

Cellular and Satellite Datalink & Cloud **Manual v1**



BLOS-04
Cellular



BLOS-10
Satellite

EN 9100 Certified Company

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Part I – BLOS-04

1. Purpose and Audience

This manual describes the **Cellular DataLink BLOS-04**: a multi-bearer IP transport system engineered for **Beyond-Line-of-Sight** (BLOS) aeronautical missions. It is written for avionics integrators, flight test engineers, broadcast engineers, and network administrators who install, configure, and operate the BLOS-04 in airborne and ground stations.

2. System Overview

BLOS-04 aggregates multiple communications paths to create a resilient, high-bandwidth IP link between an airborne platform and a ground node

- Up to **four cellular modems** (multi-operator LTE / 5G).
- **WAN (Ethernet) uplink** for external bearers (e.g., BLOS-10 Starlink terminal).
- Deterministic **bonding/aggregation** with seamless path steering and failover.
- **Layer-2 virtual LAN (vLAN) bridging** between paired BLOS nodes, allowing any on-board IP equipment to appear on the same subnet as ground systems.
- **Security**: AES-256 encryption and support for STANAG-4609 KLV metadata carriage.
- **Certification**: Designed for demanding aeronautical environments and compliant with DO-160 categories as specified in product datasheets.
- Compatible with **RF Downlink** chains: the WAN port can ingest Ethernet output from microwave receivers/encoders, extending traditional RF links into the bonded IP path.

Typical application: one BLOS-04 installed in a helicopter and a second BLOS-04 at the ground receiving site. The pair forms a virtual L2 bridge so airborne devices (cameras, encoders, radios, mission computers) are reachable from the ground as if locally connected, and vice-versa.

3. Key Features

- **Unlimited coverage** by combining 4×cellular paths and Satellite/WAN (BLOS-10).
- **High aggregate throughput** with low end-to-end latency suitable for **real-time video** and command/control.
- **Automatic bearer steering**: if cellular coverage degrades, the system shifts more traffic to the satellite/WAN path (e.g., Starlink via BLOS-10).
- **Global multi-operator capability** using independent SIMs per modem.
- **Ruggedized design** for airborne use; power-fail safe configuration storage.
- **Web interface** for configuration, health monitoring, GPS visualization on a map, and traffic graphs.
- Interoperability with **satellite** backhaul (BLOS-10) and **RF Downlink** workflows (helicopter relay, fixed point-to-point).

4. Representative Use Cases

4.1 Airborne ISR / Public Safety

- Live EO/IR video downlink from helicopter to ground command post over aggregated 4G/5G plus **satellite (BLOS-10) or RF microwave downlink**, while maintaining telemetry, PTZ control and mission data.

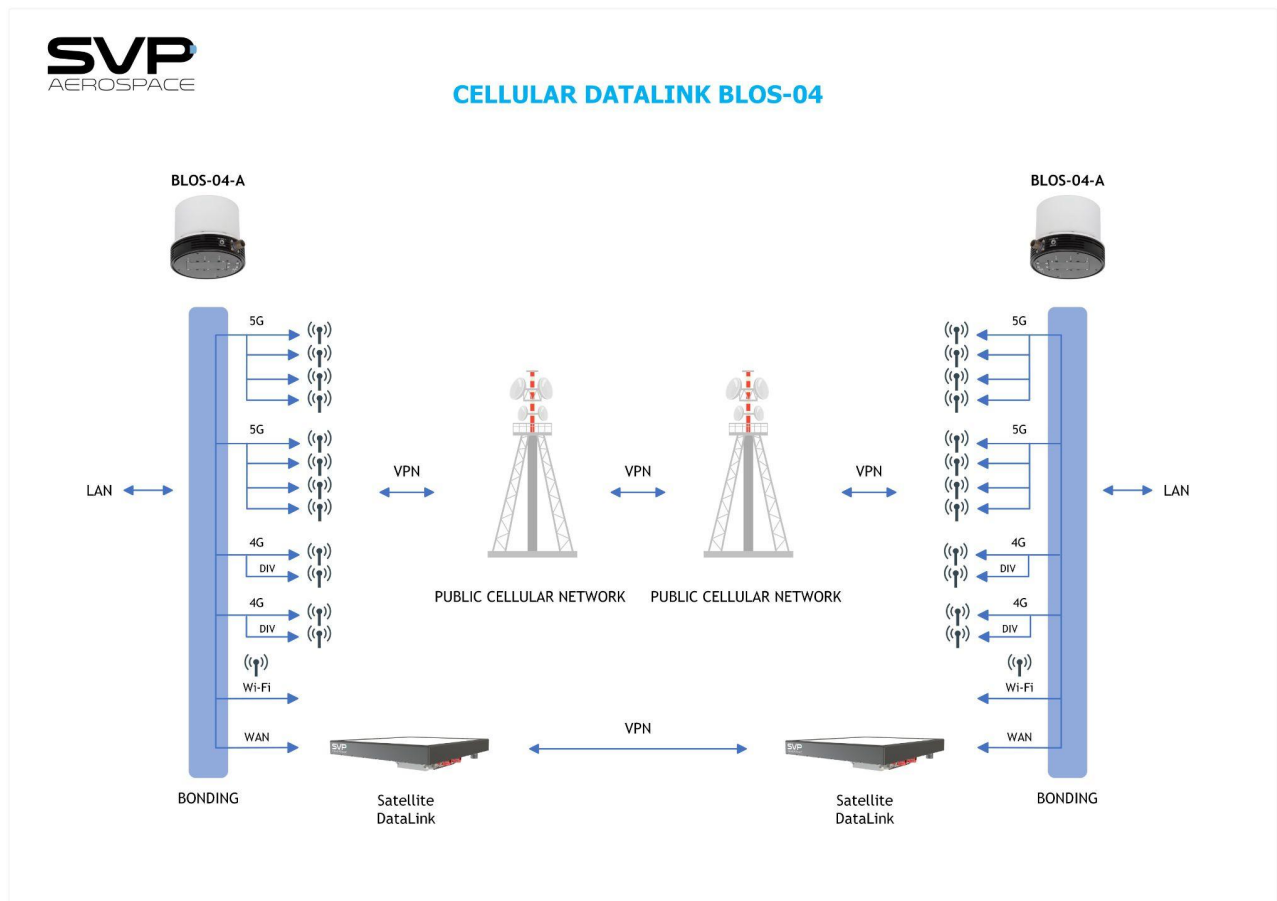
4.2 Live Broadcast (Sports & News)

- Field camera → encoder → BLOS-04 backpack. The link bonds across multiple cellular networks; when available, a **Starlink (BLOS-10) backhaul or an RF microwave downlink receiver/encoder** attaches to WAN for higher headroom and geographic independence.

4.3 Remote Operations & Telemetry

- Bidirectional IP tunneling for flight-test instrumentation, avionics diagnostics, or remote sensor control.

4.4 Application Topologies



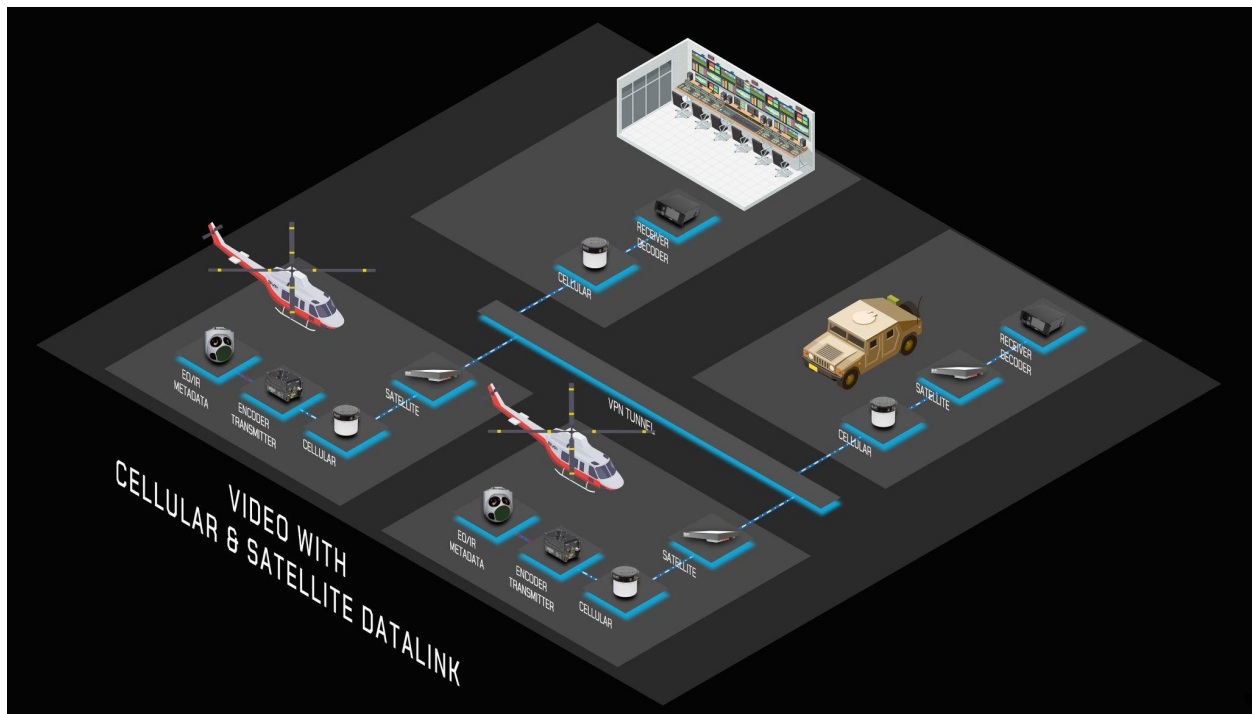
This diagram shows how a pair of **BLOS-04** units create an end-to-end IP bridge:

- **Left and right BLOS-04 nodes** sit on their respective **LANs** (eg. airborne side / ground side). Any payload connected to each LAN (encoders, cameras, mission PCs, etc.) becomes reachable across the link.
- Each BLOS-04 uses up to **four cellular modems** (4G/5G). The modems attach **concurrently** to public cellular networks from different operators. Traffic is **bonded**—striped across all available paths according to link quality and loss/latency—so no single bearer is “primary”.
- The blue arrows labeled **VPN** indicate an encrypted overlay between nodes. All mission traffic crosses this VPN tunnel while remaining transparent to end devices.
- The **WAN** port can feed an external backhaul such as a **satellite datalink (BLOS-10)**. When present, it is simply another bearer in the bonding pool, extending coverage beyond terrestrial networks.

- The **Wi-Fi** interface provides local, short-range access to the BLOS-04 for maintenance. Because the system bridges at **Layer-2**, a technician connecting over Wi-Fi to one node can also reach devices on the **remote** LAN through the same bridge.

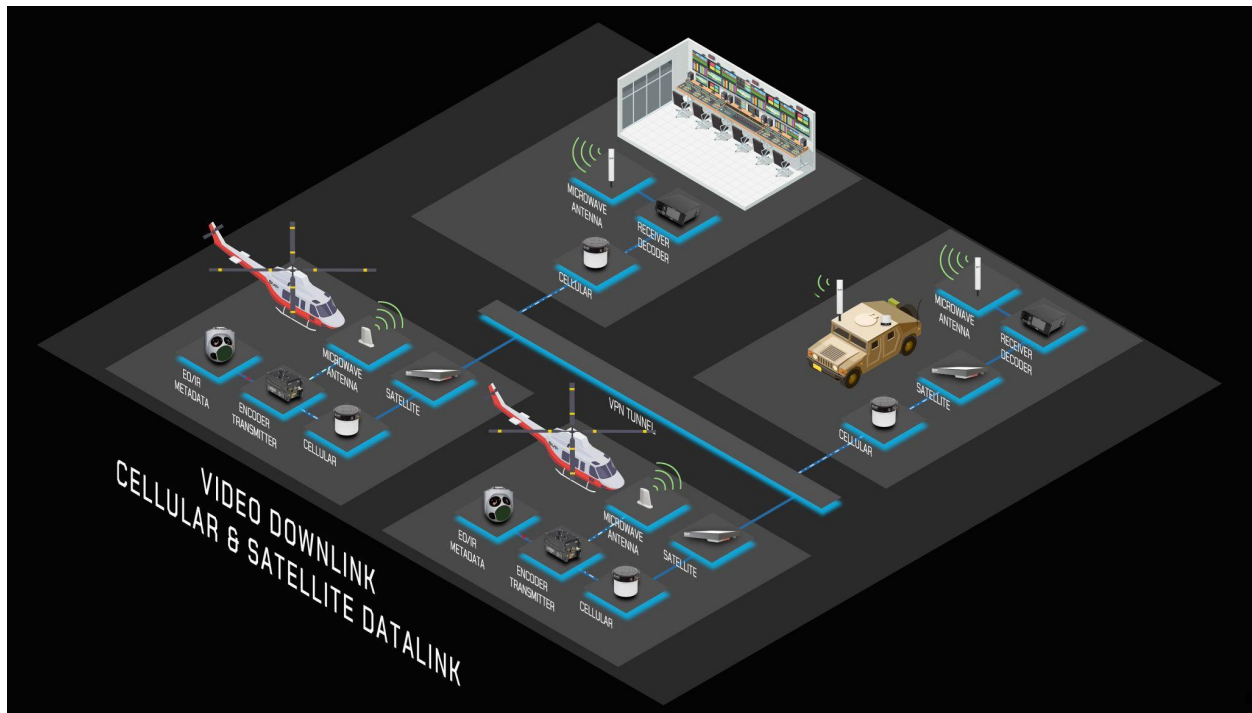
Multi-node operation. Although the picture shows two endpoints, the bridge is not limited to point-to-point. Multiple BLOS-04 units can join the **same Layer-2 domain** (for example, aircraft + ground station + OB van + vessel). All participating LANs appear on one virtual switch, so devices on any site can discover and talk to devices on the others.

Example configuration with Cellular DataLink (BLOS-04) and Satellite (BLOS-10).



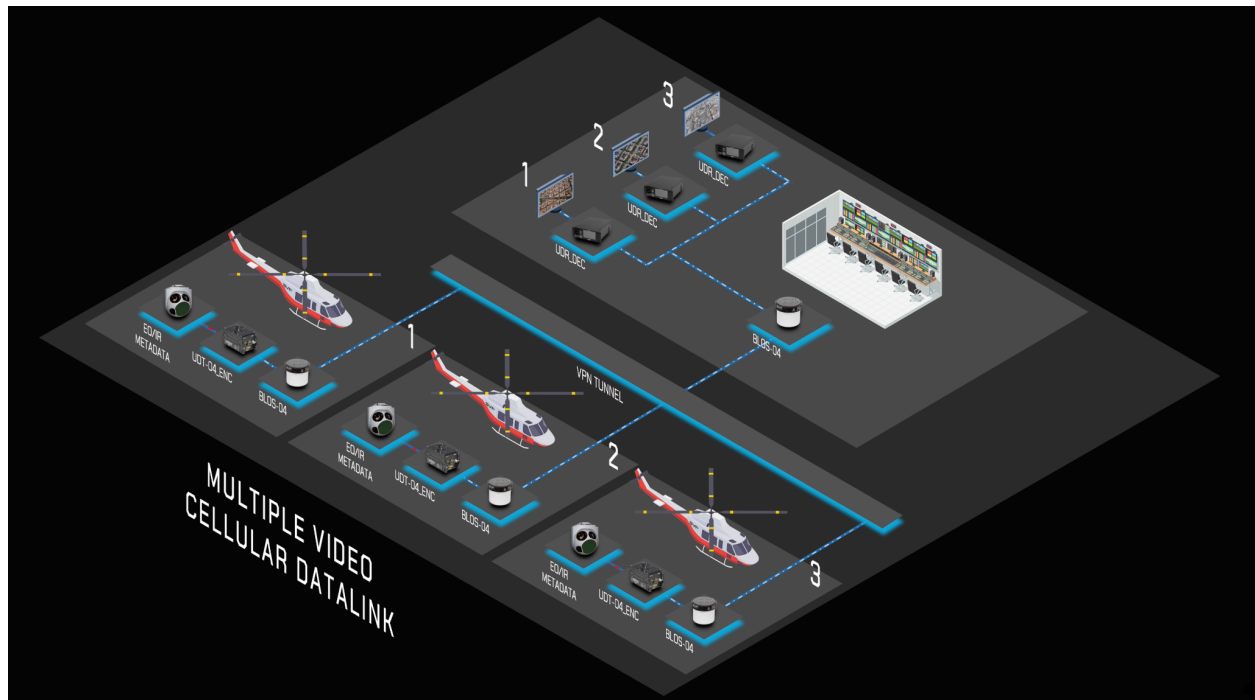
The system establishes a local area network (LAN), enabling seamless exchange of data and imagery between all system elements.

Example configuration with Cellular DataLink (BLOS-04) and Satellite (BLOS-10), combined with a microwave downlink between helicopters and ground stations.



The system creates a local area network (LAN), allowing transparent data and image sharing across all connected assets. In addition, the integrated microwave downlink provides direct Line-of-Sight (LOS) transmission between airborne platforms and the ground. This LOS system operates independently of public networks or third-party infrastructure, ensuring maximum robustness and operational independence.

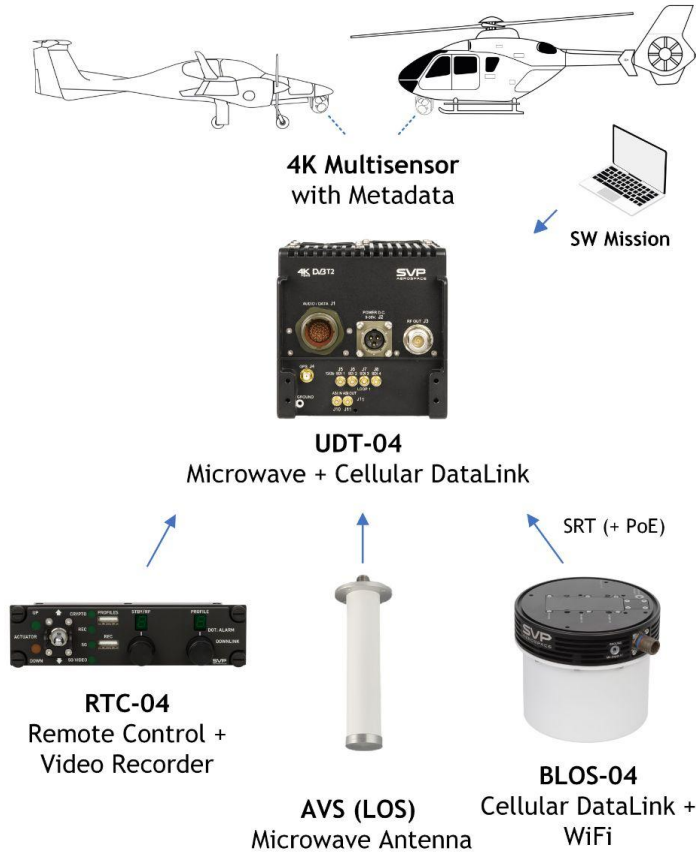
Example of a multi-helicopter transmission to a single ground reception point.



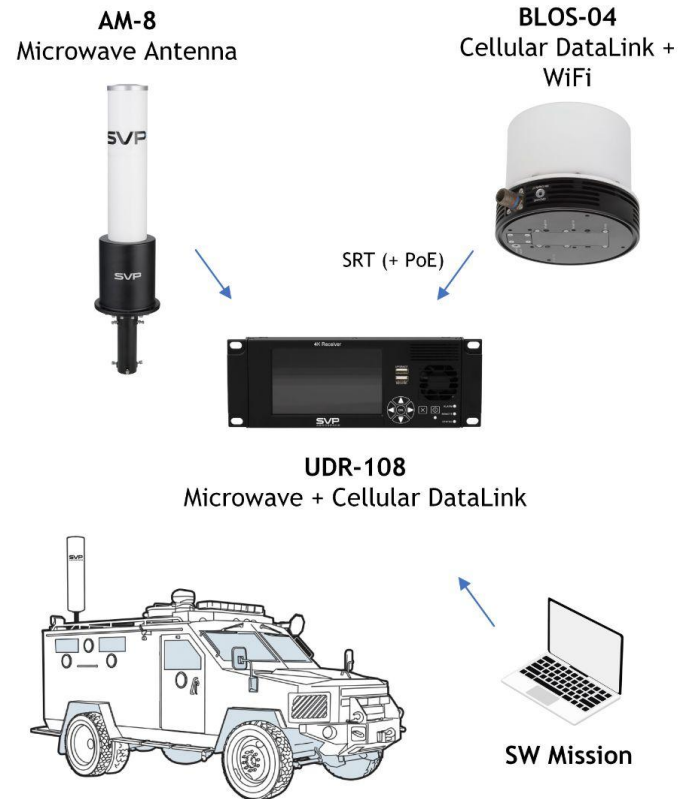
On the ground, only one BLOS-04 unit is required to receive multiple signals simultaneously.

This technique enhances system security, as encryption is preserved end-to-end — from the airborne camera all the way to the final destination of the signals.

FIXED-WING & HELICOPTER TRANSMITTER



PORTABLE RECEPTION



The graphic shows an end-to-end workflow with two complementary paths:

- **Microwave (RF) path** for line-of-sight contribution.
- **Cellular DataLink path** (via **BLOS-04**) for BLOS operation and as a fallback/augment.

Left side — Airborne / Transmit chain

- **Platform:** fixed-wing or helicopter.
- **Sources:** a **4K multisensor** (with metadata) and the **SW Mission** laptop feed the **UDT-04** (Ultra-Definition Transmitter).
- **UDT-04 outputs:**
 - **Microwave RF → AVS (LOS)** airborne antenna (available in the usual ENG/aviation bands).

- **IP over Ethernet → BLOS-04** (Cellular DataLink + Wi-Fi).
Over the IP leg we **recommend SRT** for resilient, low-latency video transport.
- **RTC-04 controller:** cockpit-friendly remote allowing pilots to switch **profiles** (e.g., *Microwave only*, *Cellular DataLink only*, or *Hybrid*) and to trigger local record functions when applicable.

Right side — Portable reception chain

- **Platform:** vehicle-mounted (or can be a fixed ground post).
- **Antenna: AM-8** sector microwave antenna with **8-way diversity** for robust RF reception.
- **Receiver: UDR-108** (Ultra-Definition Receiver) accepts:
 - **Microwave RF** from the AM-8.
 - **IP input (SRT)** from the **BLOS-04** when cellular DataLink is used.
- **BLOS-04 (ground):** provides the **Cellular DataLink + Wi-Fi** and bridges the IP feed into the receiver network.
- **SW Mission (ground):** monitoring/decoding and control software.

What the topology enables

1. **Two complementary paths.**
 - **LOS microwave** for pristine contribution when the link is in view.
 - **BLOS cellular** for global coverage.
2. **Same operational LAN across nodes.**
The DataLink behaves as **Layer-2 bridging**, so airborne devices, the vehicle receiver, and additional sites appear on a **single operational subnet**. This means cameras, encoders, recorders, and control apps can discover and talk to each other transparently.
3. **Scales beyond point-to-point.**
You are **not limited to one aircraft ↔ one ground site**. Multiple BLOS-equipped assets (e.g., a helicopter, a van, and a boat) can join the same bridged domain and interoperate simultaneously.
4. **Operational flexibility.**
Using the **RTC-04**, crews can select the most appropriate profile (Microwave only / DataLink only / Hybrid) to conserve data or maximize resilience. SRT over the IP leg maintains low latency and stability when cellular conditions vary.

Takeaway: The diagram illustrates how **UDT-04 + AVS (LOS)** and **BLOS-04 (Cellular DataLink)** work together so your receiver (**UDR-108** with AM-8) always has a path—RF when there is

line-of-sight, cellular DataLink when there isn't, or both—while keeping every endpoint on the **same network** for seamless control and monitoring.

6. Specifications

Category	Specification	Details
Network	Interface Speed	2x Ethernet 10/100 Mb
	Interface	1x LAN 1x WAN (Satellite)
	SIM Cards (2options)	Option A: 2 x 5G & 2 x 4G (LTE) Option B: 4 x 4G (LTE)
	WiFi	Access Point (5GHz)
Power	Power Supply	Powered by external connector Powered by PoE (Active and Passive)
	Power Supply Range	11 to 72 V. DC
	Power Consumption	30 Watts Max.
General	Supported Data	IP Streaming with AES-256 Encryption KLV Metadata - eg: STANAG 4609
	Internal Antennas	4 Antennas per 4G (LTE) SIM (2 antennas per SIM Card) 8 Antennas per 5G SIM (4 antennas per SIM Card) 1 Antenna for WiFi

		1 Antenna for GPS
	GPS	Compatible with Mission GPS Software
Mechanical	Connector	D38999, 13 Pins female.
	Weight	890 gr
	Size	112 x 131 mm (diameter)
	Installation	Compatible with: Airfilm Camera Systems DT-1 Dart Aerospace Crosstube Antenna Mount Kit Sealed flat-base mounting.
Environmental	Protection	Waterproof (IP67) Gore Pressure valve
	Certification	DO-160
Security	Cybersecurity	Encryption up to AES-256-CBC

7. System Architecture

7.1 Interfaces

- **LAN** (labeled *LAN* in the Web Server) – aircraft/vehicle side. Connect all on-board equipment here. Including RF microwave downlink receivers/encoders with Ethernet output.
- **WAN** – external uplink. Connect **BLOS-10 (Starlink)** or any IP backhaul.
- **Cellular Modems (4)** – independent SIM slots; multi-operator aggregation.
- **Wi-Fi** – optional client interface for local access.

7.2 Bonding Engine

Traffic is packetized and striped across active bearers. Path selection is adaptive and loss-aware. On the receiving BLOS, packets are reassembled into original frames for delivery at Layer-2.

7.3 Indicators

Inside the **sealed SIM compartment** (remove the weather cap), you will find **four status LEDs**, one aligned with each SIM slot (**SIM 1–SIM 4**). They provide a quick at-a-glance view of cellular availability:

LED color	Meaning
Blue	The corresponding SIM is attached to the cellular network and data service is available.
Red	The corresponding SIM has no cellular connection (no service / not registered / radio disabled).

Note: If a SIM is not inserted or the slot is administratively disabled, the LED may remain off. For detailed signal and operator information, use the Web Interface

8. User Interface & Configuration

8.1 Web Interface

- **Browser:** Google Chrome or Microsoft Edge (current versions recommended).
- **URL:** `http://<Webserver IP>/` (default is: 192.168.1.100).
- **Credentials:** Provided by SVP or your admin (changeable under *Security* in future revisions). Default is: username: **admin** ; password: **12345** .

Note – In the interface and this manual we distinguish two IP settings:

- **Webserver IP:** the management address you use to reach the Web Server.
- **LAN IP:** the operational address used for the virtual L2 bridge between BLOS endpoints.

8.2 Network Configuration

8.2.1 Webserver IP

- Purpose: access to the Web Server.

- Choose an address reachable from your maintenance laptop or maintenance network.

8.2.2 LAN (Operational Network)

- Purpose: the L2 domain for mission devices on both ends of the link.
- **Rule of thumb:** set **both airborne and ground BLOS** to the **same LAN subnet** as the devices they interconnect.
 - *Example:* If both aircraft and ground equipment use 192.168.1.x/24, set the BLOS-04 **LAN** to 192.168.1.x/24 (unique host addresses on each side).
- This ensures end devices ARP each other transparently through the bonded tunnel.

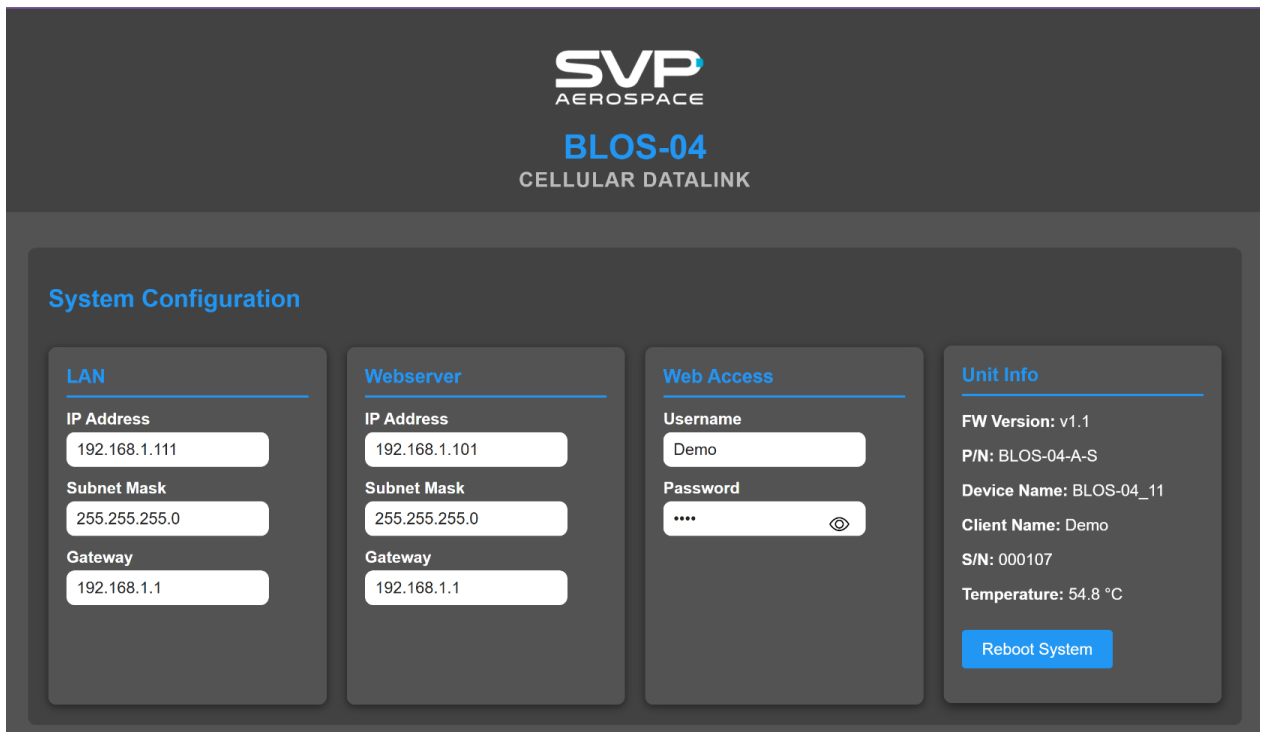
8.2.3 WAN

- DHCP provided by the external backhaul (e.g., BLOS-10).
- When a cable is present and link is up, the **WAN IP** is shown in the Web Interface.
- The link is used automatically by the bonding engine; no user routing is required.

8.3 Unit Information

Unit Info panel summarizes:

- Device name (also displayed on the browser tab and map label).
- Firmware identifiers, serial number and part number.
- **Temperature** monitor.



The screenshot displays the SVP AEROSPACE BLOS-04 CELLULAR DATALINK web interface. The main title is "BLOS-04 CELLULAR DATALINK". Below the title, there is a "System Configuration" section with four panels:

- LAN:**
 - IP Address: 192.168.1.111
 - Subnet Mask: 255.255.255.0
 - Gateway: 192.168.1.1
- Webserver:**
 - IP Address: 192.168.1.101
 - Subnet Mask: 255.255.255.0
 - Gateway: 192.168.1.1
- Web Access:**
 - Username: Demo
 - Password: **** (with an eye icon for visibility toggle)
- Unit Info:**
 - FW Version: v1.1
 - P/N: BLOS-04-A-S
 - Device Name: BLOS-04_11
 - Client Name: Demo
 - S/N: 000107
 - Temperature: 54.8 °C
 - Reboot System button

8.4 Network Interfaces Panel

The **Network Interfaces** area presents SIMs, Satellite (WAN), and Wi-Fi. Visual consistency follows SVP UI guidelines: clear headings, concise status.

8.4.1 Cellular (SIM 1-4)

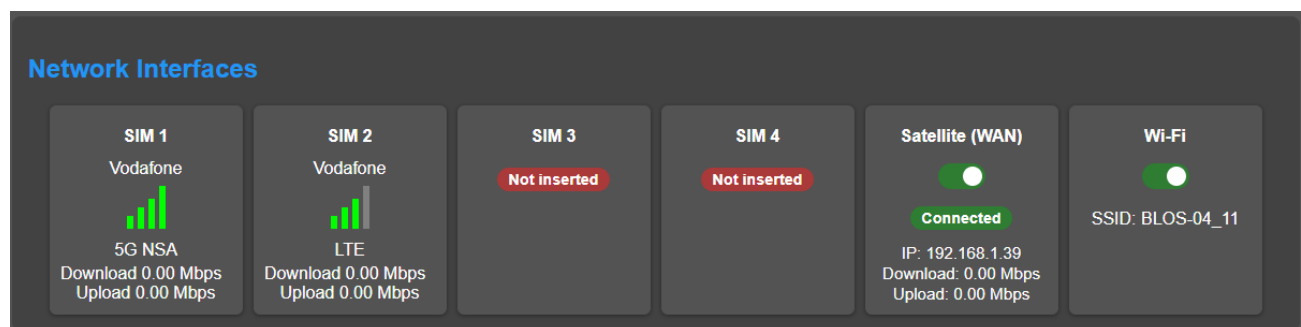
- Each card shows **carrier**, **signal bars**, and **technology** (LTE, **LTE-A**, 5G NSA/SA) parsed from modem status.
- **“Not inserted”** appears when no SIM is detected. Throughput numbers are presented on the global graphs rather than per-SIM.

8.4.2 Satellite (WAN)

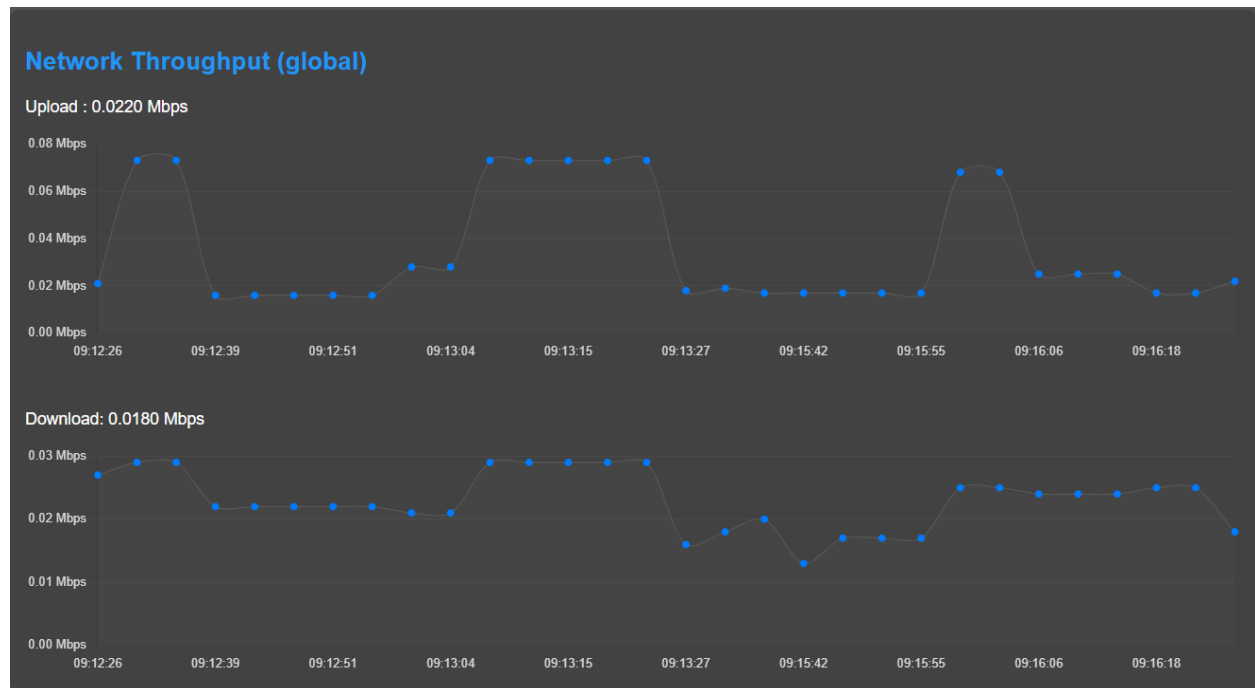
- **Switch:** ON/OFF.
- **Display rules:**
 - If the physical link is up (cable connected / link present), the **WAN IP** is always shown.
 - **Connected + Switch ON:** show “Connected” and instantaneous **Download/Upload** rates.
 - **Connected + Switch OFF:** show **only the WAN IP** (no “Connected”, no throughput).

8.4.3 Wi-Fi

- **Switch:** enables/disables the interface.
- **Display rules:** when enabled and associated, the **SSID** is shown.
- SSID is **factory-defined and not user-changeable** in this release.



8.5 Traffic Dashboard



Two time-series charts display **aggregate Upload** and **Download** (Mbps) across all active bearers. Curves are smoothed and sampled every few seconds.

8.6 Positioning (GPS)

When a valid GNSS fix is available:

- The **map** centers on the aircraft with a persistent **label** displaying the **Device Name**.
- Text fields render **Latitude** and **Longitude** in degrees/minutes, and **Altitude** in meters.
- If no fix is available, the map still loads but **no marker** is placed.

9. BLOS-10 (Satellite) Integration

Connect the BLOS-10 to the WAN port of the BLOS-04 to add a satellite bearer. The bonding engine continuously measures **latency, loss, jitter and available capacity** on **all** active paths (cellular, satellite and—when present—RF microwave via WAN) and **dynamically allocates traffic across them**.

No path has fixed priority. Traffic share adapts in real time to link quality: if a bearer degrades, its contribution is reduced; as it recovers, it is increased—seamlessly and without

manual routing changes. This preserves sessions across bearer changes and maximizes end-to-end performance and availability.

In addition to satellite backhaul, the WAN interface can ingest Ethernet from **RF microwave downlink systems**, allowing traditional microwave contribution links to feed the bonding engine under the same adaptive distribution model.

10. Troubleshooting

Symptom	Likely Cause	Corrective Action
Cannot reach the Web UI	Wrong Webserver IP or PC on a different subnet	Set your PC to the same subnet as the Webserver IP or update the Webserver IP to a reachable range.
Devices on aircraft cannot see ground devices (or vice-versa)	LAN IP/subnet mismatch between BLOS endpoints and mission equipment	Configure LAN on both BLOS units to the same subnet as end devices; ensure unique host addresses and no duplicate IPs.
Wi-Fi shows enabled but no SSID	Out of range or credentials not provisioned	Ensure the target SSID is available and provisioned in the factory profile.
SIM card shows "Not inserted"	No SIM present or tray not latched	Power down if required and re-seat the SIM; confirm carrier plan is active.
SIM technology label incorrect	Temporary network re-selection	Wait for the next polling cycle; if persistent, check carrier coverage and confirm the modem reports network_type correctly.

No GPS marker	No GNSS fix yet	Move to open sky; verify antenna placement.
Video stutters over cellular	Local congestion or insufficient aggregate bandwidth	Add a satellite bearer (BLOS-10), reduce video bitrate, or enable additional SIMs/operators to increase diversity.

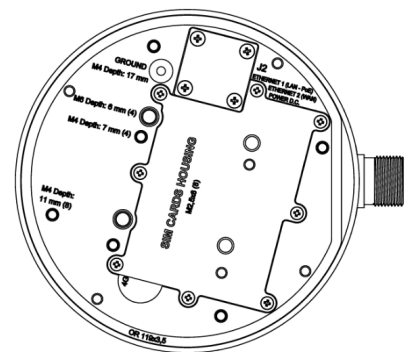
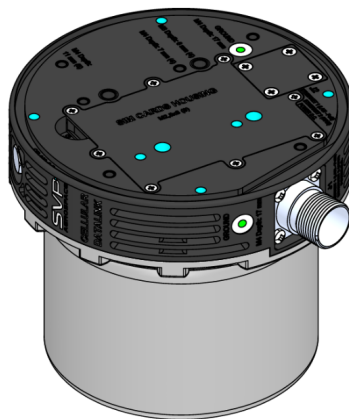
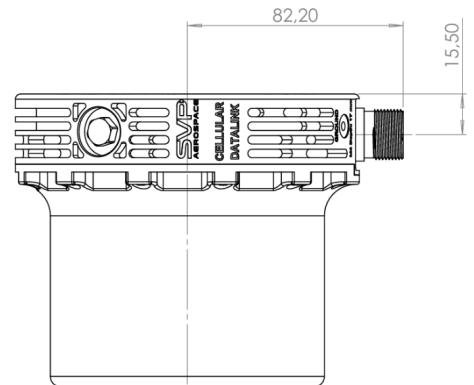
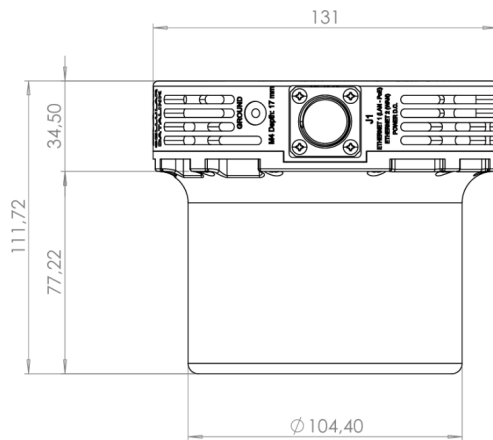
11. Best Practices

- Use **multiple MNOs** across the four SIMs to maximize diversity.
- When available, add **BLOS-10** on WAN for global paths and weather/coverage resilience.
- Keep **firmware current** per SVP recommendations.
- For flight platforms, observe cable strain-relief and DO-160 environmental constraints.

12. Commissioning Checklist

1. Bench-test power (11–72 VDC) and verify boot sequence.
2. Connect a laptop to the management network and browse to the Web-Server IP.
3. Configure Web-Server IP and LAN IP to match your network plan (avoid subnet conflicts).
4. Insert SIMs per option configuration; verify operator registration.
5. If using satellite backhaul, connect the BLOS-10 to the WAN port and verify link acquisition.
6. Confirm VPN/bonding to the peer BLOS-04 and validate end-to-end IP services (video, telemetry, control).

13. Mechanical Dimensions & How To Order



B L O S - 0 4 - A - S

A = 2 x 5G & 2 x 4G (LTE)
B = 4 x 4G (LTE)

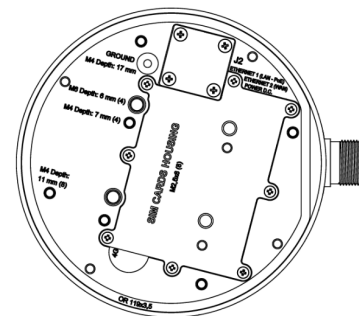
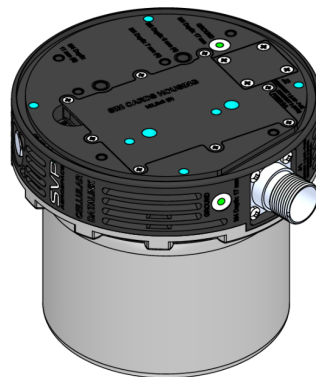
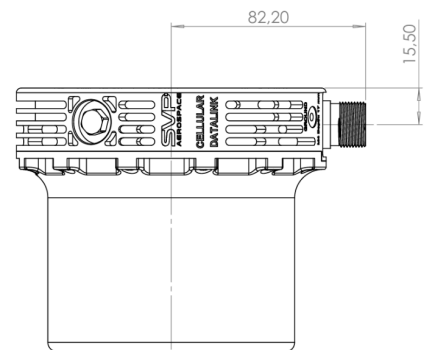
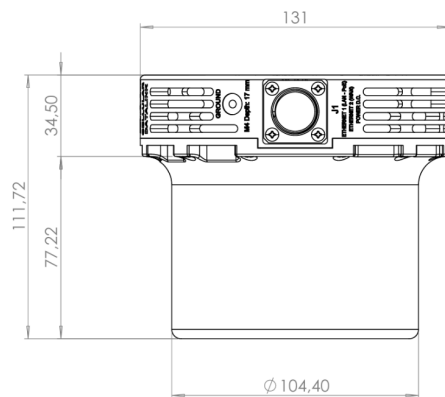
S = Side Connector
B = Base Connector

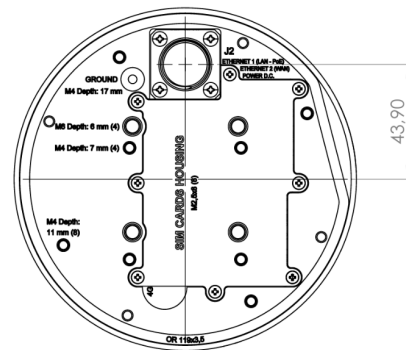
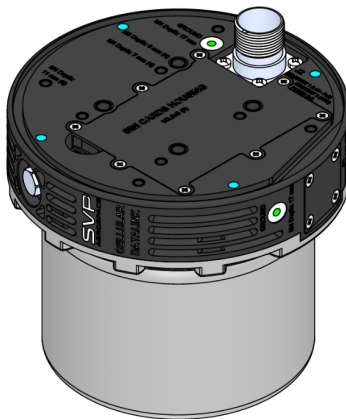
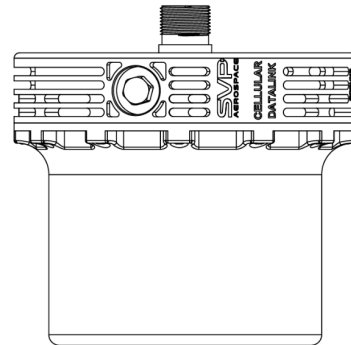
14. Installation

14.1 Connector Locations

The unit supports two alternative locations for the **MIL-DTL-38999** circular connector:

- **J1 — Side mount.**



[illegible]

14.2 Flat, Sealed Base Installation (J2)

For deck/bulkhead mounting on a sealed flat surface:

- Fit an **O-ring 119 × 3.5 mm** around the base groove to ensure environmental sealing.
[INSERT DRAWING: O-ring placement 119×3.5 on base]
- Use **8 × M4** fasteners to secure the base.
Thread depth (max): 11 mm. Do **not** exceed this depth.
- Tighten evenly in a criss-cross pattern to compress the O-ring uniformly.

[INSERT DRAWING: base pattern with 8 × M4 holes, call-out “max thread depth 11 mm”, connector at J2]

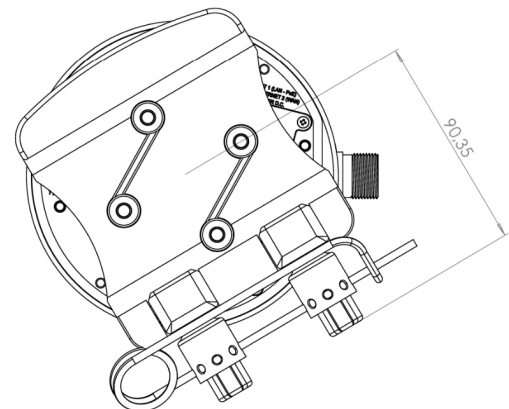
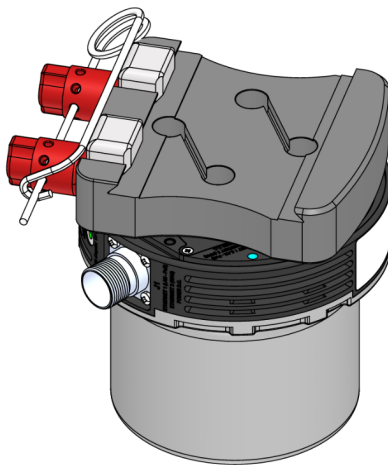
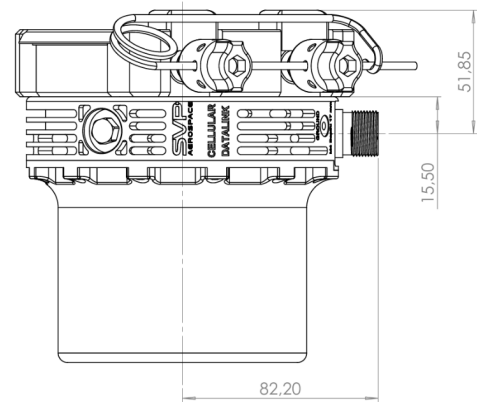
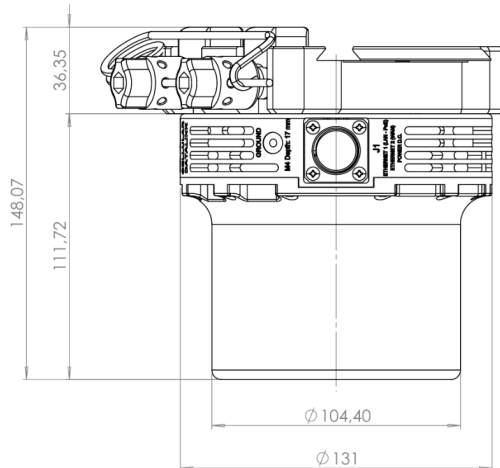
Cautions

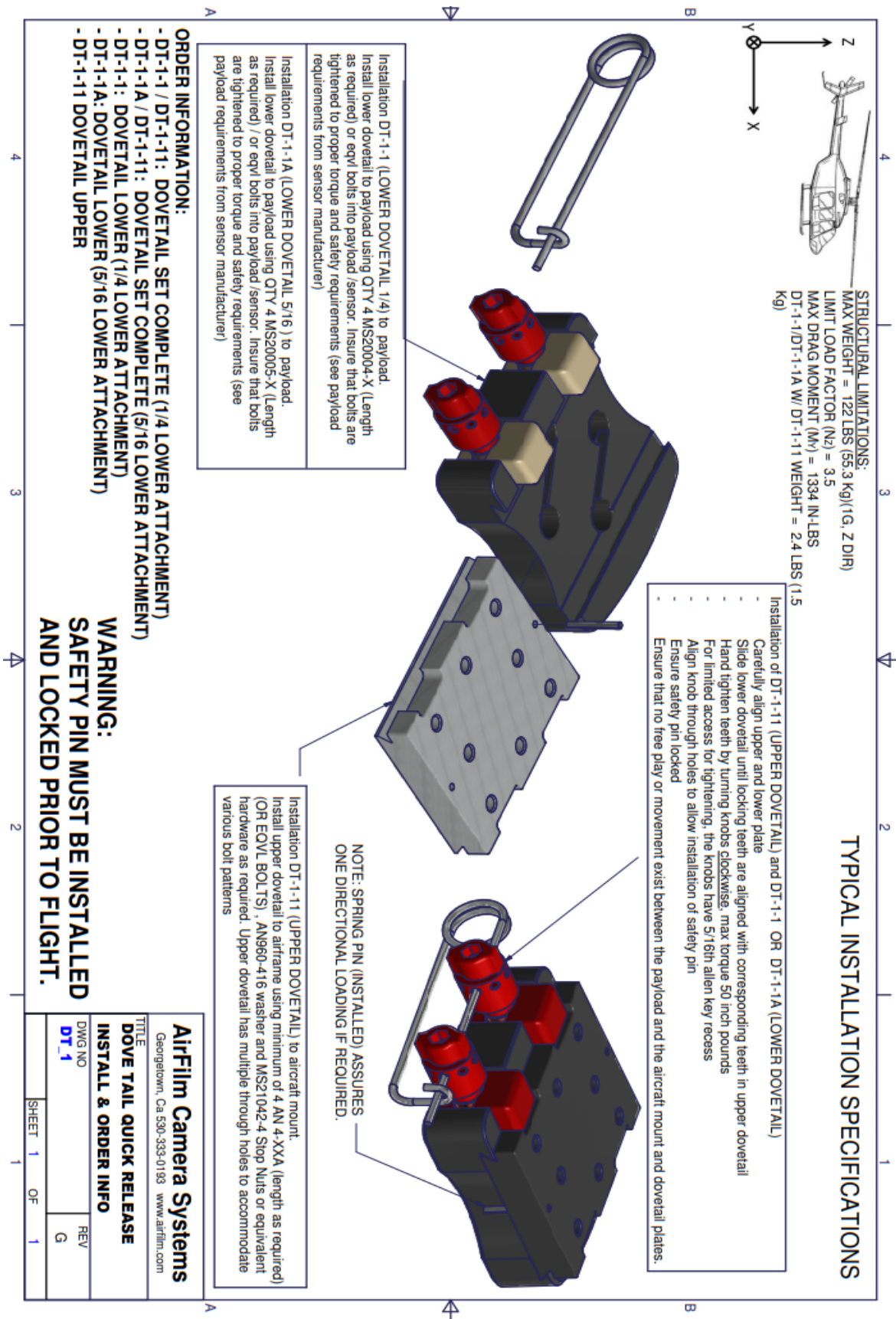
- Verify the O-ring is clean, undamaged, lightly lubricated (silicone grease), and correctly seated before tightening.
- Over-length screws can damage internal structures—observe the **11 mm** limit.

14.3 Airfilm Mount Installation

When installing on the Airfilm mount P/N: DT-1-1:

- Use **4 × M6** fasteners.
Thread depth (max): 6 mm.
- Align the mount per aircraft STC/integration instructions.





14.4 DART Crosstube Installation

For the DART Crosstube Antenna Mount Kit 206:

- Use **4 × M4** fasteners.
Thread depth (max): 7 mm.
- In this configuration the **connector is positioned at J1 (side).**

[INSERT DRAWING: DART cap interface, 4 × M4, max depth 7 mm, connector at J1]

14.5 SIM Card Access

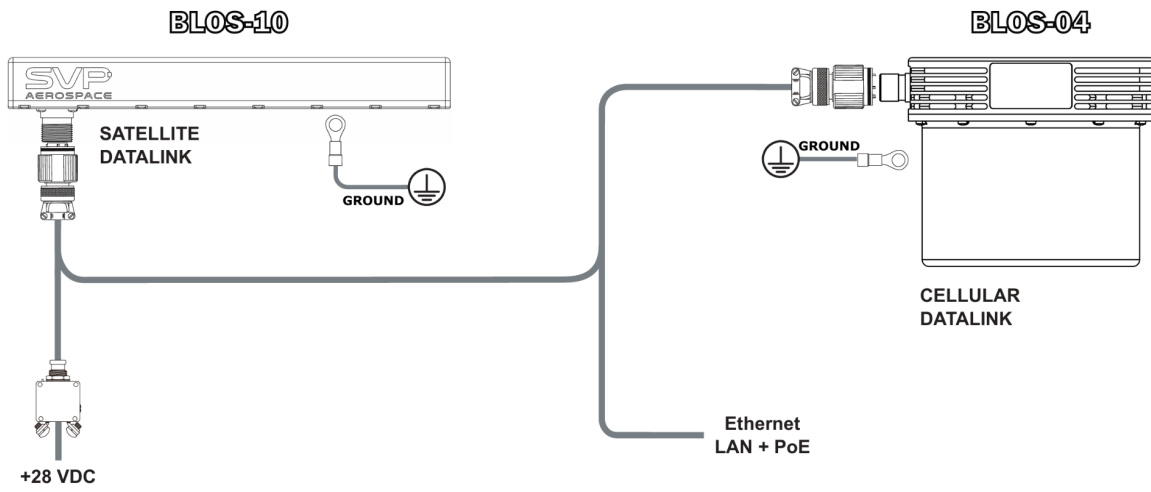
To access the SIM card compartment:

- Remove **8 × M2.5** screws from the SIM cover.
- Maintain gasket integrity and reinstall with even torque.

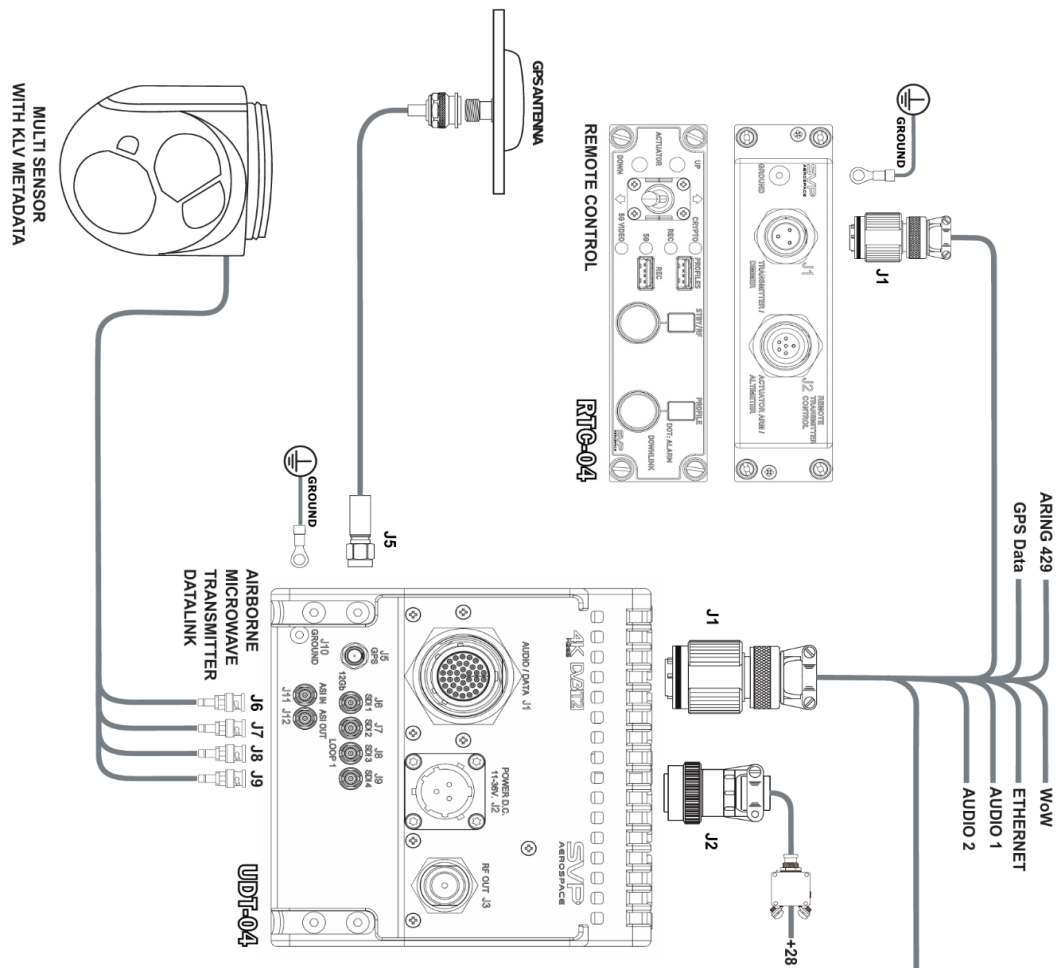
[INSERT DRAWING: SIM access cover with 8 × M2.5 screws]

14.6 Electrical Installation

BLOS-04 + BLOS-10

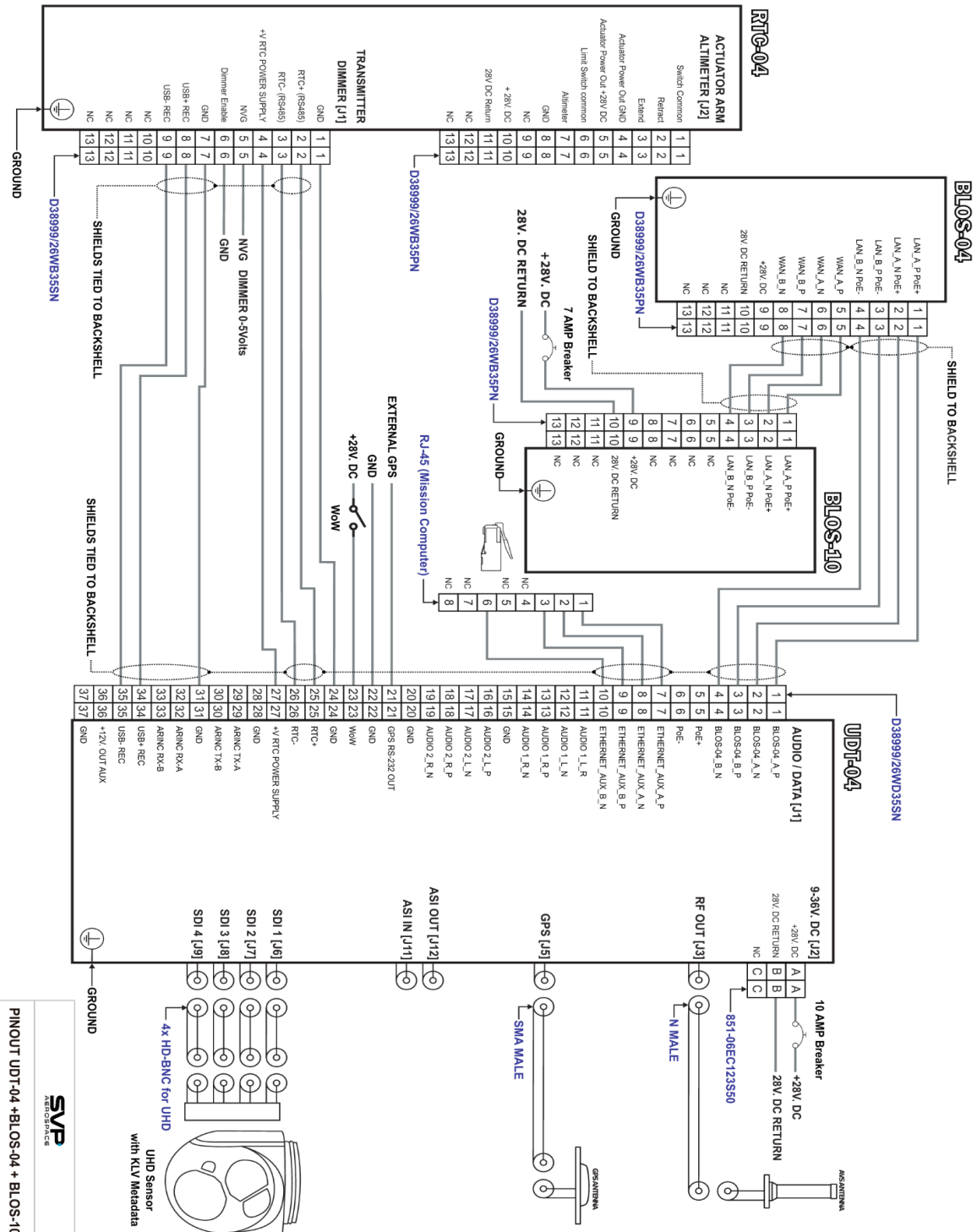


UDT-04 + BLOS-04 + BLOS-10

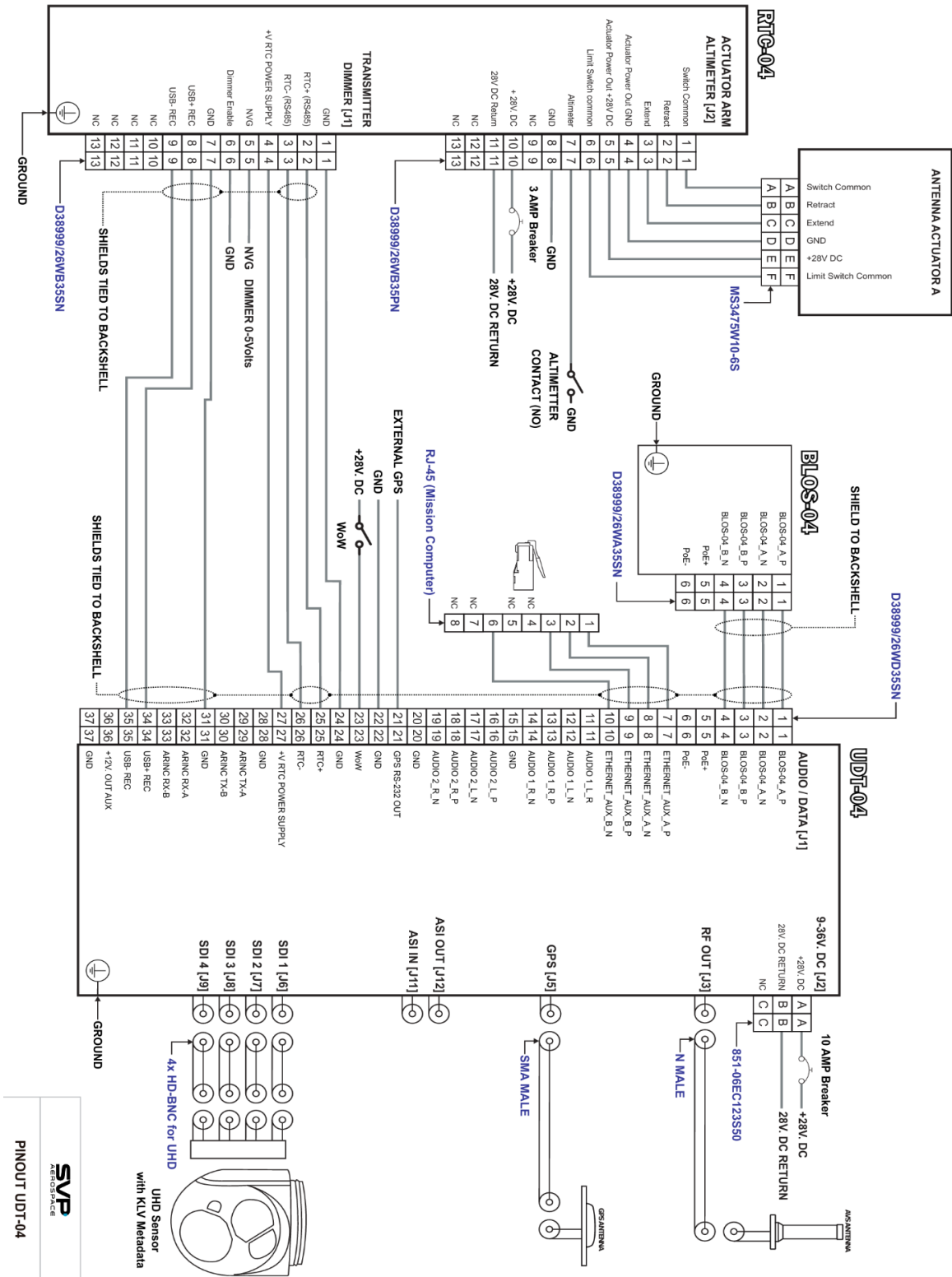


14.7 Connector Pinout

UDT-04 + BLOS-04 + BLOS-10



UDT-04 with Actuator + BLOS-04



15. Maintenance

15.1 SIM Cover O-Ring

- **Inspect** the SIM-cover O-ring for cuts, flattening, or debris.
- **Clean** and **lightly lubricate** (silicone grease) before re-installing the cover; tighten screws evenly.
[INSERT DRAWING: SIM cover O-ring position and seating]

15.2 Base O-Ring (119 × 3.5 mm) — Sealed Flat Installations

- For units mounted on sealed flat bases, **inspect the 119 × 3.5 mm O-ring** periodically.
- Replace if hardened, cracked, or permanently set.
[INSERT DRAWING: base O-ring inspection points]

15.3 Cellular Service (MNO Subscription)

- **Verify the cellular contract** with the mobile network operator (e.g., Telefónica) is active and has sufficient data allowance.
- If connectivity degrades unexpectedly, check for **expired plans, data caps, or SIM administrative blocks** before proceeding with technical troubleshooting.

Recommended practice: Perform these checks during scheduled maintenance and prior to mission deployments.

16. Required Tools and Materials

Objective: Ensure that maintenance and installation personnel have the minimum set of tools, equipment, and safety items required to perform the procedures in this manual safely, effectively, and in accordance with AS9100/ISO 9001 standards.

16.1 General Principles

- All tools must be clearly specified (type, size, tolerance) and subject to scheduled calibration and inspection.
- Tools should be uniquely identified and controlled through the Quality Management System (QMS).
- Use only tools in good condition. Damaged or worn equipment must be removed from service.

Safety and ESD (Electrostatic Discharge) protection is mandatory when working with electronic assemblies.

16.2 Standard Hand Tools

Tool	Intended Use	Notes / Recommended Sizes
Torx screwdrivers	Opening of covers, access panels, connectors	T5, T6, T8, T10 (magnetic tips recommended)
Phillips & flat precision screwdrivers	General assembly/disassembly	PH000, PH00, PH0 and flat sizes 1–2 mm
Allen (Hex) keys	Socket-head screws in enclosures	Metric set: 1.5–5 mm
Socket wrench set	Tightening fasteners in mounts	Small metric sockets (4–10 mm)
Needle-nose pliers / angled pliers	Handling cables and small parts	Insulated handles preferred
Side cutters	Cutting cable ties, wires	With insulation up to 1 kV
Crimping tool	Electrical connectors and pins	Match crimping die to connector specification

Torque wrench	Precise tightening of critical screws	0.5–5 Nm range, calibrated
----------------------	---------------------------------------	----------------------------

16.3 Measuring & Test Equipment

Equipment	Purpose	Notes
Digital multimeter	Voltage, resistance, continuity checks	Range $\geq$ 0–60 V
Caliper / Vernier gauge	Dimensional checks	Accuracy 0.01 mm
Portable computer (laptop)	Configuration, diagnostics, log collection	With Ethernet port or adapter
Ethernet cable (RJ45, Cat5 or higher)	Network connection for setup	Shielded cable recommended
Bench power supply	Laboratory bench tests	Adjustable, with current limiting

16.4 Safety & ESD Equipment

Equipment	Purpose	Notes
ESD wrist strap	Prevents electrostatic discharge damage	Must be grounded and tested regularly
Anti-static work mat	Safe surface for electronic assemblies	ESD-certified mat with ground cord

Protective gloves	Hand safety during installation	Nitrile or cut-resistant depending on task
Protective eyewear	Eye protection from debris or sparks	ANSI/EN166 compliant
Hearing protection	For high-noise environments	As required by site safety
Flashlight / inspection lamp	Illumination of installation area	LED, flexible head preferred

16.5 Consumables & Accessories

Item	Purpose
Isopropyl alcohol (IPA ≥ 99%)	Cleaning of connectors and contacts
ESD-safe brushes	Dust removal on PCBs and connectors
Cable ties	Securing harnesses during installation
Labels / markers	Cable and port identification
Replacement screws / O-rings	As specified in installation procedures

PART II – BLOS-10

1. Purpose and Audience

This section describes the **BLOS-10** Satellite DataLink: a Starlink-based, rugged gateway that provides wide-area IP backhaul and (in the VPN variant) contributes to our bonded multi-bearer transport. It is written for avionics integrators, broadcast engineers and field teams who install and operate the unit in aircraft, vehicles or fixed sites.

2. System Overview

BLOS-10 delivers satellite connectivity (Starlink Mini) and can combine it with up to four cellular SIMs to maintain service in challenging areas. A built-in VPN router is available to create secure tunnels and—when paired with BLOS-04—extend the mission network end-to-end.

3. Key Features

- Global coverage via Starlink Mini satellite service.
- Multi-path resilience: bonds Starlink with up to 4×cellular paths (where provisioned).
- Integrated VPN router (option): creates encrypted tunnels and virtual LANs between sites.
- Throughput: up to ~100 Mbps with low latency (service-dependent).
- Rugged I/O: 10/100 Mb Ethernet; MIL-spec D38999 (13-pin) power/data connector.
Wide supply range: 10–36 V DC, ~100 W.
- Environmental: IP67 enclosure with Gore pressure valve.

4. Representative Use Cases

- **Airborne ISR / Public Safety:** satellite backhaul maintains links over remote terrain; cellular paths add capacity when available.
- **Live Broadcast:** Starlink provides geographic independence; cellular augments bandwidth in urban areas.
- **Remote Operations:** reach test ranges, maritime routes or mountainous areas where terrestrial coverage is poor.

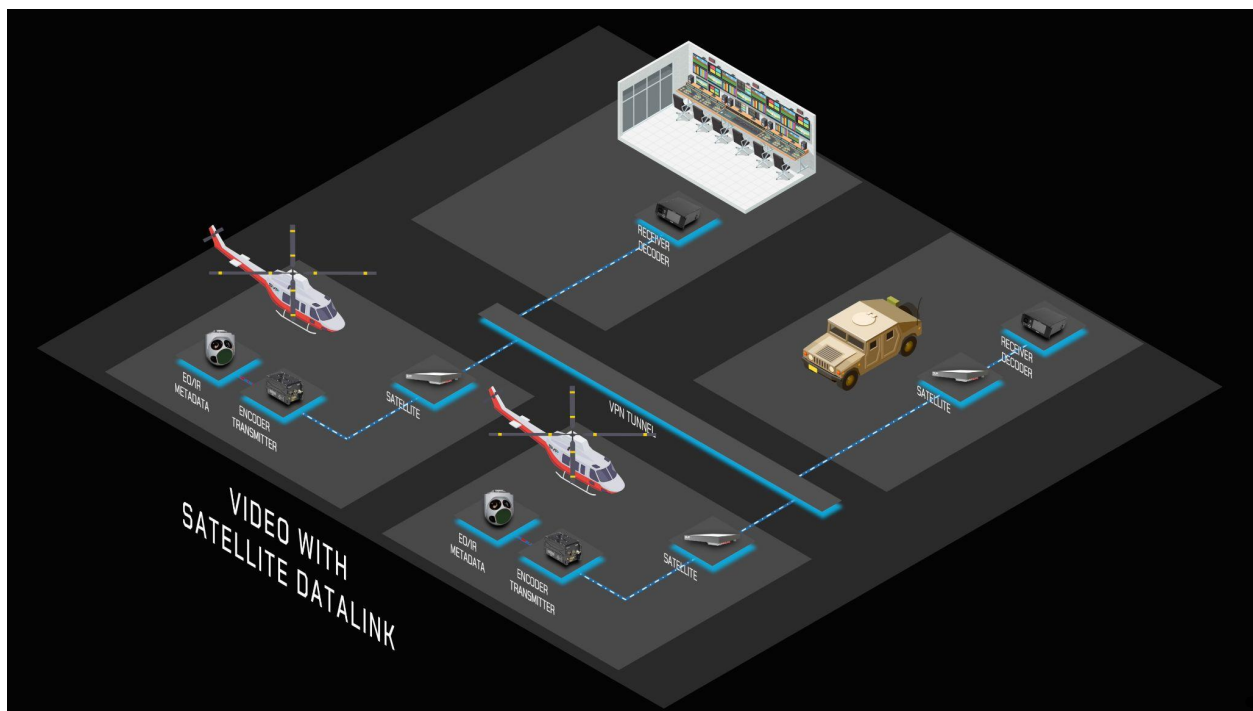
5. Operating Modes

5.1 Data Link Mode (BLOS-10-V)

Ships **with VPN router**. Use when you need encrypted site-to-site tunnels and integration with BLOS-04 bonded workflows.

5.2 Internet-Only Mode (BLOS-10-I)

Operates as a **stand-alone Internet gateway** (like an ISP access point for your local network), feeding on-board systems with general IP connectivity—no VPN/bonded tunnel required.



The BLOS-10 can operate as a fully stand-alone unit without the BLOS-04.

In this configuration, the terminal provides direct satellite connectivity to the local network, enabling IP communication, streaming, and data transfer through its integrated Webserver and Ethernet interface.

The system does not require any auxiliary equipment to establish or maintain the satellite link.

6. System Architecture

6.1 Interfaces

- **Ethernet:** 1× 10/100 Mb (data/LAN).
- **Connector:** MIL-SPEC **D38999, 13 pins** (combined power + data).

6.2 Bonding & Traffic Distribution

When cellular SIMs are provisioned, traffic is **distributed across satellite and cellular** based on link availability and quality; there is **no fixed priority** path. Balancing adapts dynamically to keep sessions stable.

7. Web-Server Interface

7.1 System Overview

This section provides a consolidated view of the terminal's status and performance.

- **Device**
Displays terminal identity and current operating state:
 - *State:* CONNECTED, SEARCHING, or STOWED.
 - *Uptime:* Time since last power-on.
 - *Hardware / Software:* Model identifier and firmware version.
 - *Azimuth / Elevation:* Antenna pointing angles.
 - *Indicators:* GPS (Disabled / Searching / Fix), Roaming, Obstruction (Clear / Obstructed).
- **Link Health**
A single quality score (0–100) with supporting metrics:
 - Latency (median round-trip time).

- Packet loss (percentage over recent window).
- Obstruction (current sky blockage).
Guide: ≥80 Excellent; 60–79 Good; 40–59 Fair; <40 Poor.

● Power

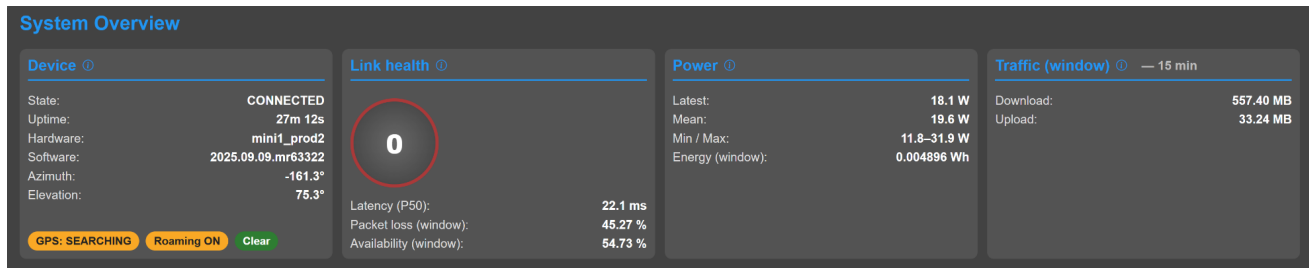
Reports power consumption statistics:

- Current draw (W).
- Minimum, maximum, and average values.
- Energy used over the recent window (Wh).

● Traffic

Shows network activity during the most recent interval:

- Upload and download volume (MB/GB).
- Real-time throughput charts (Upload/Download, Mbps), updated once per second, covering the last 60 seconds.



7.2 BLOS-10 Configuration

Operators can configure and secure the Webserver through the following panels:

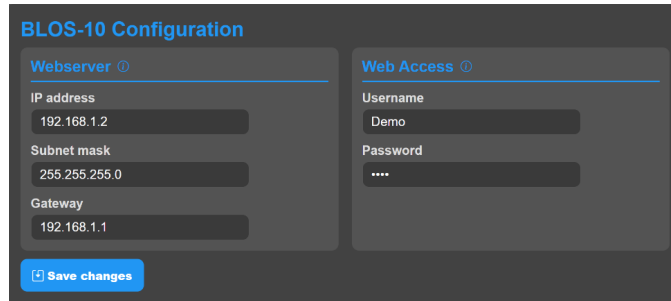
● Webserver

Network settings including IP address, subnet mask, and gateway. These values allow the BLOS-10 to fit into the local aircraft or ground network segment.

● Web Access

User login credentials (username and password).

- A failsafe password is also provided for emergency access; it must be safeguarded according to company policy.
- Sessions automatically expire after inactivity to maintain operational security.



BLOS-10 Configuration

Webserver

IP address
192.168.1.2

Subnet mask
255.255.255.0

Gateway
192.168.1.1

Web Access

Username
Demo

Password
....

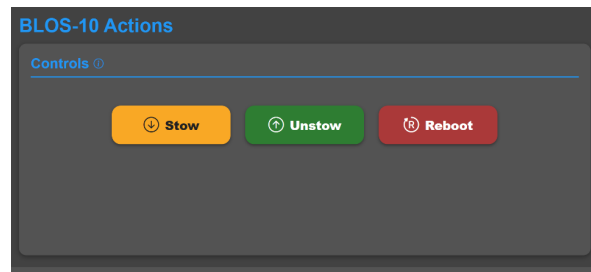
[Save changes](#)

7.3 BLOS-10

Actions

The Webserver offers direct controls for operating the terminal:

- **Stow:** Folds and secures the antenna for transport.
- **Unstow:** Deploys the antenna for satellite operation.
- **Reboot:** Restarts the terminal; connectivity is temporarily interrupted until the link is re-established.



BLOS-10 Actions

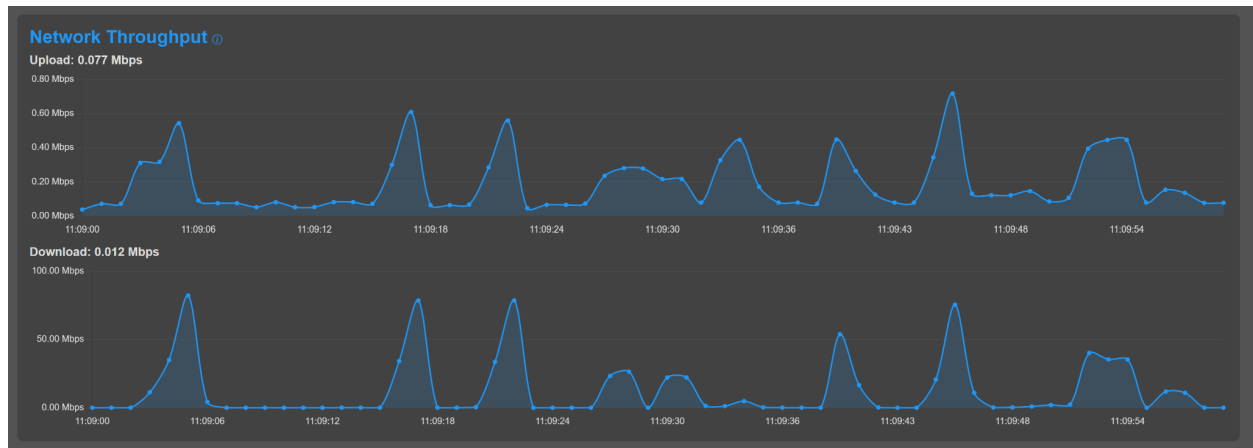
Controls

[Stow](#) [Unstow](#) [Reboot](#)

7.4 Network Throughput

Real-time performance charts for short-term behavior verification.

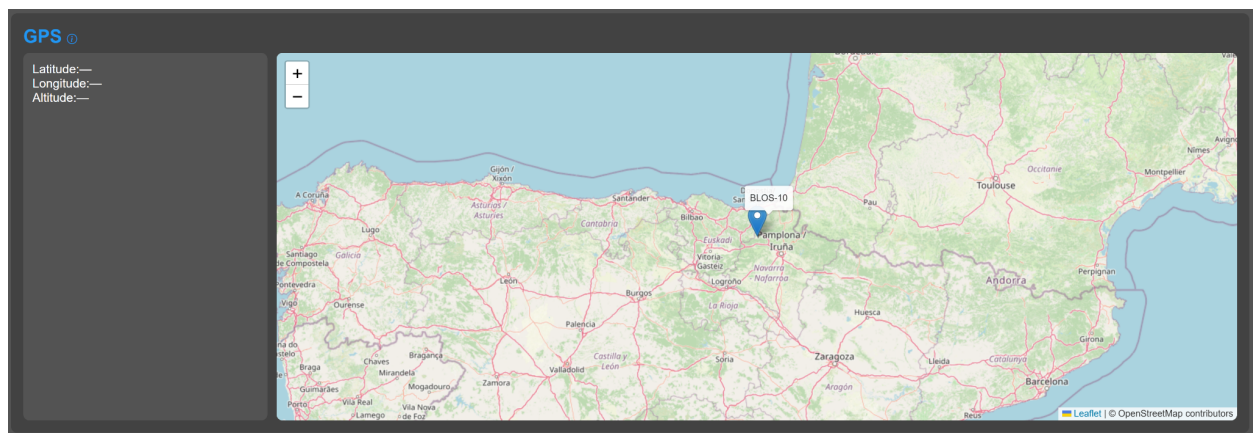
- **Upload / Download (Mbps)**
- **Update rate:** 1 Hz
- **Display window:** Last 60 seconds (rolling)
Use to validate stability, detect transient congestion, or confirm recovery after re-pointing or configuration changes.



7.5 GPS

Geographic position and an interactive map (when available).

- **Latitude / Longitude / Altitude** (numeric fields)
- **Map:** Centers on the most recent position and labels the device name
- **Note:** If fields are blank, ensure the terminal is allowed to share its location on the local network.



7.6 Alerts

The Webserver lists all system alerts to support troubleshooting. Alerts are color-coded for severity:

- **Green (Normal):** No action required.
- **Amber (Warning):** Degraded condition; investigation recommended.

- **Red (Critical):** Immediate operator action required.

Below is the full list of possible alerts and their meanings:

Motors Stuck

- **Meaning:** The antenna pointing motor is unable to move.
- **Impact:** The antenna cannot track satellites; service will be lost.
- **Corrective Action:** Power-cycle the unit. If unresolved, inspect installation for mechanical blockage (ice, debris, incorrect mount).

Thermal Throttling

- **Meaning:** The unit has reduced performance due to high temperature.
- **Impact:** Throughput may be limited.
- **Corrective Action:** Improve ventilation and cooling. Avoid operation in hot or enclosed environments.

Thermal Shutdown

- **Meaning:** The terminal has shut down automatically due to critical temperature.
- **Impact:** Service interrupted until the system cools down.
- **Corrective Action:** Allow cooling before restarting. Review environmental conditions and installation.

Mast Not Near Vertical

- **Meaning:** The antenna mast is tilted outside the acceptable range.
- **Impact:** Tracking performance reduced; possible service loss.
- **Corrective Action:** Verify the mounting surface is level and the mast is vertical.

Unexpected Location

- **Meaning:** The unit is operating outside its permitted service area.
- **Impact:** Service may be restricted or denied.
- **Corrective Action:** Confirm service coverage for the region. Contact provider if issue persists.

Slow Ethernet Speed Negotiation

- **Meaning:** The Ethernet port has negotiated a reduced speed.

- **Impact:** Bandwidth may be limited.
- **Corrective Action:** Check cable integrity. Use Cat5e or higher cabling. Reseat connectors.

Ethernet Limited to 100 Mbps

- **Meaning:** The Ethernet connection is restricted to 100 Mbps instead of 1 Gbps.
- **Impact:** Peak throughput reduced.
- **Corrective Action:** Replace the Ethernet cable. Verify the client network interface supports Gigabit operation.

Roaming Active

- **Meaning:** The terminal is connected via a roaming network.
- **Impact:** Latency and throughput may vary; costs may differ by plan.
- **Corrective Action:** Confirm roaming is acceptable for the mission. No further action required unless performance is insufficient.

Installation Pending

- **Meaning:** The installation procedure has not been completed.
- **Impact:** Full service may not be available.
- **Corrective Action:** Complete installation steps via the companion application.

Heaters Active

- **Meaning:** Internal heaters are operating to prevent ice accumulation.
- **Impact:** Increased power consumption.
- **Corrective Action:** Ensure sufficient power margin. No action usually required.

Power Supply Thermal Throttling

- **Meaning:** The power supply is limiting output due to high temperature.
- **Impact:** Reduced performance or instability possible.
- **Corrective Action:** Improve cooling and check power cabling.

Power Save Mode Active

- **Meaning:** The terminal has entered a low-power idle mode.
- **Impact:** Service may pause or be limited.
- **Corrective Action:** Resume normal operation to exit power save mode.

Beamforming Telemetry Stale

- **Meaning:** Antenna beamforming data is outdated.
- **Impact:** Possible degradation of link quality.
- **Corrective Action:** Monitor link health. If persistent, reboot the unit.

Low Motor Current

- **Meaning:** Motor current is abnormally low, often due to ice or mechanical jam.
- **Impact:** Antenna movement may be impaired.
- **Corrective Action:** Inspect antenna for ice or obstruction; clear before resuming operation.

Signal Lower Than Predicted

- **Meaning:** Received signal is below expected levels.
- **Impact:** Reduced throughput or stability.
- **Corrective Action:** Verify clear line-of-sight. Check for interference or obstructions.

Obstruction Map Reset

- **Meaning:** The obstruction map has been recently cleared.
- **Impact:** Predictions may be less accurate until rebuilt.
- **Corrective Action:** No action required; system will regenerate data automatically.

Water Detected in Dish

- **Meaning:** Moisture has been detected inside the antenna housing.
- **Impact:** Possible degradation or hardware damage.
- **Corrective Action:** Inspect sealing and housing. Reseal or service as required.

Water Detected in Router

- **Meaning:** Moisture has been detected inside the router.
- **Impact:** Risk of malfunction or permanent failure.
- **Corrective Action:** Inspect housing and cabling. Service or replace if compromised.

Router Port Slow Speed

- **Meaning:** The router port is operating below expected speed.
- **Impact:** Bandwidth may be restricted.
- **Corrective Action:** Verify Ethernet cabling and connectors. Replace if necessary.

Obstructed Now

- **Meaning:** The antenna currently lacks clear line-of-sight to the satellites.
- **Impact:** Service interruption or instability until obstruction clears.
- **Corrective Action:** Ensure clear sky view. Relocate if feasible.

Alerts ⓘ			
✓ Motor stuck Normal	✓ Thermal throttle Normal	✓ Thermal shutdown Normal	✓ Mast not near vertical Normal
✓ Unexpected location Normal	✓ Slow Ethernet Normal	✓ Ethernet 100 Mbps Normal	⚠ Roaming Active
⚠ Install pending Active	✓ Heaters on Normal	✓ PSU thermal throttle Normal	✓ Power save idle Normal
✓ DBF telemetry stale Normal	✓ Low motor current Normal	✓ Signal lower than predicted Normal	✓ Obstruction map reset Normal
✓ Dish water detected Normal	✓ Router water detected Normal	✓ Router port slow Normal	✓ Obstructed now Normal

8. Installation

8.1 Mounting & Placement

- **Mechanical footprint:** 273 × 312 × 30 mm (without connector); 2500g.
- **Mount compatibility:** Airfilm **DT-1-1** and **Dart Crosstube Antenna Mount**.
- **Connector orientation:** base-mounted **D38999** (13-pin).
- **Site selection (satellite):** choose a location with the **widest possible sky view**; avoid masts, blades or structures that can shadow the terminal. Keep cable runs secure and away from sharp bends.
- **Installation Orientation:** The BLOS-10 must be installed in a **horizontal position**, with the **fiberglass cover facing upward**. This orientation ensures optimal satellite visibility and proper internal thermal performance. Do not mount the unit vertically or inverted. Verify that the mounting surface is flat, rigid, and free of vibration.

8.2 Power & Data

- Supply **10–36 V DC**; design for **~100 W** headroom. Use the supplied harness on the **D38999**.
- Connect LAN equipment (or a BLOS-04 WAN port) to the Ethernet interface.

8.3 Commissioning Checklist

1. Verify power and boot.
2. Confirm **Starlink link** acquisition.
3. If cellular SIMs are present, confirm registration/bonding.
4. (VPN model) validate tunnel reachability end-to-end.
5. Record the device label and installation notes for maintenance.

9. Maintenance

- Keep the terminal with **clear sky view**; re-survey sites with new obstacles or seasonal foliage.
- Keep the top surface clean.
- Inspect the **D38999** connector and cabling for strain and sealing; maintain IP67 gaskets.
- Check **service subscriptions** (satellite and any cellular plans).
- Apply recommended firmware updates during scheduled maintenance windows.

10. Troubleshooting

- **No Internet:** verify satellite alignment / link state and cellular bonding (if used).
- **No VPN (V model):** confirm router credentials/tunnel config.
- **Power issues:** confirm 10–36 V supply and connector integrity.

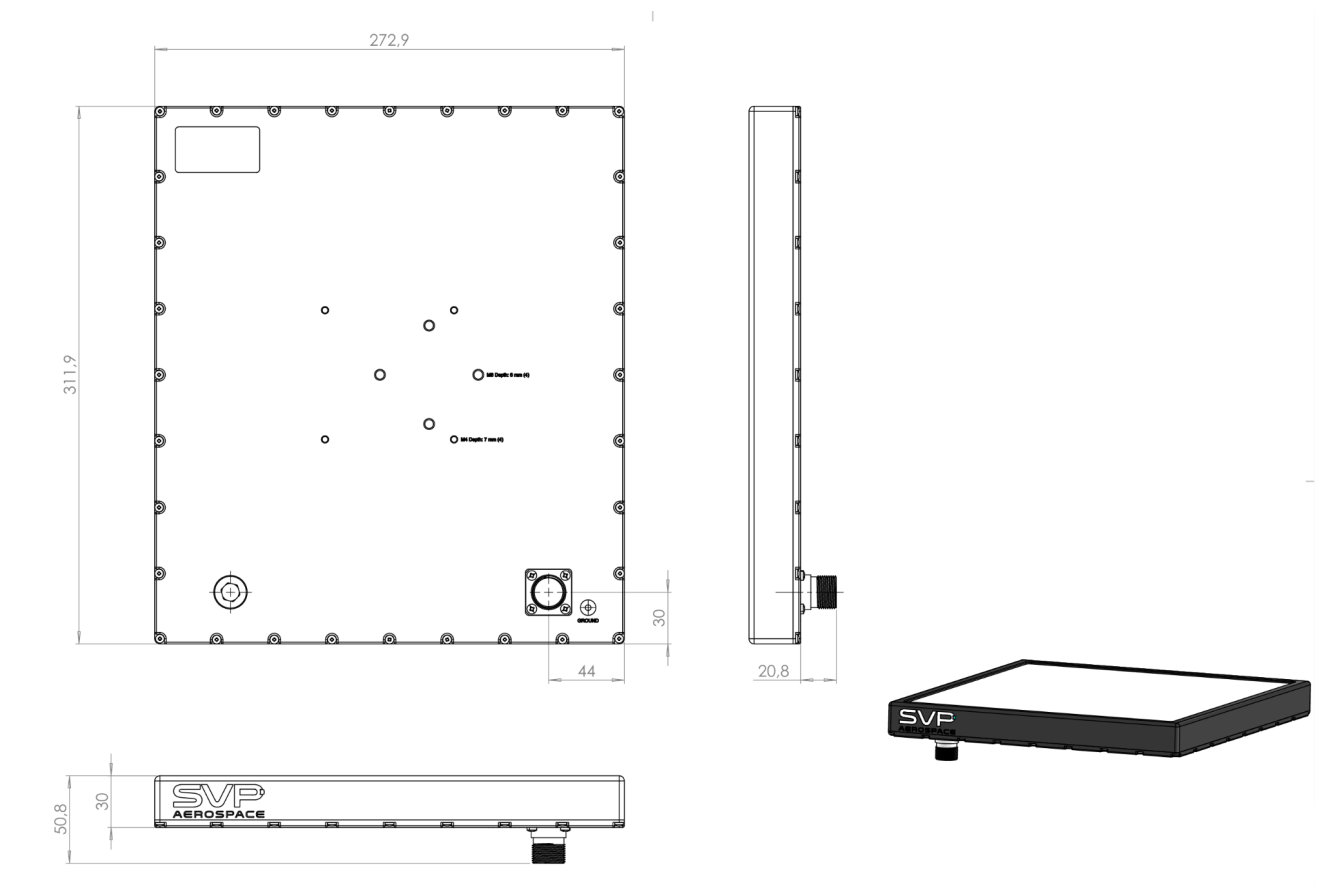
11. Specifications

Category	Specification
Satellite Backhaul	Starlink Mini–based satellite connectivity (service-dependent performance).

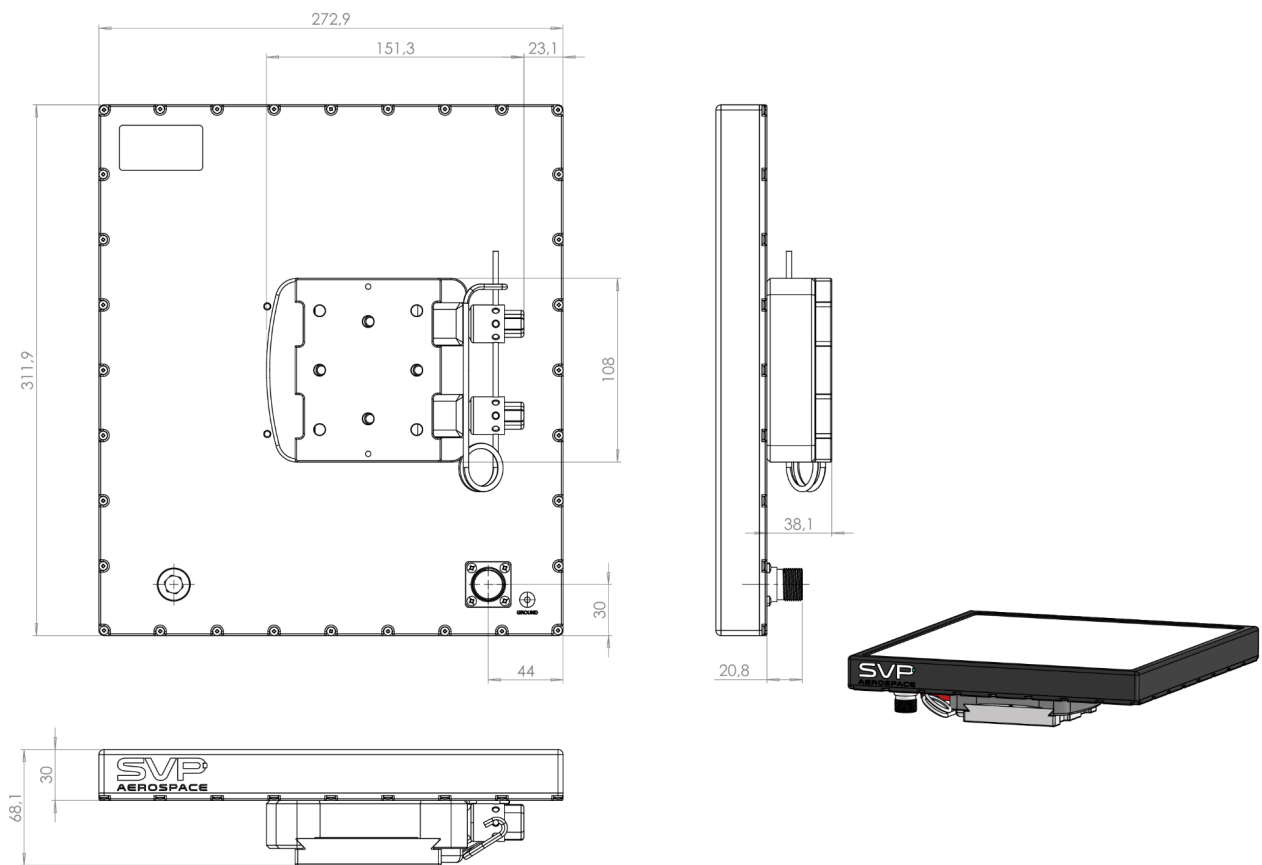
Cellular Aggregation (option)	Up to 4× LTE/5G SIM paths for multi-bearer resilience and added capacity.
VPN / Routing (model BLOS-10-V)	OPTIONAL: Integrated VPN router for encrypted site-to-site tunnels.
Internet Gateway (model BLOS-10-I)	Stand-alone Internet access point for on-board networks (no VPN required).
User Throughput	Up to 100 Mbps (aggregate, service-dependent).
Latency	Low-latency satellite path; actual figures depend on service conditions.
Ethernet	1×10/100Base-T.
Connector	MIL-DTL-D38999, 13-pin (combined power + data harness).
Power Input	10–36 V DC.
Power Budget	~100 W (size the supply for worst-case).
Mechanical Size	273 × 312 × 30 mm (without connector).
Weight	≈ 2500g.
Enclosure / Rating	Rugged sealed housing. IP67 ingress protection. Gore® pressure valve.
Mounting Compatibility	Airfilm DT-1-1 Dart Crosstube Antenna Mount (vehicle/aircraft use).

Operating Modes	DataLink (VPN) mode Internet-only mode (select at order time).
Interfaces Supported	Satellite (Starlink) Cellular (up to 4 SIMs, optional) Ethernet.
Environmental Notes	Install with the widest possible sky view; avoid obstructions and shadowing.
Ordering Codes	BLOS-10-V (with VPN router) BLOS-10-I (Internet-only gateway).

12. Mechanical Dimensions & How To Order



With **Airfilm**:



Refer to the dimensional drawing when placing or machining mounts. Ordering codes:

- **BLOS-10-V** — includes VPN router (DataLink).
- **BLOS-10-I** — Internet-only gateway.

13. Notes on Integration with BLOS-04

Connect the BLOS-10 Ethernet to the **WAN** port of a BLOS-04 to add satellite capacity to a bonded mission link. Traffic is shared across satellite and cellular paths based on real-time link quality—no manual prioritization is required.

PART III – Cloud

1. Introduction

This manual describes how to access and operate the **Cloud** portal for supervising fleets of **BLOS-04** units. It is written for pilots and mission operators, maintenance engineers, and fleet managers who need fast situational awareness without touching low-level configuration.

1.1 What the Cloud Is

The Cloud is a secure, browser-based dashboard that shows the **operational state** of every device you own (status, interfaces, throughput trends and GPS).

1.2 Why it Matters

Anywhere access: check your fleet from any network—no need to be on the same LAN as the device.

Single pane of glass: health, location and basic performance in one place.

Safe by design: automatic idle logout and conservative data handling (e.g., stale GPS hidden).

Mission clarity: quick “is it up, where is it, what is it doing?” answers for non-expert users.

2. Getting Started

2.1 Sign-In

Open the Cloud URL in a supported browser and enter your credentials. If authentication succeeds you land on the **Devices** page. The URL is: <https://cloud.svpaerospace.com/>

2.2 Session & Security

- Sessions expire automatically after **10 minutes** of inactivity for safety.
- Credentials and server communication are protected over HTTPS.

2.3 Data Freshness (at a glance)

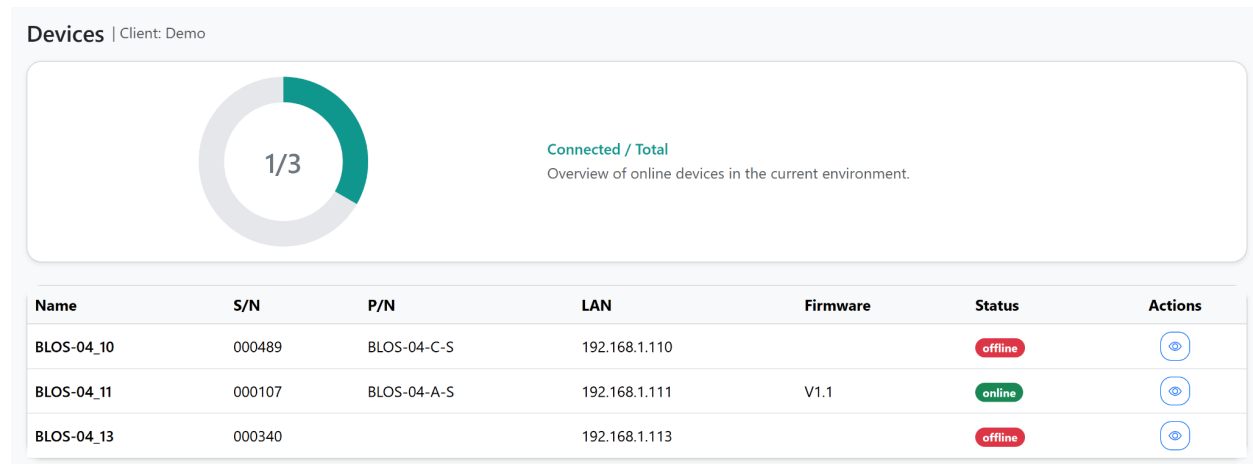
- **Devices list:** auto-refreshes every 30 seconds.
- **Device Details modal:** polls live data every 30 seconds while open.
- **Fleet map:** updates device positions every 1 minute.

3. Devices Page (Fleet View)

The table lists all devices linked to your account. Columns are intentionally compact and consistent with the BLOS-04 manual.

Column	Description
Name	Device name used throughout the system.
S/N	Serial number (prefix stripped to show only digits).
P/N	Part number.
LAN	Discovered local LAN address of the unit.
Firmware	Reported firmware version.

Status	Online/offline based on recent telemetry.
Actions	Eye icon to open Device Details.



4. Device Details

A focused, live view of one unit. The modal keeps updating every **30 s** while open.

4.1 Interfaces

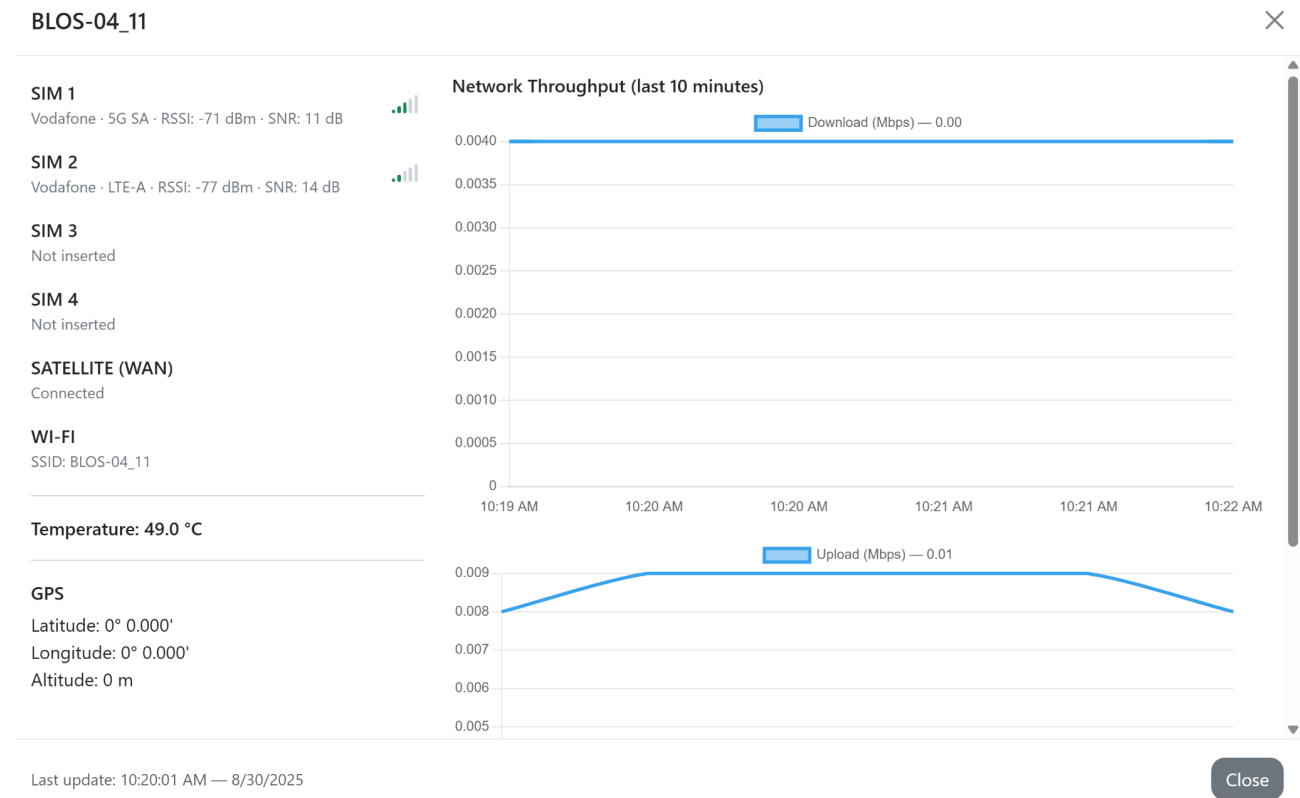
- **SIM 1–4** – Shows operator and technology (e.g., *LTE-A*, *5G SA*) with **RSSI** (dBm) and **SNR** (dB). Bars appear **only** when a SIM is present. Empty slots read **Not inserted**.
- **SATELLITE (WAN)** – **Connected** or **Disconnected**. No bars are displayed.
- **WI-FI** – When disabled, shows **Disconnected**. When enabled, shows **SSID**.

4.2 Network Throughput

Two line charts (Download/Upload) present a **rolling 10-minute** trend aggregated across active interfaces. The goal is a quick sense of activity, not per-link diagnostics.

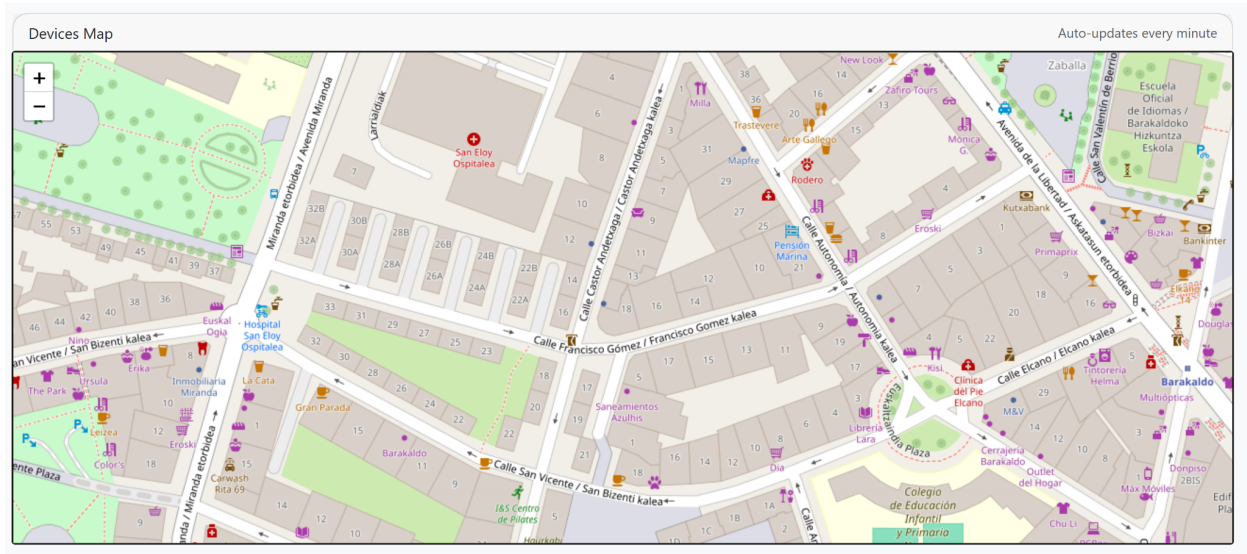
4.3 GPS

Coordinates are formatted in **degrees and minutes** with a sign, e.g., **43° 09.879'** and **-2° 37.630'**. Altitude is shown in meters. The **Last update** label prints **time first, then date**. GPS fixes older than **10 minutes** or at **0, 0** with zero altitude are hidden.



5. Map

An interactive map displays a marker for every device with a **fresh** GPS fix (≤ 10 minutes old). Each marker carries a **permanent label** with the device name. Clicking opens a popup with altitude and the last update time. When a new fix arrives, the previous marker is removed to show clean movement.



6. Operating Tips

- Keep the Device modal open for a few minutes to accumulate meaningful throughput samples.
- An empty **LAN** field usually means no valid local address was advertised
- If a device appears **offline**, ensure it has power and at least one active data link; allow up to two minutes for the list to refresh.

7. Troubleshooting

- **Can't sign in** → check credentials or try again with another browser (Microsoft Edge and Google Chrome are recommended).
- **No GPS shown** → the unit has not reported a valid fix in the last 10 minutes, or the last fix was 0, 0 with altitude 0.
- **Charts flat at zero** → the unit is idle or you opened the modal just now; wait for samples (30-second polling).

Glossary

- **Access Point (AP)** – Wi-Fi mode where the device creates a local wireless network clients can join. In this project AP is the typical mode for on-site access.
- **Activity (link)** – Telemetry flag indicating a network interface is passing traffic. Used to qualify “online” state.
- **AES-256** – Symmetric encryption standard (Advanced Encryption Standard, 256-bit key) used to protect data in transit or at rest.
- **Altitude (m)** – Height above mean sea level reported by the GNSS receiver; displayed in meters.
- **ARP (Address Resolution Protocol)** – IPv4 mechanism that maps an IP address to a device’s MAC address on the same LAN using broadcast queries. Relevant here because the BLOS-04’s L2 bridging preserves ARP traffic so airborne and ground devices can discover each other as if locally connected.
- **Backhaul** – The upstream connectivity that carries traffic from the field site to the wider internet/private core (e.g., satellite via BLOS-10, microwave, fiber).
- **Bandwidth / Bitrate** – Amount of data transferred per second. In the Cloud, throughput charts show Mbps (megabits per second).
- **BLOS-04** – Field unit providing multi-link IP connectivity for aircraft and mobile broadcast platforms. Exposes local web services and reports telemetry to the Cloud.
- **BLOS-10** – Satellite gateway that provides LEO satellite internet backhaul (e.g., Starlink) to extend coverage and independence from terrestrial networks.
- **Bonding / Aggregation** – Combining several links (e.g., multiple cellular modems, satellite/WAN) into one logical path to increase resilience and effective throughput.
- **Broadcast Contribution** – Transport of live audio/video from field locations to production or playout centers. Relies on predictable IP connectivity and link monitoring.
- **Carrier Aggregation (CA)** – LTE/5G feature that combines multiple radio carriers to increase user throughput.
- **Cellular (SIM 1–4)** – Packet radio interfaces (LTE / 5G) used for wide-area data links. Each slot reports operator, signal and technology.
- **CGNAT (Carrier-Grade NAT)** – Provider NAT that places devices behind shared public IPs; can complicate inbound connections and port forwarding.
- **Cloud (portal)** – Secure web dashboard that aggregates device status, GPS and basic performance for all your BLOS-04 units.
- **Connected / Disconnected** – Operational state of an interface. For SATELLITE (WAN) it indicates physical link availability; for Wi-Fi it reflects whether the AP is enabled.
- **Data Link** – Any path that carries IP traffic (cellular, Ethernet, Wi-Fi, satellite).
- **DCS / D38999** – Rugged circular connector family commonly used in aerospace; referenced in installation sections for power/data interfacing.
- **Degrees and Minutes (DMM)** – GPS format used in the Cloud: $\pm D^{\circ} M.mmm'$ (e.g., $43^{\circ} 09.879'$).

- **DHCP** – Protocol that automatically assigns IP configuration (address, mask, gateway, DNS) to devices on a network.
- **DO-160** – Environmental test standard for airborne equipment (temperature, vibration, RF susceptibility, etc.).
- **Diversity / MIMO** – Use of multiple antennas and/or radios to improve reliability and throughput via spatial diversity.
- **Downlink / Download** – Traffic from the device to the user; shown as Download (Mbps) in charts.
- **Encoder (Video)** – Device or software that compresses raw video/audio (e.g., H.264/H.265) and emits IP streams (SRT/RTMP/RIST).
- **ENG / SNG** – *Electronic News Gathering* (mobile news production) / *Satellite News Gathering* (using satellite uplinks).
- **Epoch / Timestamp** – Time in milliseconds since 1-Jan-1970 used in telemetry. Converted to local date/time in the UI.
- **FEC (Forward Error Correction)** – Adds redundancy to streams so receivers can repair some packet loss without retransmission.
- **Firmware** – Software image running on the device. Shown for quick asset tracking.
- **Fleet Map** – Interactive map in the Cloud displaying every device with a fresh GPS fix and a permanent name label.
- **GEO / MEO / LEO** – Geostationary / Medium- / Low-Earth-Orbit satellite regimes; LEO (e.g., Starlink) offers low latency with moving satellites.
- **GNSS / GPS** – Global navigation satellite system; “GPS” is used generically. The Cloud hides stale or invalid fixes (older than 10 minutes or 0,0 with 0 m altitude).
- **GCS (Ground Control Station)** – Flight operations workstation; often uses the Cloud for fleet situational awareness.
- **H.264/AVC, H.265/HEVC** – Video compression standards used by encoders; HEVC typically halves bitrate for similar quality vs AVC.
- **Headroom (network)** – Unused throughput margin available above current traffic; important for video quality during bursts.
- **HTTPS / TLS** – Encrypted HTTP over Transport Layer Security used by the Cloud for secure sessions.
- **ICCID** – Identifier of the SIM card. Useful for logistics; not typically displayed in the UI.
- **Idle Logout** – Automatic session termination after a period without user activity (8 minutes by default) to enhance security.
- **IMEI / IMSI** – Modem and subscriber identifiers seen in low-level diagnostics; not required for routine Cloud usage.
- **Interface** – Network port or radio (Cellular, Wi-Fi, Ethernet, VLAN) with its own status and metrics.
- **IP Rating (e.g., IP67)** – Ingress protection code indicating resistance to dust/water.
- **Jitter** – Variation in packet arrival time; high jitter can affect real-time media quality.
- **KLV / STANAG-4609** – Metadata (Key-Length-Value) format and NATO standard for ISR video; supported carriage over IP.

- **LAN (Local Area Network)** – On-site network where the device provides services. The Cloud displays the first valid non-private LAN address discovered.
- **Latency** – One-way or round-trip delay; lower is better for control and live contribution.
- **Latitude / Longitude** – Geographic coordinates. Presented in degrees & minutes with sign; hemisphere letters are omitted.
- **Link Bars** – Visual signal indicator used for cellular SIMs when a card is inserted. Not shown for Wi-Fi or satellite.
- **LOS / BLOS** – Line-of-Sight vs Beyond-Line-of-Sight radio operation; BLOS missions depend on resilient backhaul.
- **MNO (Mobile Network Operator)** – A cellular carrier that owns and operates radio access and core network infrastructure. Using multiple MNOs across SIM slots improves coverage diversity and resilience compared with relying on a single network.
- **Modal (Device Details)** – See Device Details (modal); updates every 30 seconds while open.
- **Modem (Cellular)** – Radio module that registers to the mobile network and presents IP connectivity to the system.
- **Mbps / kbps** – Megabits and kilobits per second, the units used in throughput reporting and internal stats.
- **Mission** – A discrete operational use of a device (flight, ENG live, etc.).
- **MTU (Maximum Transmission Unit)** – Largest IP packet size on a link; mismatches can cause fragmentation or loss.
- **NAT** – Network Address Translation; maps private addresses to public ones. See also CGNAT.
- **NTP** – Network Time Protocol used to synchronize clocks across devices.
- **Network Throughput** – Aggregate data-rate across active interfaces. The Cloud shows 10-minute rolling trends for download and upload.
- **Online / Offline** – Fleet status derived from recent telemetry timestamps and interface activity.
- **OpenVPN** – Common TLS-based VPN solution using certificates for authentication; supported for optional remote access.
- **Packet Loss** – Percentage of packets that never arrive; excessive loss degrades video/telemetry.
- **P/N (Part Number)** – Supplier part code used for ordering and inventory.
- **PoE (Power over Ethernet)** – Technique to power devices via Ethernet cabling (active 802.3af/at/bt or passive variants).
- **Polarization (antenna)** – Orientation of the electromagnetic field (e.g., vertical, horizontal); must match between ends for best performance.
- **QoS** – Quality of Service; prioritization mechanisms to protect real-time traffic.
- **RIST** – Reliable Internet Stream Transport; standards-based, interoperable alternative to SRT for professional video over unmanaged networks.
- **RSRP / RSRQ / SINR** – LTE/5G radio metrics: Reference Signal Received Power / Quality / Signal-to-Interference-and-Noise Ratio; often used alongside RSSI and SNR.

- **RSSI (dBm)** – Received Signal Strength Indicator. Negative number where values closer to 0 dBm are stronger (e.g., -65 dBm is stronger than -85 dBm).
- **RTMP** – Real-Time Messaging Protocol; legacy TCP-based live video protocol still used with some CDNs.
- **SATELLITE (WAN)** – Backhaul interface presented in the UI for satellite connectivity. Shows Connected/Disconnected; no bars are rendered.
- **SATCOM** – Satellite communications in general (GEO/MEO/LEO).
- **S/N (Serial Number)** – Unique hardware identifier; shown without alphanumeric prefixes for readability.
- **SNR (dB)** – Signal-to-Noise Ratio. Higher is better.
- **SRT (Secure Reliable Transport)** – UDP-based video transport protocol optimized for unpredictable networks. Features include **ARQ** packet retransmission, optional **FEC**, adaptive jitter buffer, **AES-128/256** encryption, and configurable end-to-end latency. Well-suited for contribution over cellular/satellite/WAN.
- **STA (Station) mode** – Wi-Fi client mode that joins another AP. Not typically used in this project but included for completeness.
- **Starlink** – LEO satellite constellation offering low-latency broadband; used by BLOS-10 to provide WAN backhaul.
- **Static IP** – Fixed address assigned to a device, often useful for firewall rules and return paths.
- **Stale (data)** – Information older than a safe threshold; the Cloud hides stale GPS or marks devices offline when telemetry ages out.
- **Telemetry** – Operational data emitted by devices: timestamps, link state, GPS, and counters.
- **Throughput Chart** – Line plot of Download/Upload Mbps over the last 10 minutes in the Device Details modal.
- **UAV / UAS** – Uncrewed aircraft system; common aviation context where BLOS-04 is deployed.
- **UI** – User Interface.
- **Uplink / Upload** – Traffic from the field unit to the network; shown as Upload (Mbps).
- **UTC** – Coordinated Universal Time. The UI shows local time; UTC may appear in raw logs.
- **VLAN** – Virtual LAN presented as a logical interface (vlan0) riding on top of Ethernet.
- **VPN** – Encrypted tunnel for remote access. Certificates can be generated from the Cloud when enabled.
- **WAN (Wide Area Network)** – Off-site connectivity (e.g., satellite or provider network) used to reach the Cloud.
- **WebServer** – Local HTTP service on the device for on-site maintenance; its address appears in the Devices list.
- **Wi-Fi** – Local wireless interface used mainly in AP mode for maintenance access; in the UI it displays *Disconnected* when disabled or *SSID*: when enabled.



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