SprintLink

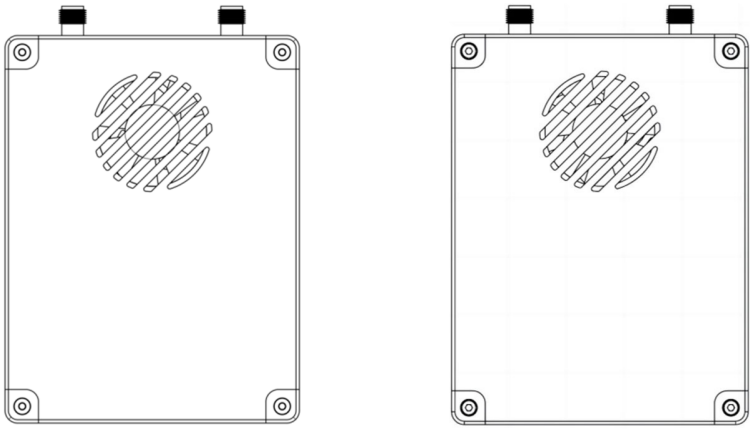
User Manual

www.Sprintlink.cn

Contents

1. Package Contents

Air Unit & Ground Unit

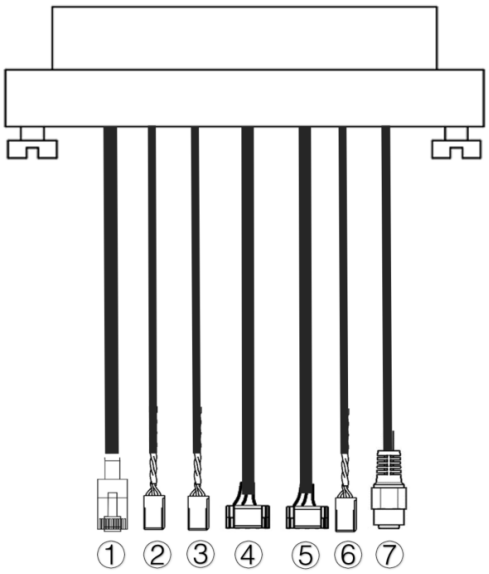


Air unit antenna × 2

Ground unit antenna × 2

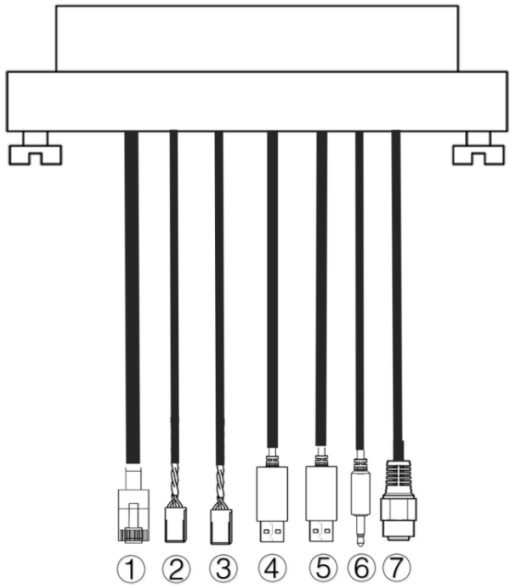
Note: ground unit antenna can be replaced by directional patch antenna according to customer requirement.

Air unit cables



No.	Interface
1	Ethernet
2,3	S.BUS, as shown in picture, the 1st pin from the left of dupont connector is S.BUS signal, the 3rd is G.
4,5	Telemetry serial, as shown in picture, the 2nd pin from the left of GH1.25 connector is Rx, the 3rd is Tx, the 6th is G. (TTL by default, RS232/422 alternative)
6	PPM, as shown in picture, the 1st pin from the left is PPM signal, the 3rd is G.
7	Power

Ground unit cables



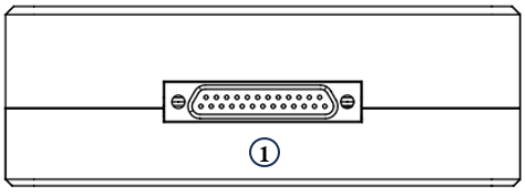
No.	Interface
1	Ethernet
2,3	S.BUS, as shown in picture, the 1st pin from the left is S.BUS signal, the 2nd is 5V+, the 3rd is G.
4,5	Serial-USB(TTL-USB by default, RS232/422 alternative)
6	PPM
7	Power

2. Product Description

2.1. Parameters

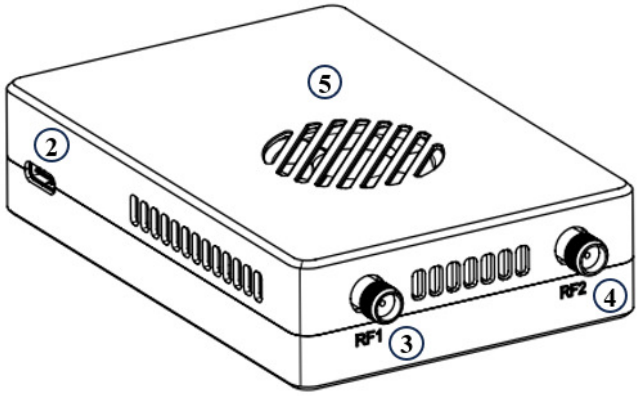
Parameters	Value
Frequency	2410~2478MHz
Band width	10MHz (uplink), 10MHz (downlink)
Power	24.85dBm
Modulation	OFDM
Constellation	BPSK, QPSK, 16QAM
FEC	LDPC (1/2, 2/3, 3/4, 5/6)
Duplex	TDD
Downlink throughput	2.3Mbps ~ 8bps
Uplink throughput	600kbps
Encryption	AES 256
Interface	Ethernet, USB, TTL, RS232, RS422, PPM/S.BUS
Power consumption	16.8W(air unit); 8.88W(ground unit)
Latency	<300ms (Camera dependent)
Dimension	92.5*70.3*25mm
Weight	198g
Rated voltage	DC 12V~26V
Working temperature	-40°C ~60°C

2.2. Air Unit Interfaces



① J30J connector

It's a J30J-25 pin connector providing power/Ethernet/serial/PPM/S.BUS.



② USB Port

Use for debugging.

③ RF1 Port

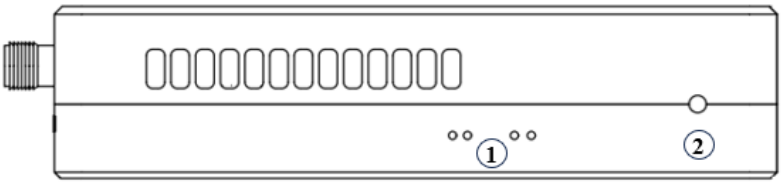
Connect the 1st air unit antenna to this port.

④ RF2 Port

Connect the 2nd air unit antenna to this port.

⑤ Fan Ventilation Outlet

Don't block this fan ventilation outlet to ensure effective cooling.



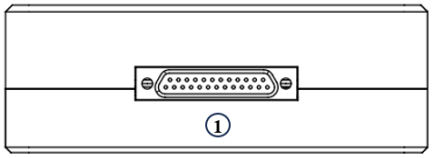
① LEDs

Four Led Two on the left side (1-2) are radio link (UL/DL) indicator. The UL/DL LEDs are only used for ground unit but during binding flashes on both air and ground side. Two led on the right sides are ethernet link indicator.

② Binding button

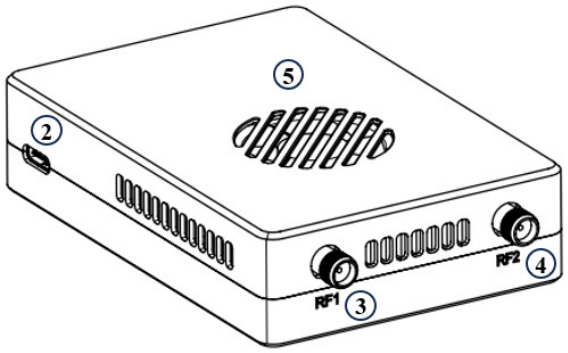
Press-and-hold this button to perform the binding operation. Bound already before factory delivery, no need to bind again by user.

2.3. Ground Unit Interfaces



① J30J connector

It's a J30J-37 pin connector providing power/Ethernet/serial/PPM/S.BUS.



② USB Port

Use for debugging.

③ RF1 Port

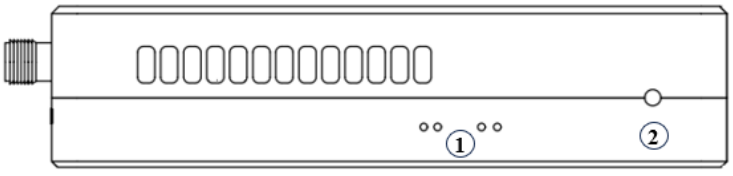
Connect the 1st Ground unit antenna to this port.

④ RF2 Port

Connect the 2nd Ground unit antenna to this port.

⑤ Fan Ventilation Outlet

Don't block this fan ventilation outlet to ensure effective cooling.



① LEDs

Two Four Led Two on the left side (1-2) are radio link (UL/DL) indicator. The UL/DL LEDs are only used for ground unit but during binding flashes on both air and ground side. Two led on the right sides are ethernet link indicator.

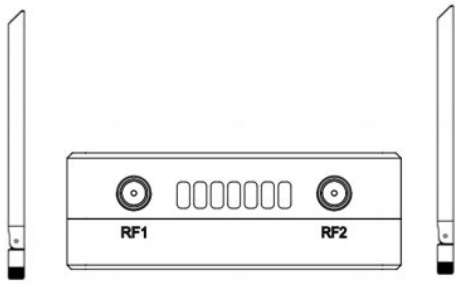
② Binding button

Press-and-hold this button to perform the binding operation. Bound already before factory delivery, no need to bind again by user.

3. System setup

3.1. Air Unit Installation

3.1.1. Antenna installation



Screw the air unit antennas on the RF ports.

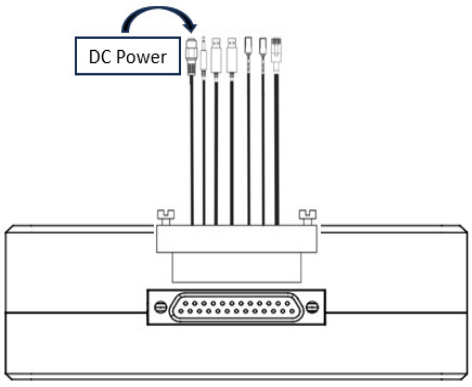
Note:

(1) To avoid equipment damage, install antennas before powering on the units.

(2) When mount air unit to drone, make sure the antennas are not both blocked by any part of the drone.

(3) Both antennas need to be installed.

3.1.2. Power supply

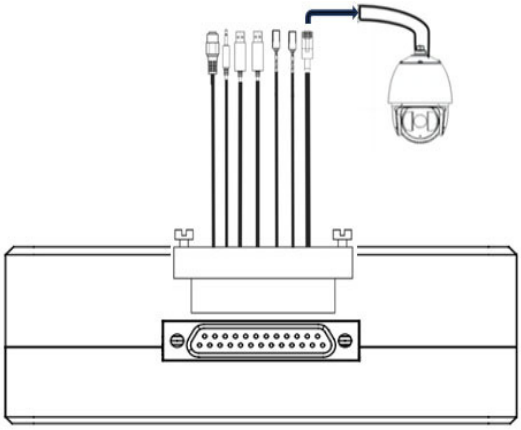


Insert the J30J connector to the J30J port of air unit and connect battery/power source to the power port at the other end.

Note:

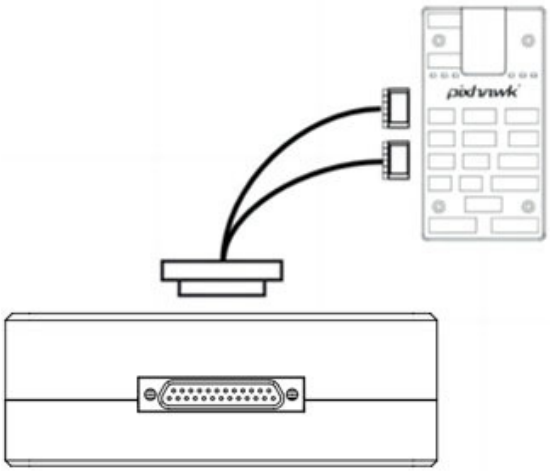
To avoid equipment damage, install antennas before powering on the units.

3.1.3. Connect camera



Connect the video output port of the IP camera to the Ethernet video input port of the air unit.

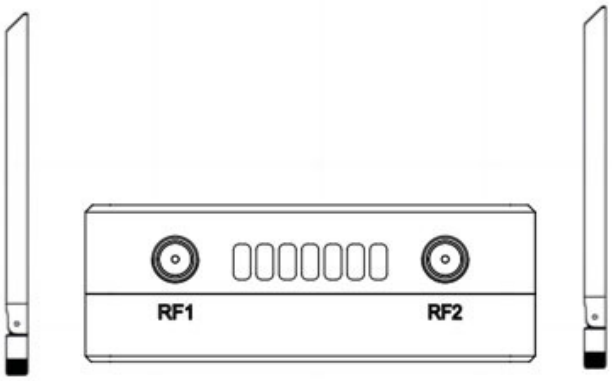
3.1.4. Connect flight controller (RC & telemetry)



Insert the J30J connector to the J30J port of air unit and connect the other end of the serial cable to the telemetry port of a flight controller and the RC cable to the PPM/S.BUS port of a flight controller.

3.2. Ground Unit Installation

3.2.1. Antenna installation



Screw the ground unit antennas on the RF ports.

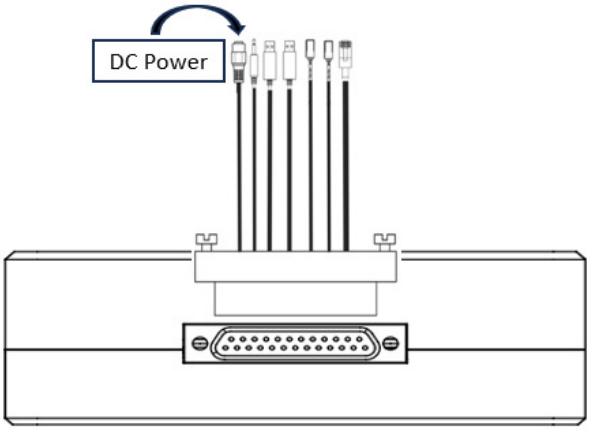
Note:

(1) To avoid equipment damage, install antennas before powering on the units.

(2) Both antennas need to be installed.

(3) Adjust the antenna to be vertical to the ground during operation.

3.2.2. Power supply

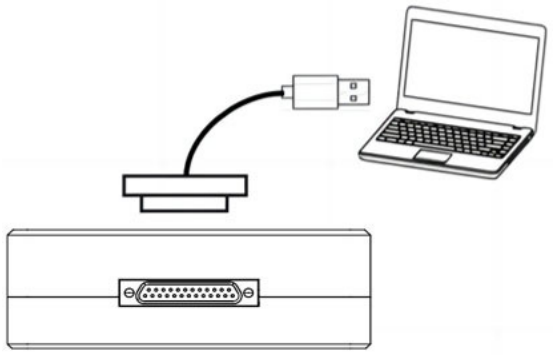


Insert the power connector of a power source into the power port of the ground unit

Note:

To avoid equipment damage, install antennas before powering on the units.

3.2.3. Telemetry connection



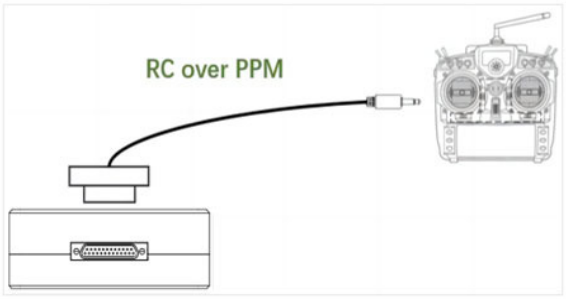
Insert the J30J connector to the J30J port of ground unit and connect the other end of supplied serial cable to the telemetry port of the ground control station.

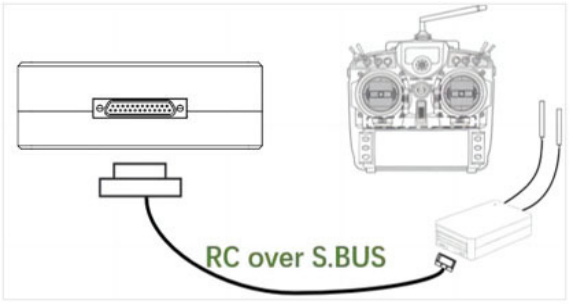
Note:

(1) Ensure the baud rate of ground station and the baud rate of Taisync module are configured to be the same.

(2) Ensure the serial cable sequence matches the interface definition of Taisync module.

3.2.4. Connect remote controller





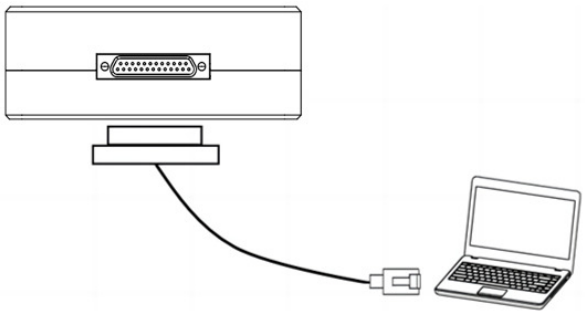
Using PPM mode: Insert the trainer port connector of the supplied RC cable to the trainer port of a remote controller and Insert the J30J connector to the J30J port of ground unit. Using S.BUS mode: Insert the J30J connector to the J30J port of ground unit, connect the other end to a S.BUS receiver, and the S.BUS receiver communicates with the remote controller wirelessly.

Note:

(1) Ensure the RC cable's pin-out matches the interface pin-out of Taisync module.

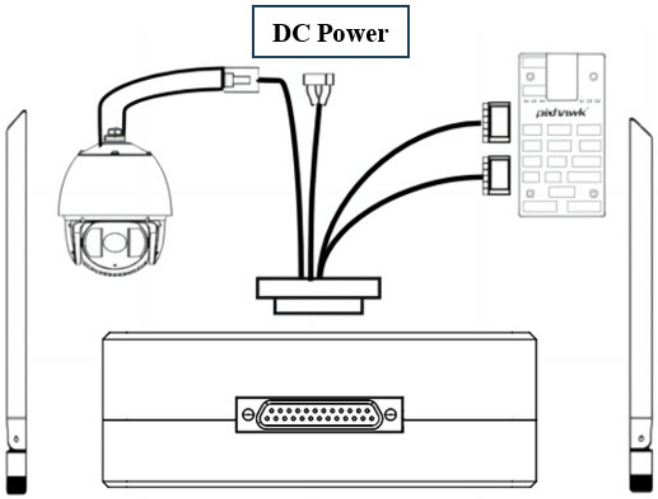
(2) If a S.BUS receiver is used, there should be enough guard band between the working frequency band of the receiver and the working frequency band of Taisync module.

3.2.5. Setup video output



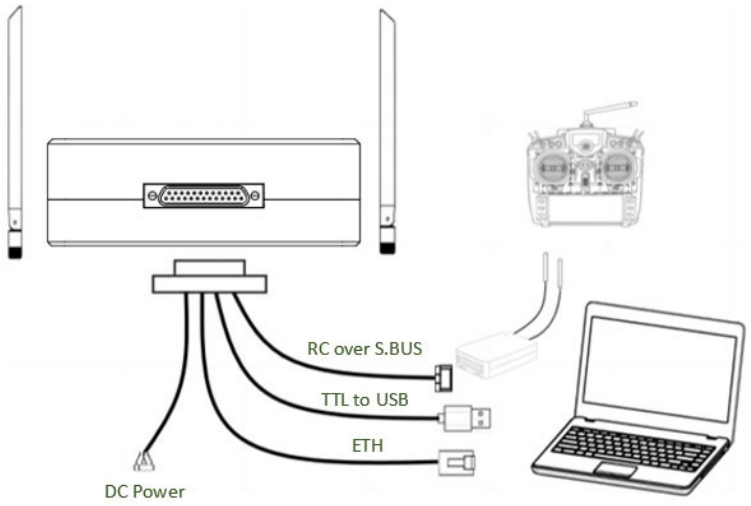
Insert the J30J connector to the J30J port of ground unit and connect the other end of supplied Ethernet cable to PC or the ground control station. Make sure IP addresses of camera and PC are in the same subnet.

3.3. Use Taisync System



Air side block diagram

1. Install antennas to the air unit.
2. Connect IP camera output to Ethernet port of the air unit.
3. Connect the PPM/S.bus port of the flight controller to the RC port of the air unit.
4. Connect the telemetry port of the flight controller to the serial port of the air unit.
5. Connect 9V~26V DC power source to the power port of the air unit and turn it on.
6. If the latest firmware is needed, can upgrade through Web UI. For further details go through the next topic Device management.



Ground side block diagram

1. Install antennas to the ground unit.
2. Configure the remote controller to be in trainer mode. If PPM mode is used, connect the remote controller interface of the ground unit to the trainer port of the remote control. If S.BUS mode is used, a S.BUS receiver needs to be connected to the ground unit using supplied cable, and the connection between the S.BUS receiver and the remote controller need to be established.
3. Connect the USB port of a ground control station to the serial port of the ground unit through a Serial-2-USB adaptor to use telemetry link.
4. Connect the Ethernet port of a GCS or PC to the RJ45 connector of ground unit to get IP video/telemetry (telemetry over Ethernet).
5. Turn on the ground unit.
6. If the latest firmware is needed, can upgrade through Web UI. For further details go through the next topic Device management.
7. After downlink and uplink are established, both LEDs of the ground unit will be on.

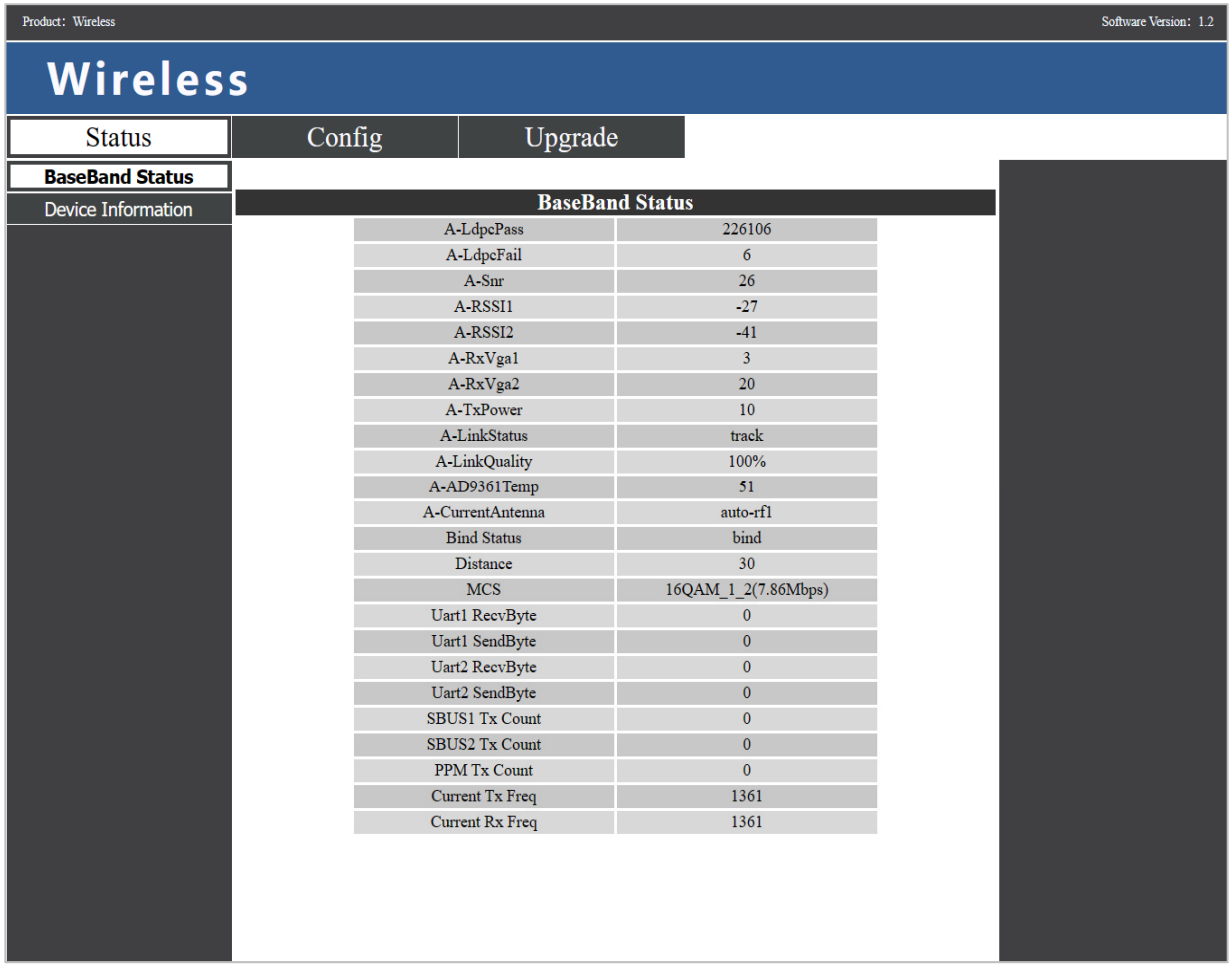
4. Device Management

Both module Air and Ground has web-page management interface. Directly connect PC to air unit/ground unit by Ethernet cable, set PC IP address as 192.168.199.33/24, and visit 192.168.199.18 (air unit)/192.168.199.16 (ground unit) through web-page.

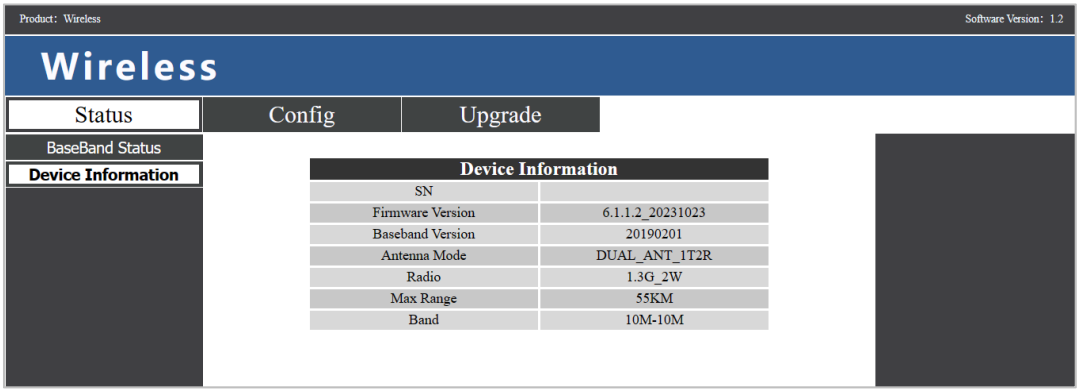
4.1. Manage Air Unit

After accessing module successful through web UI, one can check the baseband status and do the required configuration and firmware upgradation. Here is the rundown of each function.

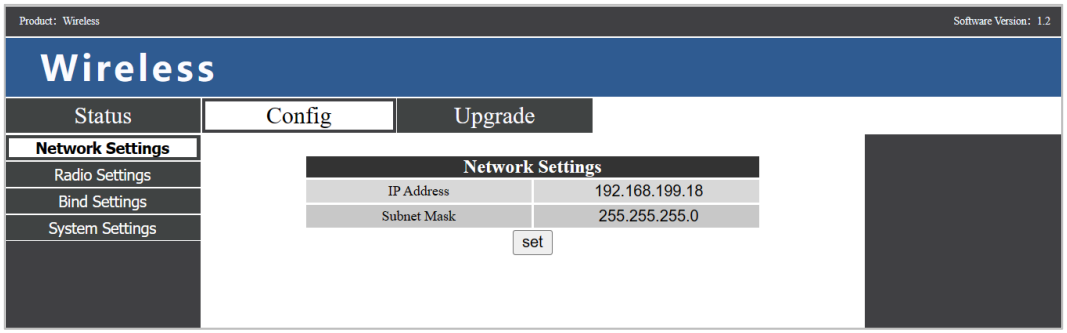
Status→Baseband status, there's detailed real-time information of Air unit like RSSI, SNR, Tx Power, LDPC stats, telemetry stats, etc.



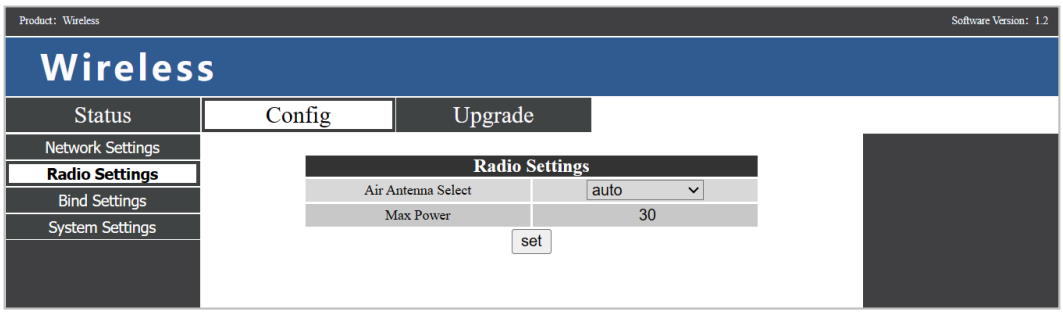
Status→Device information, there's information of SN and firmware version, etc.



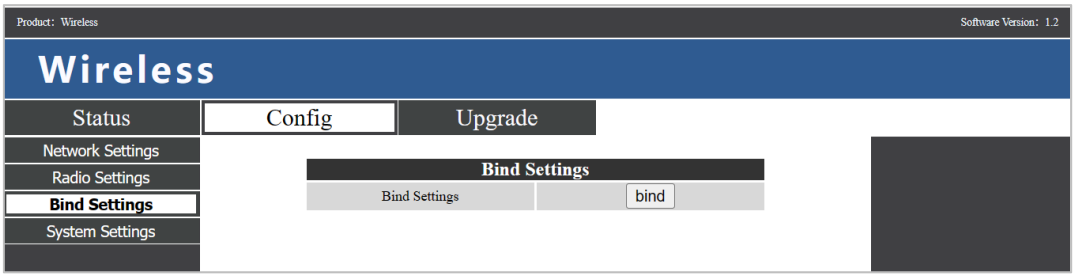
Config→Network settings, there's IP address of unit itself, it can be changed as per user's request.



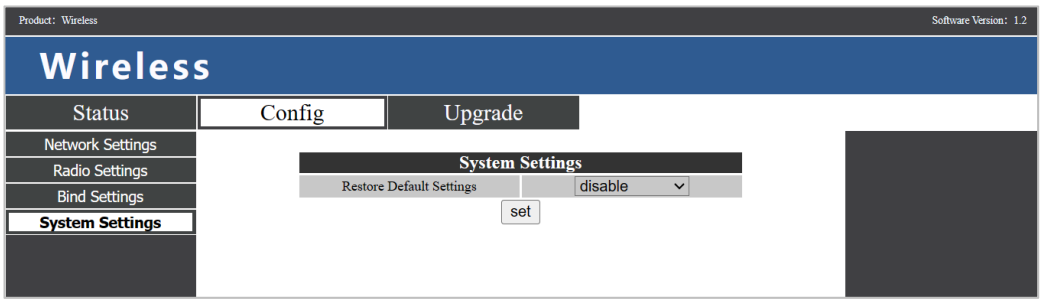
Config→Radio settings, there are options of auto/antenna1/antenna2 for air antenna select, and transmitting power can be set as per user request.



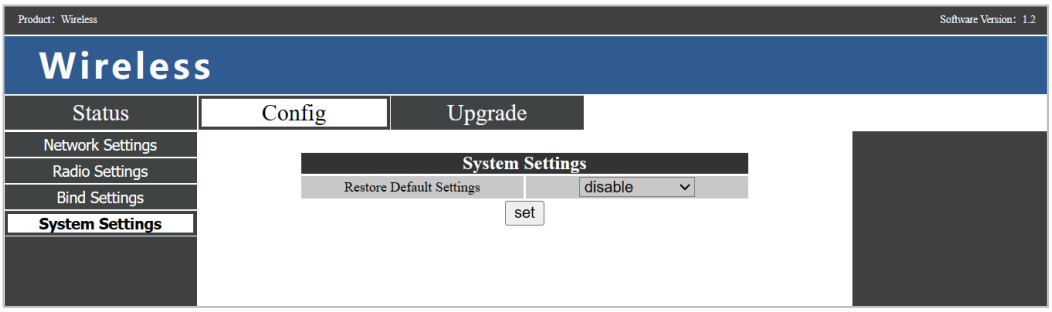
Config→Bind setting, bind process can be triggered by clicking bind instead of physical bind button.



Config→System settings, restore unit to factory settings by “enable”.



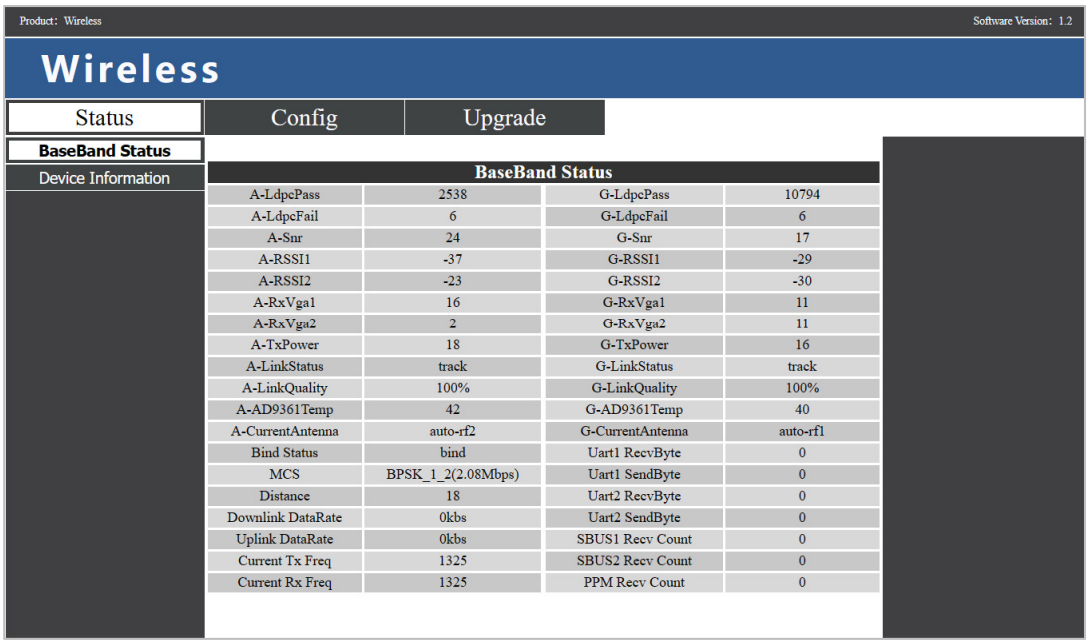
Upgrade→Upgrade, browse and select file to be upgraded first, then click “send” to trigger the process.



4.2. Manage Ground Unit

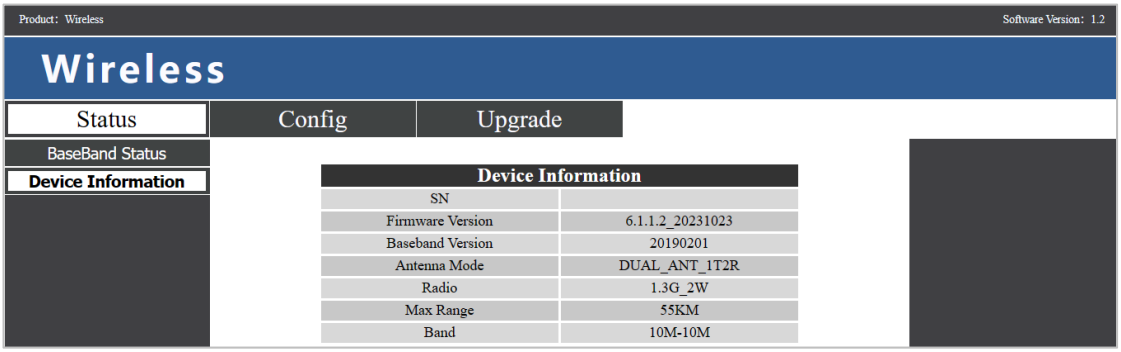
After accessing module successful through web UI, one can check the baseband status and do the required configuration and firmware upgradation. Here is the rundown of each function.

Web UI→ Status→ Baseband status, there’s detailed information of Air and Ground units like RSSI, SNR, Tx Power, LDPC stats, telemetry stats, etc.

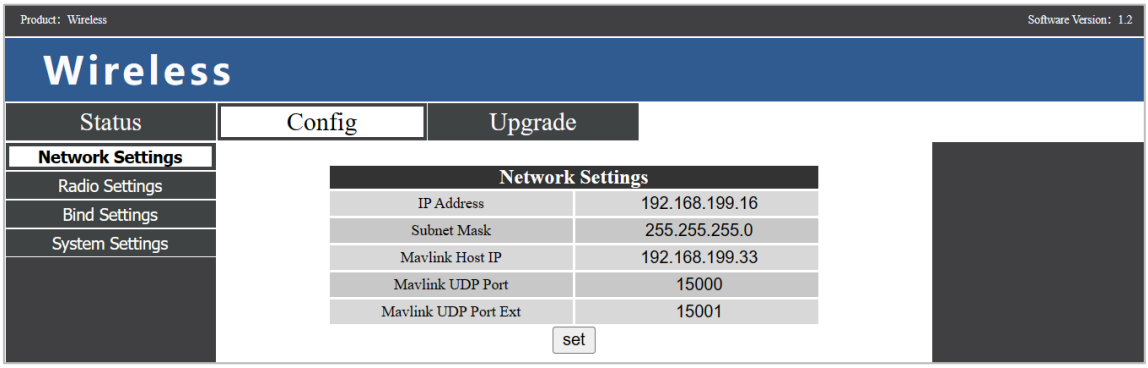


A-LdpcPass	2538	G-LdpcPass	10794
A-LdpcFail	6	G-LdpcFail	6
A-Snr	24	G-Snr	17
A-RSSI1	-37	G-RSSI1	-29
A-RSSI2	-23	G-RSSI2	-30
A-RxVga1	16	G-RxVga1	11
A-RxVga2	2	G-RxVga2	11
A-TxPower	18	G-TxPower	16
A-LinkStatus	track	G-LinkStatus	track
A-LinkQuality	100%	G-LinkQuality	100%
A-AD9361Temp	42	G-AD9361Temp	40
A-CurrentAntenna	auto-rf2	G-CurrentAntenna	auto-rf1
Bind Status	bind	Uart1 RecvByte	0
MCS	BPSK_1_2(2.08Mbps)	Uart1 SendByte	0
Distance	18	Uart2 RecvByte	0
Downlink DataRate	0kbs	Uart2 SendByte	0
Uplink DataRate	0kbs	SBUS1 Recv Count	0
Current Tx Freq	1325	SBUS2 Recv Count	0
Current Rx Freq	1325	PPM Recv Count	0

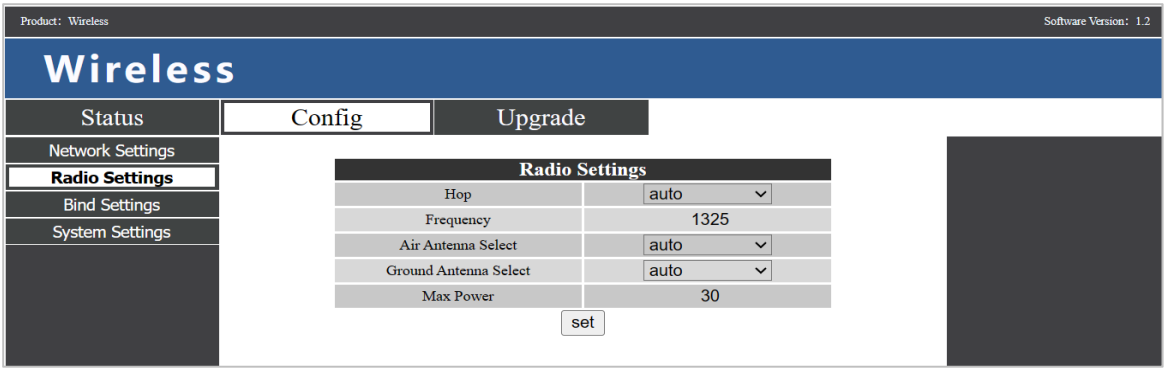
Web UI→ Status→ Device information, there's information of SN and firmware version, etc.



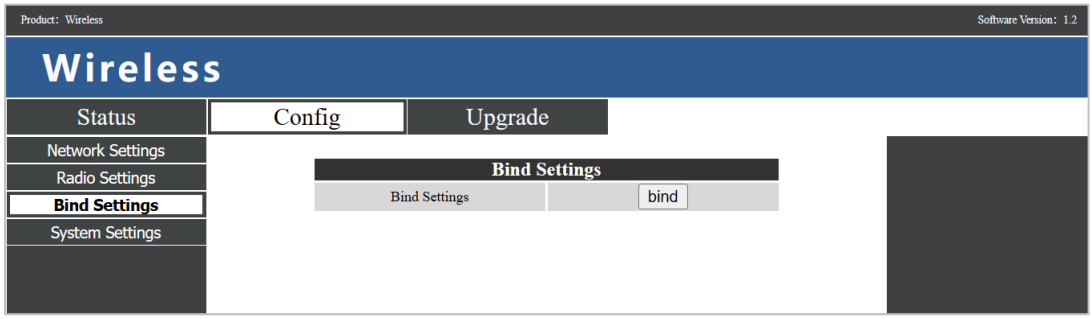
Web UI→ Config→ Net settings, there're IP address of unit itself, telemetry destination IP address and UDP ports, all of these parameters can be changed as per user's request. For instance, if user use physical telemetry 1 cable, and input the mavlink host IP as 192.168.199.33 and the mavlink UDP port (mavlink UDP port ext is for physical telemetry 2 cable) as 15000, then user need to set the GCS IP address as 192.168.199.33 and UDP telemetry link listening port as 15000.



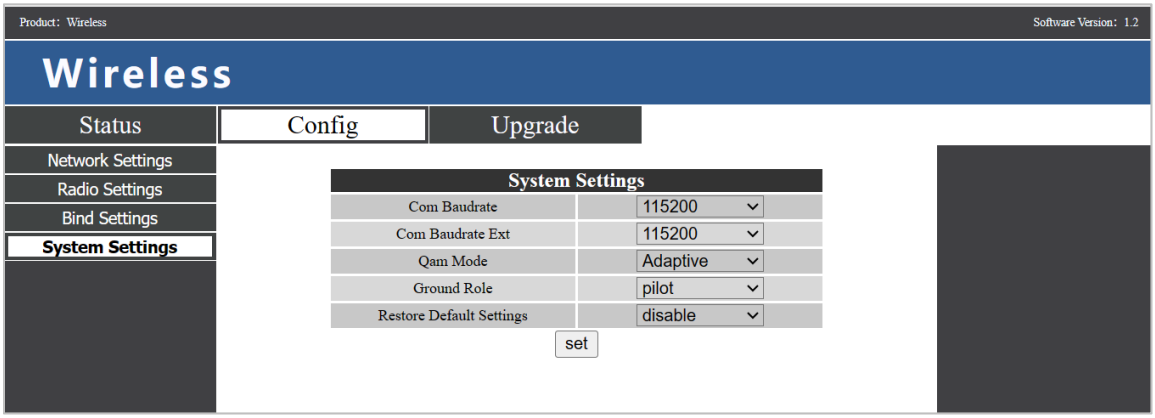
Web UI→ Config→ Radio settings, there are hop, frequency, Air/Ground antenna selection and transmitting power can be set. When hop is auto, user do not need to/cannot set frequency, system dynamically selects the best frequency to use by itself, in other words, when hop is manual, user can set frequency manually. There are options of auto/antenna1/antenna2 for air/ground antenna selection. Transmitting power can be set as per user request. Hop/Frequency/Air antenna select only can be changed when the radio link between the air unit and ground unit is securely established.



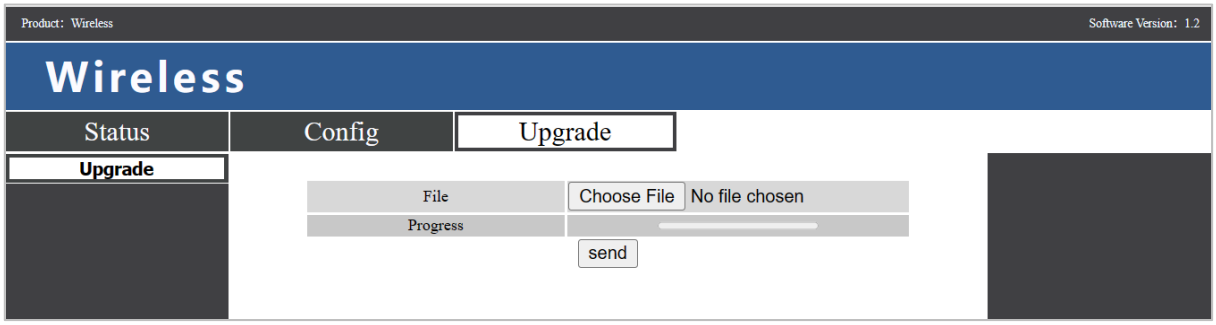
Web UI→ Config→ Bind setting, bind process can be triggered by clicking bind instead of physical bind button.



Web UI→ Config→ System settings, baud rate for U1/U2 two serial ports can be set. When QAM mode is set as adaptive, unit will dynamically change modulation scheme based on real-time signal quality (SNR). Role of pilot has bi-directional transmission while observer only has downlink data.



Web UI→ Upload→ Upload, browse and select file to be upgraded first, then click send to trigger the process.



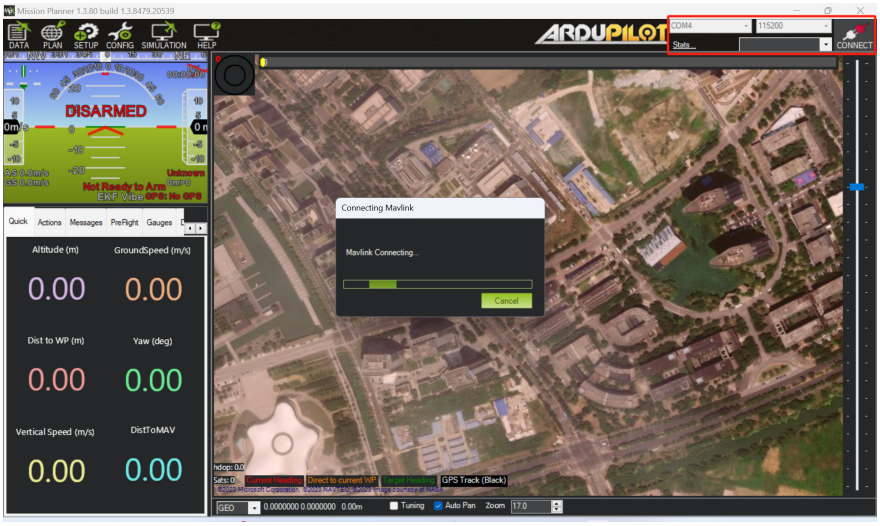
5. Applications

5.1. Telemetry connection

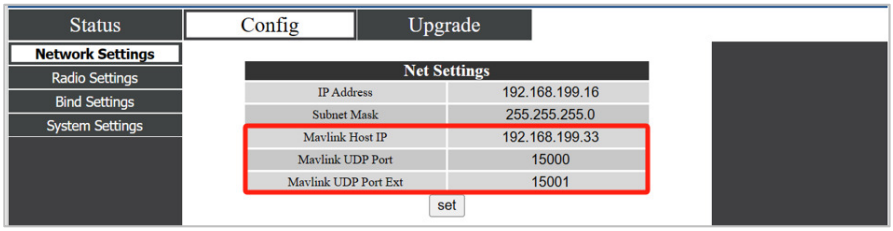
At the Air side telemetry Port of air unit connects “TELEM1” Port of a flight control (Pixhawk4). Getting telemetry data through QGC and MP are described below.

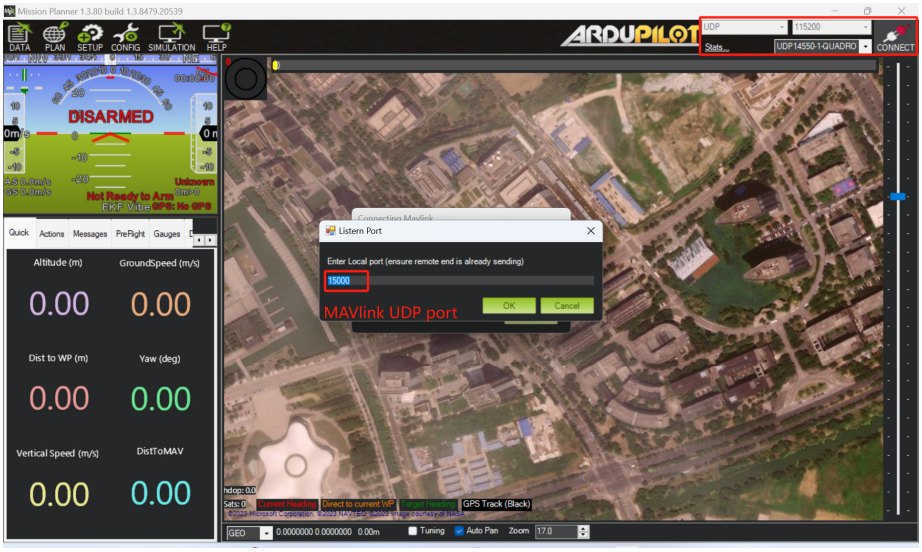
5.1.1. Telemetry over Mission Planner (MP)

I. **Telemetry data through Serial (TTL to USB)**: Connect the TTL to USB connector of the ground unit to the USB port of the PC. As always, it's compulsory to have the same communication baud rate. Open MP, select the serial port, enter the baud rate, and click on connect as circled in the screenshot below



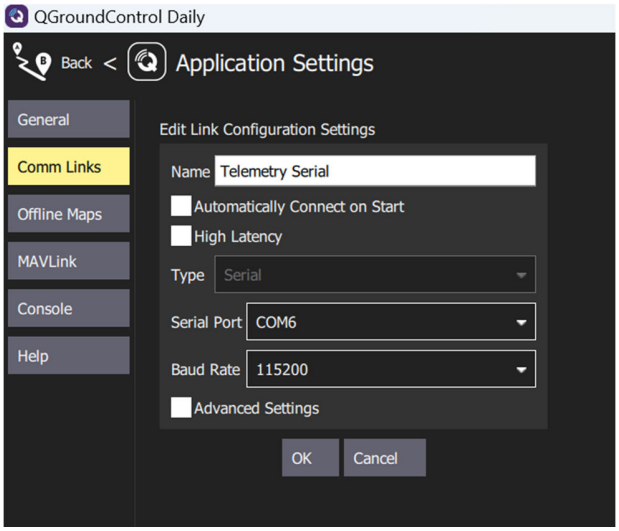
II. **Telemetry data through UDP:** Connect the ethernet connector of the ground unit to the ethernet port of the PC. Select the UDP and enter the baud rate and click on connect. The destination address (MavLink Host IP) should be the IP address of the PC and enter the UDP port the same as MavLink UDP port. i.e. 15000.

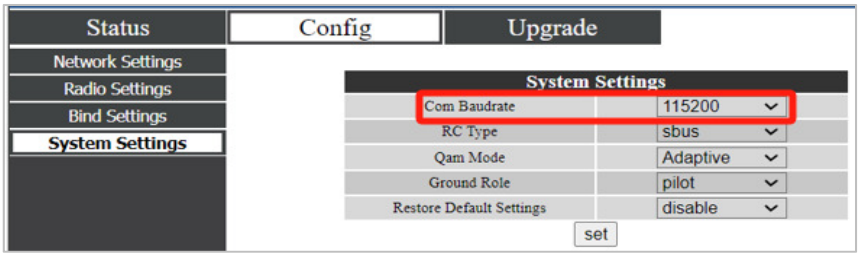




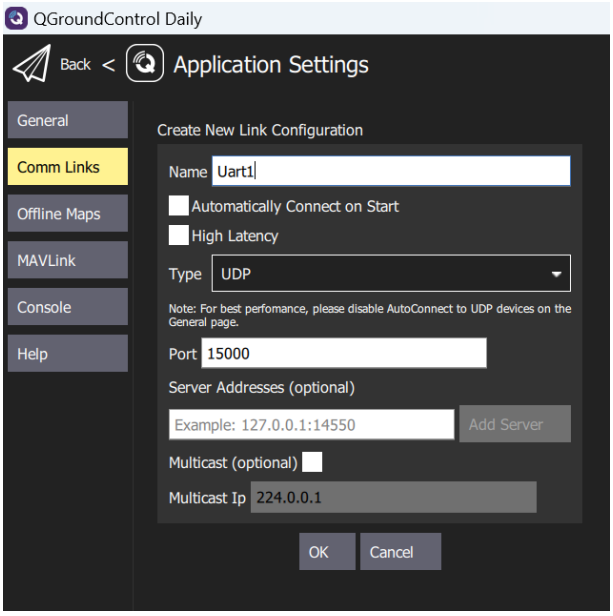
5.1.2. Telemetry over QGroundControl (QGC):

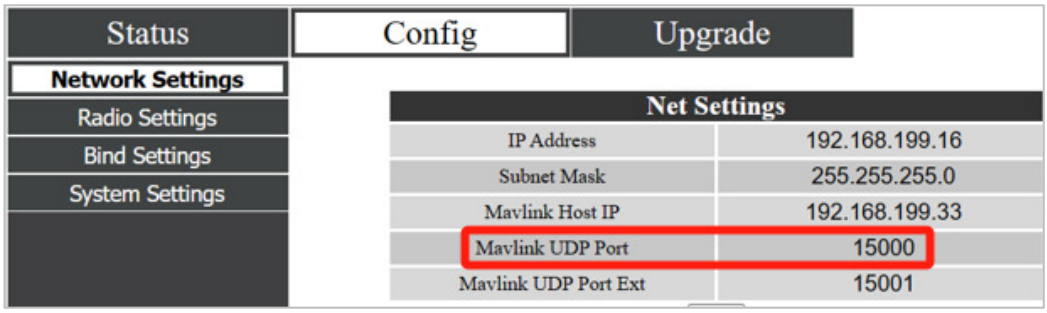
I. **Telemetry data through Serial (TTL to USB)**: For telemetry data go to the QGC **application settings → Comm Link → Add** and enter the name select the Type Serial select the serial port of the PC connected to the telemetry port of the ground unit and the Baud Rate same as web UI system settings and click ok.





II. **Telemetry data through UDP:** For telemetry data go to the QGC **application settings → Comm Link → Add** and enter the name select the Type UDP enter the MavLink UDP port the same as web UI Network settings and click ok.



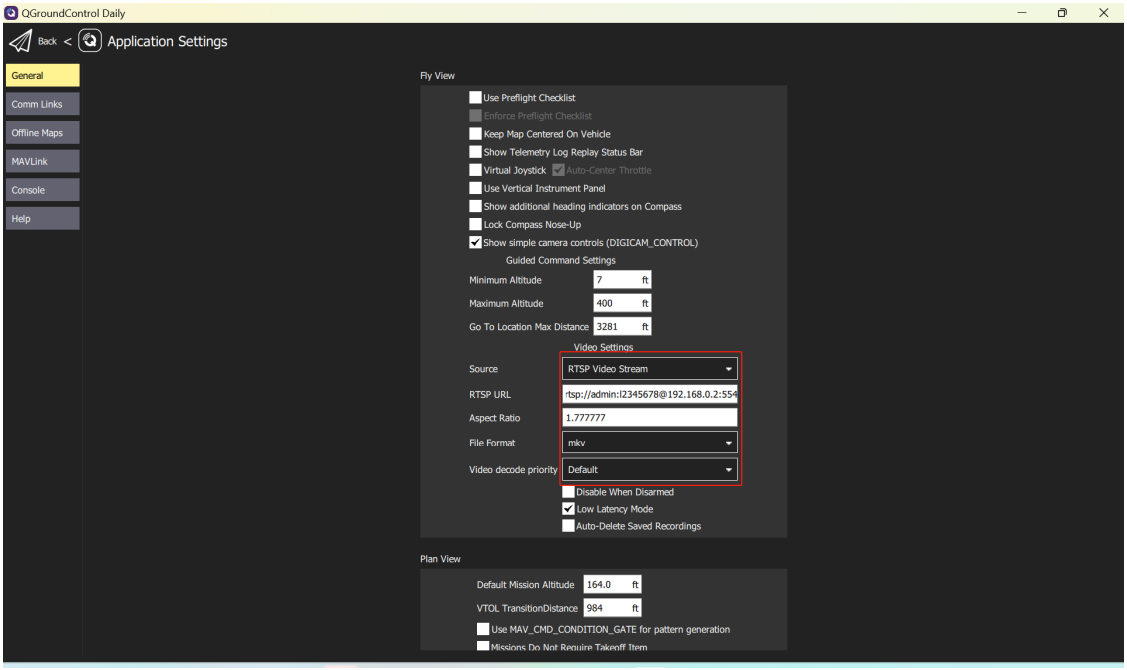


5.2. Get live video

Get real-time video through RTSP on media players like QGC/VLC. Make sure IP addresses of PC and camera are in the same subnet.

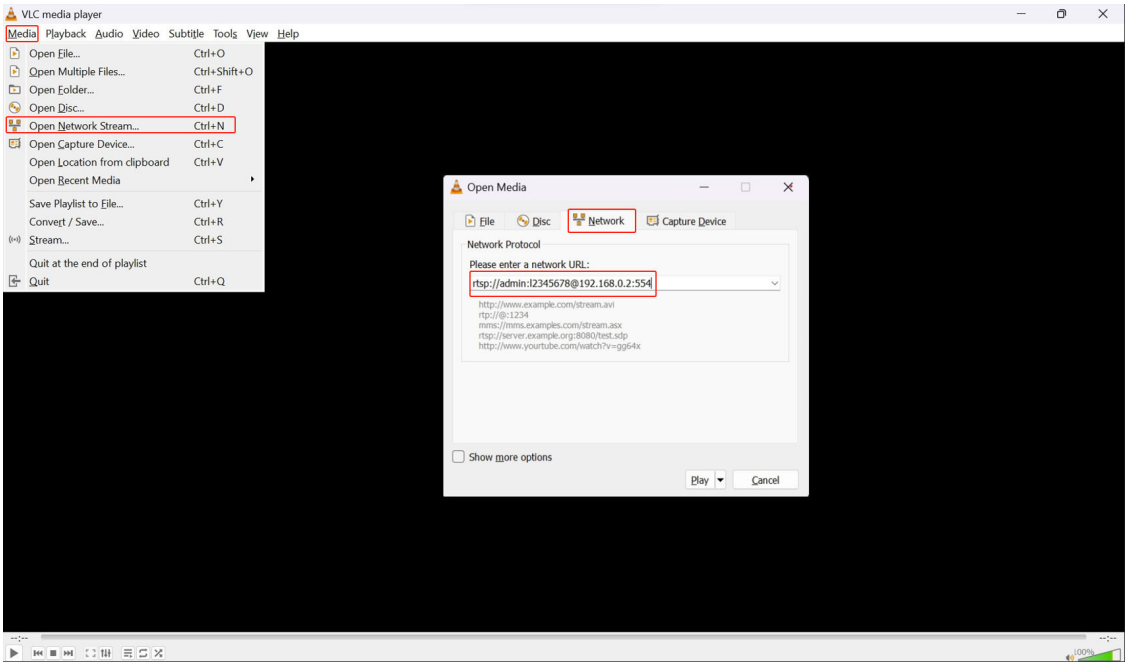
5.2.1. Getting Video through QGC

For real time video go to the QGC **application settings → General → Video settings.** Select RTSP video stream from the source dropdown and RTSP URL i.e., rtsp://admin:l2345678@192.168.0.2:554 here admin means the username, l2345678 means the password, and 192.168.0.2 is the IP address of the camera.



5.2.2. Getting Video through VLC

Open VLC go to media on left top corner and select open network stream from the dropdown menu a popup window will open go to network and enter the RTSP URL i.e., rtsp://admin:l2345678@192.168.0.2:554 here admin means the username, l2345678 means the password, and 192.168.0.2 is the IP address of the camera.



6. Notes

6.1. Link performance

- RF cable connector/Antenna connector check

Before flight, check if the antennas are connected to the modules. Running module without antennas connected results in very short range and can potentially damage the module. It is recommended to check the connection of all RF connectors. Loose connection can degrade the range significantly.

- Antenna placement

Place the two air antennas so that no matter what position the drone is, at least one antenna is not blocked by the payload from the ground station.

If the drone will fly in full throttle, it will lean forward. Install the air antenna so that it is close to be vertical to the ground when the drone moves forward in full throttle.

- Battery level

The reception performance will degrade if the battery runs low, even though it might still power the units up.

6.2. RC link & remote controller

The RC link of Taisync module supports the PPM and S.BUS protocols. If the PPM protocol is used, you need to configure the remote controller to PPM mode and turn off the wireless transmission of the remote controller. If the S.BUS protocol is used, the wireless working frequency of the receiver connected to the remote controller must work in different frequency bands with the working frequency of Taisync module and have a certain isolation guarantee.

If you do not use the RC link of Taisync module, you should pay attention to the remote link working frequency of the remote controller when using the RC link of the remote controller. If it is in the same frequency band as the working frequency of Taisync module, it will cause interference with each other.

Avoid interference with Taisync module by the wireless link of the remote controller or receiver when using Taisync system.

6.3. Firmware update

Upgrade files: FPGA upgrade file for air unit, FPGA upgrade file for ground unit, MCU1 upgrade file for air unit, MCU1 upgrade file for ground unit, MCU2 upgrade file for air unit, MCU2 upgrade file for ground unit.

Upgrade files are upgraded through Web UI. During the upgrade, the power cannot be powered off and the normal connection of USB cable should be ensured at the same time. If the upgrade fails, the power cannot be powered off, please try to upgrade again directly. Otherwise, it will be necessary to return to us to use special burning tools for firmware burning.

6.4.Bind operation

“Bind” is used to pair an air unit with ground unit.

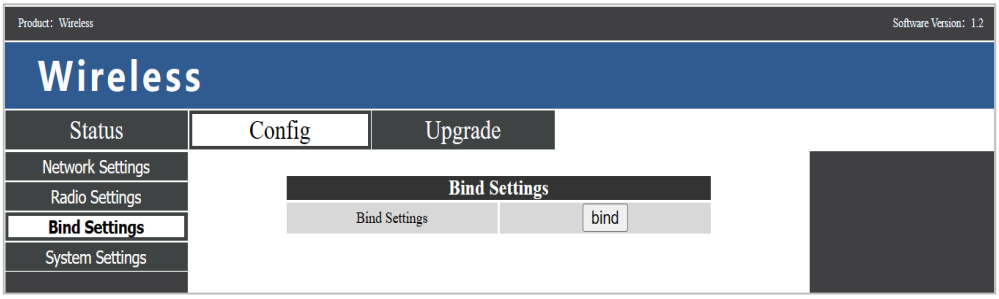
There are three methods to pair an air unit and a ground unit these are Bind through physical bind button/Trigger Bind from bind settings through web UI/Binding through Color ID.

6.4.1. Bind through physical bind button

1. Power on both air unit and ground unit.
2. Press the physical bind button of the air unit, last 5s+. The LED light next to the bind button flashes green, indicating that it is in the binding state.
3. Press the physical bind button of the ground unit, last 5s+. The LED light next to the bind button flashes green, indicating that it is in the binding state.

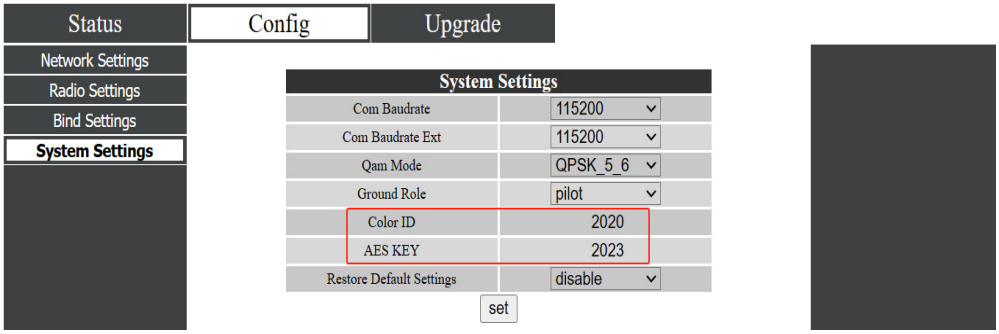
6.4.2. Trigger Bind from bind settings through web UI

1. Under configuration page of both Air and Ground units go to bind settings and trigger the Bind button.



6.4.3. Binding through Color ID

1. Under configuration page of both Air and Ground units go to system settings and input the value for color ID (0-255) and AES key (256bits/32 characters). Units having the same color ID and same AES key will bound automatically.



When the link indicator LEDs of ground unit are always on, it indicates that the air and ground unit is bound.

Note:

(1) If modules binding with different firmware version, the binding operation may fail.

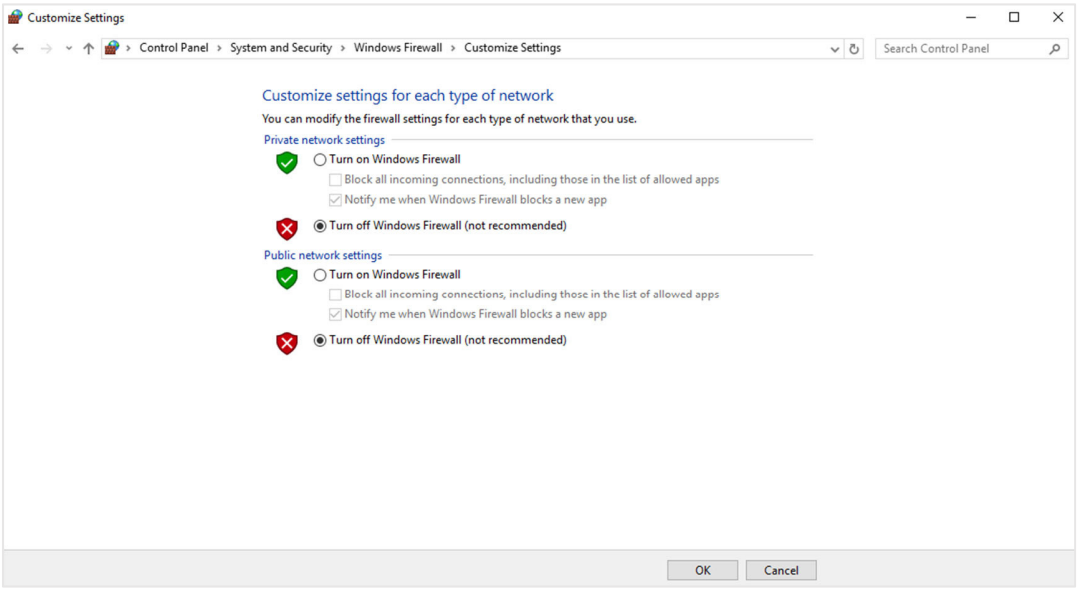
(2) If the firmware of either the air unit or the ground unit is refreshed incorrectly, such as mistakenly upload the Air unit Firmware onto the ground unit, or attempting to bind the wrong air unit to the ground unit, the binding operation will fail.

(3) Units are bound already before factory delivery, customer do not need to bind again after unboxing.

(4) If unit is restored to factory setting, bind again is needed.

6.5. PC Windows firewall

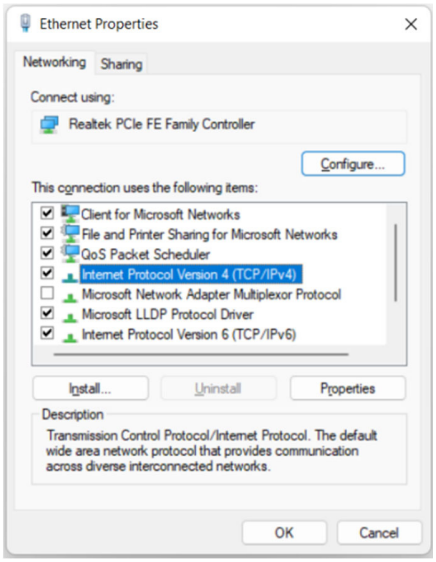
Make sure PC firewall is disabled in case video and/or telemetry is blocked. Here take Windows10 operation system for reference. Path: Control Panel\System and Security\Windows Firewall\Customize Settings.
Set Private/Public network settings as 'Turn off Windows Firewall' as below, click 'OK'.

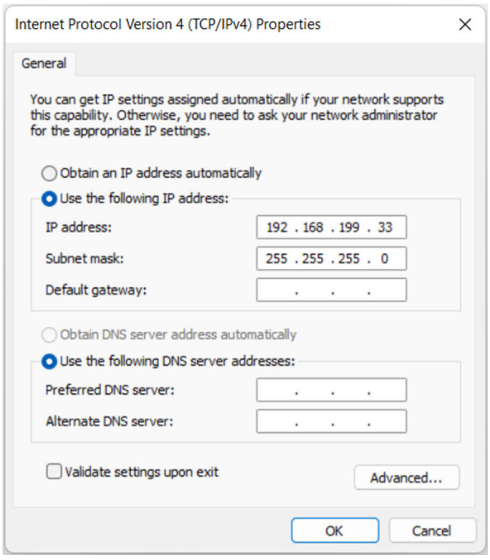


6.6. Set PC IP address

PC IP address should be set correctly when watch video in PC, IP address can be set following below steps:
Double click ‘Ethernet’ at Control Panel\Network and Internet\Network Connections,

Double click ‘Internet protocol version 4(TCP/IPv4)’, set PC IP address like below, click 'OK' to complete the settings.





6.7. J30J-25 connector pin definition

Name	Pin
Power	13,25
GND	3,8,12,20,23,24
Ethernet TX+	1
Ethernet TX-	2
Ethernet RX+	14
Ethernet RX-	15
SBUS_V	9,21
SBUS1	10
SBUS2	22
PPM	11
232TX1 or 422A1	16
232RX1 or 422B1	17
232TX2 or 422A2	4
232RX2 or 422B2	5
TTLTX1 or 422Z1	18
TTLRX1 or 422Y1	19
TTLTX2 or 422Z2	6
TTLRX2 or 422Y2	7

7. FAQ

Q1: How does the SprintLink module supply power?
Air unit: DC, power supply range: 12-26V.
Ground unit: DC, power supply range: 12-26V.
Q2: Can the SprintLink module be powered on before antennas installation?
The antennas must be installed before power on.
Q3: How many antennas do SprintLink 's air unit need to be installed?
Two antennas need to be installed.
Q4: How many antennas do SprintLink 's ground unit need to be installed?
Two antennas need to be installed.
Q5: Can different types of remote controllers be used to control drone?
Yes, just output standard PPM signals through the coach port, or use S. BUS receiver.
Q6: Can two air units be installed on a drone?
No, a drone can only have one air unit.
Q7: Can two ground units be installed at the receiving end?
The ptp system can only install one ground unit; the ptmp system supports more than one ground units.
Q8: What if the uplink/downlink LED indicator is not on?
Please follow the following steps:
1) Please check the power supply of the air and ground unit is normal.
2) Please check the antennas installation of the air and ground units is normal: whether the antennas is blocked; whether the antennas connection is loose; whether the RF cable and port is not tightened;
3) Check whether the TX frequency of the ground unit is consistent with the RX frequency of the air unit through Web UI.
4) Check the TX power of the ground unit through Web UI.
5) If above steps cannot solve the problem, please contact SprintLink technical support staff.

Q9: Telemetry connection cannot be setup properly?
Please follow the following steps:
1) Please check whether the link status is normal.
2) Please check whether the serial telemetry cable connection between flight controller and air unit is correct and that between ground unit and ground station is correct.
3) Check whether the baud rates are the same.
4) If above steps cannot solve the problem, please contact SprintLink technical support staff.
Q10: RC connection cannot be setup properly?
Please follow the following steps:
1) Please check whether the link status is normal;
2) Please check whether the RC connecting between flight controller and air unit is correct and that between ground unit and remote controller is correct;
3) If using PPM mode, check the mode configuration of the remote controller; if using S. BUS mode, check the configuration of the receiver and remote controller;
4) Please check whether the RC connection of the air and ground unit is correct. We provides standard cables. If you make it by yourself, please check the pin;
5) Please check whether the RC mode is configured correctly in SprintLink app;
6) If above steps cannot solve the problem, please contact SprintLink technical support staff.
Q11: What if there's no video output?
Please follow the following steps:
1) Please check whether the link status is normal;
2) Please check whether the Ethernet cable and camera is normal;
3) Please check whether the RTSP address is correct;
4) Please check whether PC IP address and camera IP address are in the same sub-net;
4) If above steps cannot solve the problem, please contact SprintLink technical support staff.

Q12: What if the video suffers from distortion?
Please follow the following steps:
1) Please confirm whether the downlink mode configuration is larger than the video bit rate;
2) Please check whether the Ethernet connection of air unit cable is reliable;
3) Whether the connection of Ethernet cable of ground unit is reliable;
4) Please check If there is interference exists, change the working frequency if need;
5) If there is no interference, whether the limit distance of communication link has been reached;
6) If above steps cannot solve the problem, please contact SprintLink technical support staff.
Q13: What if the transmission distance of the module is shorter than expectation?
Please follow the following steps:
1) Please verify whether the antenna and RF cable are installed correctly and check whether they are supplied Falcon accessories.
2) Please ensure that the air antennas are not both blocked by the payload, there is no obvious blocking at the ground unit near the antennas, and the antennas of the air and ground units are perpendicular to the ground.
3) Please check whether the module works with full RF power output.
4) Please check whether the downlink mode configuration is proper or not, the high throughput downlink modes can significantly reduce the transmission distance.
5) Please check whether the working frequency is obviously interfered or not.
6) Please check whether there is serious obstruction between the air and the ground unit during flight, and the complex geographical environment will also affect the transmission distance.
7) If above steps cannot solve the problem, please contact SprintLink technical support staff.

FCC Warning

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE 1: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-Consult the dealer or an experienced radio/TV technician for help.

NOTE 2: Any changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

RF Exposure Statement
To maintain compliance with FCC'S RF Exposure guidelines, This equipment should be installed and operated with minimum 20cm between the radiator and your body. This device and its antenna(s) must not be co-located or operation in conjunction with any other antenna or transmitter.