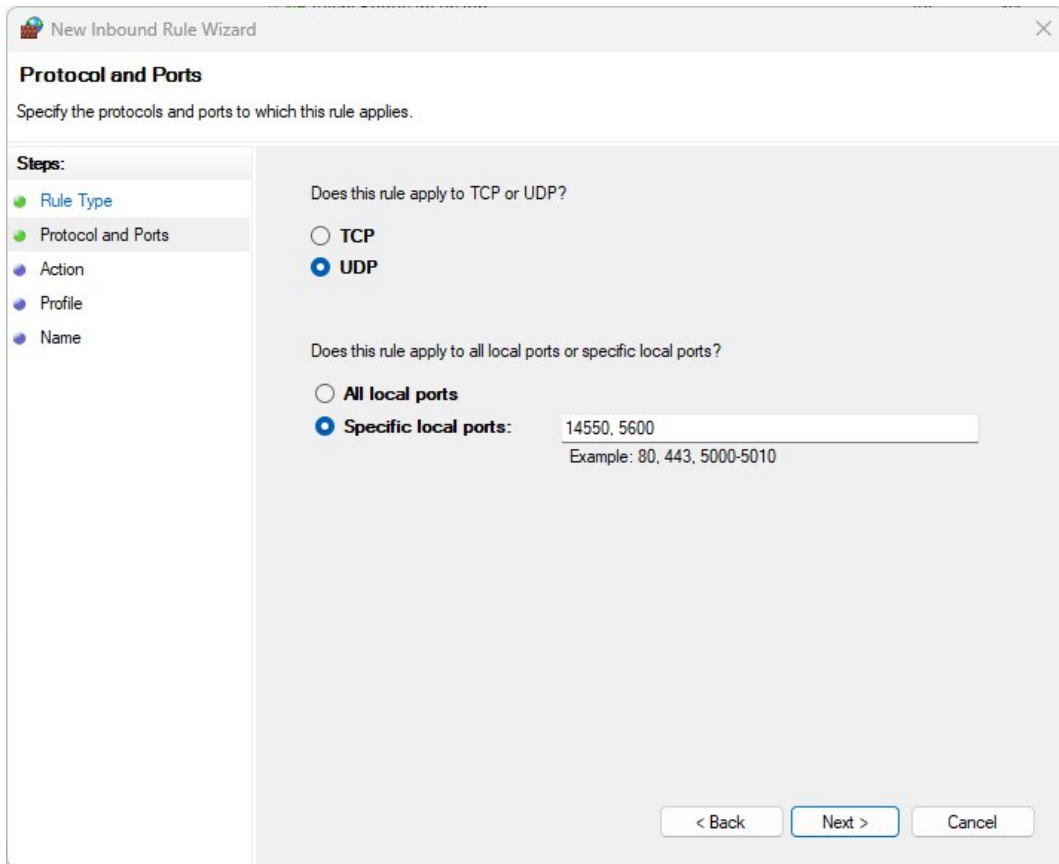


Figure 41: Specify the port list comma-separated

5. Finalize your steps

In the next window, select **Allow the connection** and check the suitable network types, including **Private** network. Enter the rule name, e.g., 'QGroundControl allowed ports', and save it. After this, your software will be allowed to establish the incoming connections from Sky Pulse.

15 Configuration API

15.1 Generic information

In addition to the Web UI and the dedicated mobile application, Sky Pulse provides a comprehensive REST API accessible over the network. This API allows full programmatic configuration of all parameters exposed in the Web UI, while also supporting advanced administrative commands, including but not limited to:

- Module soft reset / reboot
- Uploading / applying a drone authentication key
- Initiating firmware upgrade procedures
- Other device management operations

NOTE! Certain configuration parameters may interact with or override one another. Incorrect or conflicting combinations can lead to unexpected behavior

It is strongly recommended to:

- Validate intended settings against observed behavior in the Web UI first
- Consult the DigiQ RF Support Team prior to production integration via the REST API

The reference Postman collection with the REST API methods can be downloaded [here \(clickable\)](#).

15.2 API description

15.2.1 Authorization

POST /cgi-bin/auth

POST /cgi-bin/auth HTTP/1.1

Host: Board IP address

Authorization: None

Accept: application/json

```
{  
  "username": "admin",  
  "password": "8ee794922d6a06ac6916cfdd1356321c"  
}
```

Note:

- 1) The JSON request string must be unfolded
- 2) The password field is md5 hashed Web UI password

Response (200 OK)

application/json

```
{  
  "status": "success",  
  "token": "98ef8a73c127ede2e6548dabea6eeec1"  
}
```

Note: The auth token is valid for 10 minutes

15.2.2 Fetching board config

GET /cgi-bin/get_config

```
GET /cgi-bin/get_config HTTP/1.1
Host: Board IP address
Authorization: None
Params: Auth token
```

Response (200 OK)

application/json

```
{
  "config": {
    "board-usage-mode": "gs",
    "radio-channel": 18,
    "radio-bandwidth": 20,
    "radio-performance-mode": "fast",
    "radio-data-density": 0,
    "board-developer-mode": 1,
    "rc-radio-silence-enable": 0,
    "rc-radio-silence-rc-channel": 13,
    "rc-radio-silence-inactive-period": 10,
    "board-ip-address": "10.0.0.2",
    "board-country": "00",
    ...
    "serial-baud-rate": 115200,
    "control-baud-rate": 115200,
    "serial-protocol": "crsf",
    "control-protocol": "sbus",
    "control-protocol-conversion": 0,
    "rc-stream-switch-enable": 0,
    "rc-stream-switch-channel": 12,
    "board-default-destination-ip": "10.0.0.5",
    "urls": [],
    "tids": []
  }
}
```

15.2.3 Updating board config

POST /cgi-bin/set_config

```
POST /cgi-bin/set_config HTTP/1.1
Host: Board IP address
Authorization: None
Params: Auth token
```

Note:

- 1) The JSON request string must be unfolded
- 2) The field names are the same as for GET /cgi-bin/get_config.sh

Response (200 OK)

application/json

```
{
  "success": "Configuration applied",
  "message": "System will reboot"
}
```

Note: The response may be absent due to the system reboot

15.2.4 Uploading drone key

POST /cgi-bin/upload_drone_key

```
POST /cgi-bin/upload_drone_key HTTP/1.1
Host: Board IP address
Authorization: None
Params: Auth token
Accept: binary
```

Note: Drone key must be 64 bytes long

Response (200 OK)

application/json

```
{
  "status": "success",
  "message": "Drone key saved successfully: 64 bytes"
}
```

This command doesn't invoke the internal parameter saving. Consider calling it before POST /cgi-bin/set_config.sh

15.2.5 Upgrading device image

POST /cgi-bin/upgrade

```
POST /cgi-bin/upgrade HTTP/1.1
Host: Board IP address
Authorization: None
Params: Auth token
Accept: binary
```

Response (200 OK)

application/json

```
{
  "status": "success",
  "message": "Firmware uploaded successfully: 7340032
bytes. Starting upgrade..."
}
```

Note: Binary is a signed software upgrade image from the DigiQ RF website

15.2.6 Fetching link capacity

GET /cgi-bin/get_link_capacity

```
GET /cgi-bin/get_link_capacity HTTP/1.1
Host: Board IP address
Authorization: None
Params: Auth token
```

Response (200 OK)

application/json

```
{
  "capacity": {
    "radio": "6500",
    "network": "3900"
  }
}
```

Note: The capacity units are Kbps

15.2.7 Trigger board reset

POST /cgi-bin/reset

```
POST /cgi-bin/reset HTTP/1.1
Host: Board IP address
Authorization: None
Params: Auth token
```

Response (200 OK)

application/json

```
{
  "success": "Board reset",
  "message": "Board reset done"
}
```

Note: The response may be absent due to the system reboot

15.2.8 Request board statistics

GET /scatter_data.json

```
GET /scatter_data.json HTTP/1.1
Host: Board IP address
Authorization: None
Params: None
```

Response (200 OK)

application/json

```
{
  "dataset1": [ ... ],
  "dataset2": [ ... ],
  "dataset3": [ ... ],
  "dataset4": [ ... ],
  "dataset5": [ ... ],
  "dataset6": [ ... ],
  "dataset7": [ ... ],
  "dataset8": [ ... ],
  "dataset9": [ ... ],
  "dataset10": [ ... ]
}
```

This call doesn't require an authorization and returns real-time statistics for the last 50 seconds. The description of datasets are provided in [Table 13](#).

Dataset	Description
dataset1	Wireless Tx bandwidth
dataset2	Wireless Rx bandwidth
dataset3	Network Tx bandwidth
dataset4	Network Rx bandwidth
dataset5	RSSI on antenna #1
dataset6	RSSI on antenna #2
dataset7	Video/data frames lost per second
dataset8	Tx Power on antenna #1
dataset9	Tx Power on antenna #2
dataset10	Unit temperature

Table 13: Description of the statistics datasets

16 Usage precautions

1. **Ensure Proper Antenna Placement:** Always ensure that the radio's antenna is properly positioned and not obstructed by any objects. Poor antenna placement can lead to weak signals, loss of communication, or reduced range.
2. **Regularly Check Battery Levels:** Before every flight, verify that both the UAV and the ground station have fully charged batteries. Low battery levels on either device can lead to unexpected power loss and potential signal disconnection during the flight.
3. **Avoid Interference:** Be aware of the surrounding electromagnetic environment, especially in areas with high-frequency interference (e.g., near radio towers, Wi-Fi networks, or other wireless communication systems). Interference can degrade the performance of the radio link and affect the UAV's control and telemetry.
4. **Monitor Signal Strength:** Always monitor the signal strength indicators on both the UAV and the Ground Unit. A drop in signal strength may indicate a connection issue, which could lead to loss of control. Make sure to operate within the effective range of the radio.
5. **Perform Range Testing:** Before conducting critical missions, perform range testing to determine the maximum communication distance between the UAV and the ground station. This helps to avoid unexpected communication loss during the flight.
6. **Check for Firmware Updates:** Keep the UAV radio firmware up to date to ensure that all communication protocols, security features, and bug fixes are implemented. Updating the firmware can help resolve known issues and improve the performance and security of the system.
7. **Ensure Proper Network Configuration:** When using the Air Unit with IP cameras or other network-dependent features, ensure that all network settings (e.g., DHCP, ONVIF protocol) are correctly configured. Incorrect network settings can result in failed connections or data loss.
8. **Use Failsafe Protocols:** Always configure and test the UAV's failsafe protocols, such as return-to-home or emergency landing procedures, in case of a communication failure. This ensures that the UAV can safely

land or return to its starting point if it loses contact with the ground station.

9. **Perform Regular System Diagnostics:** Regularly inspect the radio system for any damage, such as broken connectors, loose cables, or worn-out components. Routine maintenance and diagnostics will help identify potential issues before they cause failure during flight.
10. **Avoid Operating in Extreme Weather Conditions:** UAV radios may perform poorly in extreme weather conditions, such as heavy rain, snow, or high winds. Always check the weather forecast and avoid operating in conditions that may disrupt radio signals or jeopardize the safety of the flight.
11. **Keep System Software Secure:** Protect the UAV and Ground Unit from unauthorized access by ensuring secure communication protocols (e.g., encrypted control signals). Always verify that the system firmware and software are from trusted sources to prevent security breaches.
12. **Respect Local Regulations:** Follow all local laws and regulations regarding UAV operations, including no-fly zones and radio frequency usage. Avoid operating near airports, military zones, or restricted areas to prevent interference with other communication systems.

17 Troubleshooting

17.1 Device recovery

If the device encounters a faulty or unauthorized firmware, or if a sudden power loss occurs during a software update, the system may become corrupted and fail to initialize. This failure is indicated by the red LED (system error) during the boot process.

To address this, the module includes a de-brick functionality that enables recovery of the main firmware image. To activate the recovery process, press and hold the tactile switch while powering on the device. The red LED will remain illuminated, and a corresponding notification will indicate that the board is booting into recovery mode. Once the device has successfully entered recovery mode, you will be able to reflash it with the correct firmware. After

completing the flashing process, reboot the device, and it should initialize normally.

17.2 Fuse replacement

NOTE! This operation voids the warranty

In the event of a short circuit, the device's internal protection mechanism should have been activated, which likely resulted in fuse damage. To restore functionality, follow the steps below to replace the fuse:

1. Remove the screws and remove the case cover
2. Find the fuse holder near the power connector
3. Remove the old fuse with tweezers and install a new one
4. Assemble it back

The required part number for the fuse is **0453003.MR (Littelfuse)**

17.3 No control on the Flight Controller

If control frames are not reaching the flight controller, verify that the **Total** frame counter on the Air Unit's display is updating.

- If the counter remains at **zero** or does not update, check the Ground Unit side
- If the counter is **incrementing**, review the Flight Controller settings to confirm that the correct control protocol is selected. Ensure there is no unexpected protocol conversion enabled on the Air Unit side

If this part works, move on to checking the Ground Unit. Check the **RxBW** display indicators: if **Serial** RxBW remains zero, it means it didn't receive any control frames in the first place. In such a case, there might be a configuration or wiring issue with the Telemetry port.

17.4 Downlink telemetry works, but no parameters loaded in QGroundControl

Some camera models may pick the IP address reserved by the Ground Unit. Ensure that this is not the case in your scenario.

17.5 Can't ping Air Unit from the Host PC

This is expected behavior: all devices form a restricted/isolated network in which inter-node ping (ICMP echo) is not permitted. For details on permitted data streams and communication flows, refer to [section 7](#).

17.6 No video / telemetry stream

The following steps can help diagnose and resolve video transmission issues.

1. **Check radio operability:** Confirm that the blue LED is blinking, indicating that transmission is active.
2. **Check Wireless Connectivity:** Verify connectivity using the **TxBW/RxBW** indicators as described in the previous section. Ensure that the wireless subsystem is receiving data. Depending on the settings, the bandwidth should be within the range of **700-3000 Kbps**
3. **Verify redundancy mode, bandwidth and channel:** If the connection is not established correctly, check that both devices are operating on the same bandwidth and channel. Make sure 'Focus On' is set to the same value on both units.
4. **Ensure the drone keys match on both devices:** Use the Web UI or mobile application to generate and upload matching security keys
5. **Check Network LED Activity:** If the connection is configured correctly, confirm that the **Network LED** indicator is blinking. If it is not, proceed with the following checks:
 - Ensure the **Ethernet cable** is in good condition and securely connected
 - Verify the connection with the host program by **pinging the Ground Unit**

- If the ping is successful, the **H.265 video stream** should be available at **UDP port 5600** in your program
6. **Software tweaks:** Certain cameras require a specific configuration for RTSP streaming. To improve auto-detection, disable audio streaming if it is enabled. If the issue persists, manually add the stream by referring to the camera's manual to obtain the correct RTSP video URL, then enter it in the **Static RTSP Streams** section under the **Configuration** tab in the Web UI.
 7. **Static stream timing issues** The static stream acts as a backup measure within the stream auto-detection feature. It is only taken into account if it is already correctly configured and accessible at the time auto-detection is initiated. When this condition is met, the stream is successfully added to the list. Otherwise, under the current implementation, a disabled or incorrectly configured static stream is silently ignored.
 8. **Windows firewall issues** Ensure that all UDP ports used for video, custom data, or for MAVLink (UDP 14550) are allowed by the Windows Defender. Refer to [subsection 14.7](#) for the guidance.
 9. **Camera stream type:** Double-check the camera config when selecting the video source in your application: some cameras stream h.264 by default instead of h.265, and your QGroundControl may not be able to decode it.
 10. **Missing packages on Linux:** ensure you have the gstreamer package installed. Refer to the [official guide](#).

17.7 Transmit power is low

All radio modules are checked on the factory, including the peak transmit power. Consider switching the device to Developer mode to increase the transmit power and enable the experimental features. Ensure that you meet the regulatory requirements!

18 Warranty

18.1 14-Day Return & Refund

A Return & Refund Service request may be submitted under the following conditions:

1. The request is made within **fourteen (14) calendar days** from the date of product receipt, provided that:
 - The product has no manufacturing defect.
 - The product has not been activated and remains in new or like-new condition.
2. The request is made within **fourteen (14) calendar days** from the date of product receipt if a **manufacturing defect** is present.

18.2 Exclusions from Return & Refund Service

Return & Refund Service will **not** be granted under the following conditions:

- The request is submitted **beyond fourteen (14) calendar days** from the date of product receipt.
- The returned product does not include all **original accessories, attachments, or packaging**, or contains items that are not in new or like-new condition (e.g., cracks, dents, or scratches).
- A **valid proof of purchase** (receipt or invoice) is not provided, or the provided documentation is suspected of being **forged or altered**.
- The product has been **modified or used improperly**, leading to damage. This includes exposure to **moisture**, entry of foreign objects (e.g., water, oil, sand), or **incorrect installation or operation**.
- Product labels, **serial numbers, waterproof seals, or other identifying marks** show signs of **tampering or alteration**.
- Damage is caused by **external factors** beyond control, such as **fire, floods, high winds, or lightning strikes**.
- The product is **not returned** to DigiQ RF within **fourteen (14) calendar days** after the Return & Refund Service request has been approved.

- Any other circumstances as outlined in this policy.

18.3 1-Year Warranty Repair

If a product malfunctions within the warranty period, warranty repair service may be requested by contacting the [DigiQ Support Team](#). To initiate the service, a **valid proof of purchase, receipt, or order number** must be provided.

Additional charges may apply for services that are **not covered** under this limited warranty. For location-specific details, please contact [DigiQ Support Team](#).

Warranty repair service is only available in **DigiQ RF service regions** corresponding to the original purchase location.

18.4 Exclusions from Warranty Repair Service

The warranty repair service will **not** be provided under the following conditions:

- **Damage caused by pilot error**, including crashes or fire damage unrelated to manufacturing defects.
- **Unauthorized modifications, disassembly, or shell opening** that do not follow official instructions or manuals.
- **Improper installation, incorrect use, or non-compliant operation** that does not align with official guidelines.
- **Servicing performed by unauthorized service providers.**
- **Modifications to internal circuits or mismatched/misused batteries and chargers.**
- **Operation in extreme weather conditions**, including strong winds, rain, or sand/dust storms.
- **Operation in areas with high electromagnetic interference**, such as **mining zones, near radio transmission towers, high-voltage lines, or substations.**
- **Interference from high-power wireless devices**, including transmitters, jammers, and high-power Wi-Fi signals.

- **Use of unauthorized third-party components**, leading to reliability or compatibility issues.
- **Operation with a low-charged or defective battery** that compromises system functionality.
- **Products with altered or removed identification labels.**

19 Contact information

Email / Support: info@digiq-rf.com
Website: www.digiq-rf.com