SkyLine Ground Radio System (GRS) User and Installation Manual

Revision C

1 Table of Contents

2 Table of Figures

3 List of Tables

4 Proprietary Rights

5 Warranty

Uncertified uAvionix products are warranted to be free from defects in material and workmanship for one year from purchase.

Certified uAvionix products are warranted to be free from defects in material and workmanship for two years from purchase.

For the duration of the warranty period, uAvionix, at its sole option, will repair or replace any product which fails under normal use. Such repairs or replacement will be made at no charge to the customer for parts or labor, provided that the customer shall be responsible for any transportation cost.

This warranty does not apply to cosmetic damage, consumable parts, damage caused by accident, abuse, misuse, improper installation, water, fire or flood, damage caused by unauthorized servicing, or product that has been modified or altered.

IN NO EVENT, SHALL UAVIONIX BE LIABLE FOR ANY INCIDENTAL, SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, WHETHER RESULTING FROM THE USE OF, MISUSE OF, OR INABILITY TO USE THE PRODUCT OR FROM DEFECTS IN THE PRODUCT. SOME STATES DO NOT ALLOW THE EXCLUSION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU.

The warranty repair service shall be provided directly by uAvionix.

6 Revision History

Revision	Date	Comments
A		Initial Release
B	6/6/2025	Addition of revised images of the full level assembly diagrams and SkyStation915POE. Addition of kit contents for the products.
C	9/30/2025	Revised full level assembly diagrams. Added Link switching logic.

7 Regulatory Statements Regarding Frequency Authorization

Please see uAvionix document UAV-1006986-001 regarding full explanation of frequency authorizations required for Industrial, Scientific, and Medical (ISM) frequency bands, LTE frequency bands, and aviation protected C-Band frequency bands.

7.1 Industrial, Scientific, & Medical (ISM) Frequencies

This section is applicable to products using the 902-928MHz frequency range, including SkyStation915POE and SkyStation915LTE.

7.1.1 Federal Communications Commission (FCC) Statement
FCC ID: 2AFFTC2XISM

This device meets the FCC requirements for RF exposure in public or uncontrolled environments.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment

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.

7.1.2 Industry Canada (IC) Statement
IC ID: 25261-C2XISM

In order to comply with FCC / ISED RF Exposure requirements, this device must be installed to provide at least 20 cm separation from the human body at all times.

Afin de se conformer aux exigences d'exposition RF FCC / ISED, cet appareil doit être installé pour fournir au moins 20 cm de séparation du corps humain en tout temps.

This device complies with Industry Canada's license-exempt RSSs. Operation is subject to the following two conditions:

(1) This device may not cause interference; and

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1) l'appareil ne doit pas produire de brouillage;

) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement. Aviation Protected C-Band (5030-5090MHz)

This section is applicable to products using the 5030-5090MHzMHz frequency range, including SkyStation5060POE and SkyStation5060LTE.

7.1.3 Federal Communications Commission (FCC) Statement

The following required statement from the Federal Communications Commission (FCC) statement is applicable to ARS and GRS products using aviation protected C-Band frequencies only, and applies to United States based entities with the exception of direct sales to the U.S. Government and units directly exported by uAvionix:

This device has not been authorized as required by the rules of the Federal Communications Commission. This device is not, and may not be, offered for sale or lease, or sold or leased, until authorization is obtained.

7.2 LTE

This section is applicable to products using LTE frequency range, including SkyStation5060LTE and SkyStation915LTE.

The cellular service that is part of muLTElink is provided by an international MVNO (Mobile Virtual Network Operator) that has global coverage and is already pre-activated before shipping. All bandwidth costs associated with cellular data usage are included with the SkyLine service; there is no additional payment necessary regardless of the number of flight hours performed. In most countries the cellular service will use LTE Cat 1 for increased reliability and when not available in some parts of the world it will fall back to 3G/2G/EDGE as necessary. When multiple mobile carriers are detected as available, the one with the strongest signal strength and number of towers visible will be selected. In the US all major and most smaller carriers are supported with the exception of Verizon, which we will be adding

support for in 2023. While cellular service is widely available at and below 400ft AGL, it often becomes significantly less reliable at altitudes above that due to cellular towers optimizing their antennas for ground-based usage.

8 Introduction to CNPC

Control and Non-Payload Communications (CNPC) link systems are unique to Uncrewed Aircraft Systems (UAS). CNPC links provide Command and Control (C2) functionality of a UAS, and specifically exclude payload data that does not serve the CNPC function. CNPC solutions sometimes use aviation protected frequencies which are protected by international and national law and require frequency authorizations to be obtained from local regulatory authorities. The words “Non-Payload Communications” includes the CNPC Link System supporting remote pilot-to/from-ATC (Air Traffic Control) voice communications, also referred to as ATC relay.

Payload communications specifically include communications associated with the Uncrewed Aircraft (UA) mission payloads, which do not contain safety-of-flight information[1]. Therefore, payload communications do not require the use of aviation safety protected spectrum and are thus prohibited from using the CNPC link system. Some uAvionix products require specific regulatory frequency authorization. If your product requires this authorization, this will be identified in the specific product sections.

The performance of CNPC links are standardized and governed by RTCA and Federal Aviation Administration (FAA) Technical Standard Order (TSO) documentation. RTCA DO-362A provides the Minimum Operational Performance Specifications (MOPS) for terrestrial CNPC systems and defines much of the functionality for which uAvionix products have been designed. DO-362A capability supports the UAS information exchanges that allow the remote pilot to safely control, monitor, and manage the Uncrewed Aircraft (UA) utilizing the C-Band spectrum allocation.

8.1 CNPC Link System Components

A CNPC link system consists of the following:

1. CNPC link Airborne Radio System (ARS) consisting of:

[1] Safety-of-flight information is any information/data sent to or received from the UA that is necessary to ensure the UAS is operated/operating in a manner that protects people and/or property from harm due to unintentional events.

a. CNPC link system airborne radio(s)
b. One or more CNPC link system airborne antennas
c. Associated cabling connecting the radio(s) and antenna(s)

2. CNPC link Ground Radio System (GRS) – to include fixed or mobile installations of
   a. CNPC link system ground radio(s)
   b. One or more CNPC link system ground-based antenna(s)
   c. Associated cabling connecting the radio(s) and antenna(s)

NOTE: This document describes the installation and implementation of the uAvionix SkyLink GRS systems. The ARS installation and implementation is covered under separate documentation, document UAV-1006972-001.

Figure 1 illustrates the RTCA DO-362A representation of a CNPC link system.

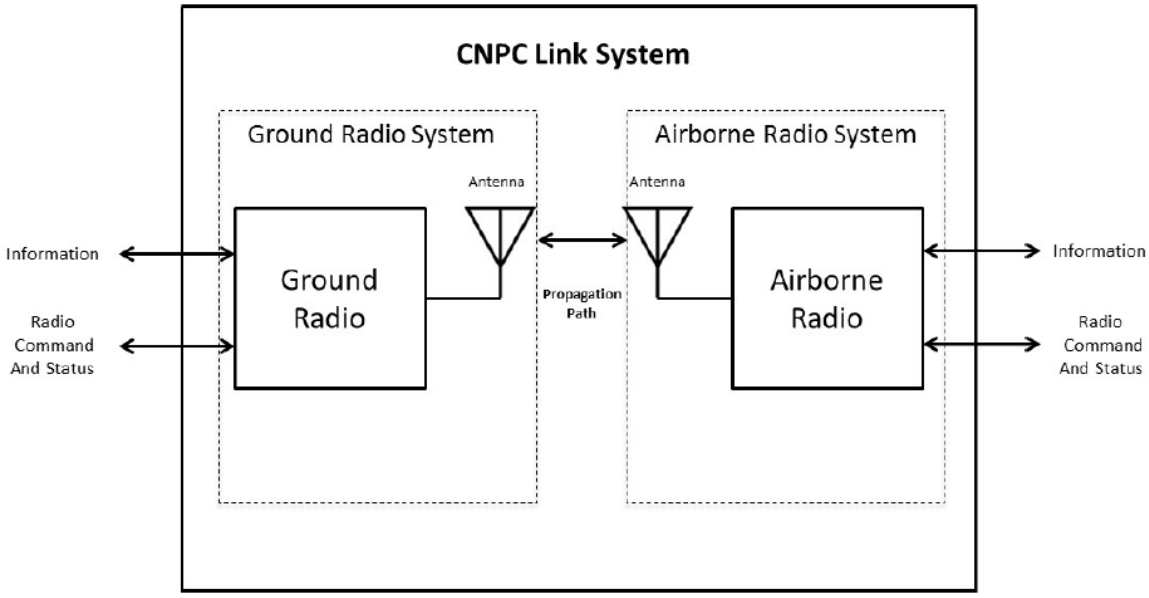

Figure 1: RTCA DO-362A illustration of CNPC link system components

NOTE: For the remainder of this document, CNPC and “Command and Control” (C2) may be used interchangeably.

9 Kit Contents

9.1 SkyStation5060POE

SkyLink Ground Radio System			
Item	Description	Qty	Part Number
1	SkyLink Ground Radio System	1	UAV-1006090-001
2	GRS Directional Antennas	2	UAV-1006176-001
3	GRS to Hub Wire harness	1	UAV-1006647-001
SkyLink Hub			
Item	Description	Qty	Part Number
1	SkyLink Hub	1	UAV-1006103-001
2	M12 X-Coded Ethernet Cable	1	UAV-1005899-001
GRS Pole Mounting Kit			
Item	Description	Qty	Part Number
1	Small hose clamp	2	UAV-1005632-001
2	GRS mounting arm	1	UAV-1006267-001
3	Shoulder screw	2	UAV-1005620-003
Hub Pole Mounting Kit			
Item	Description	Qty	Part Number
1	Small hole clamp	2	UAV-1005632-001
2	Hub mounting arm	1	UAV-1006270-001
3	Shoulder screw	1	UAV-1005620-003

9.2 SkyStation5060LTE

Item	Description	Qty	Part Number
1	Antenna 4G LTE Omni Directional Antenna	1	UAV-1006826-001
2	Omni Directional Antenna	1	UAV-1006288-001
3	Mounting Bracket	1	UAV-1007324-001

4	Socket Head Cap Screw	1	UAV-1007088-004

9.3 SkyStation915POE

Item	Description	Qty	Part Number
1	SkyStation915POE Top Level Assembly	1	UAV-1005539-001
2	LoRa Gateway Antenna 3dbi Gain Glass Fiber Reinforced Antenna RAK831 Connect Cable Ultra Distance Transmission 915MHz Q074	2	UAV-1003059-001
3	M12 ETHERNET CABLE, IP67, M12 X-CODED, RJ45, CAT5, Black 5m	1	UAV-1005899-002
4	Hose Clamp, 1-5/16"- 2-1/4"	2	UAV-1005632-001
5	Mounting Arm, Strap, skyStation2	1	UAV-1005552-001
6	Shoulder Screw, Slotted, M5 x .8, 8mm Shoulder Length	2	UAV-1005620-004
7	Getting Started Card, skyStation2	1	UAV-1005282-019

9.4 SkyStation915LTE

Item	Description	Qty	Part Number
1	SkyStation915LTE Top Level Assembly	1	UAV-1006904-001
2	RF ANT 916MHZ WHIP TILT SMA MALE	2	UAV-1005802-001
3	Socket Head Cap Screw, Hex 3/16, 1/4-20 x 3/8, SS	1	UAV-1007088-004
4	Mounting Bracket, SkyStationLTE	1	UAV-1007324-001

10 Introduction to uAvionix SkyLine and SkyLink GRS Solutions

uAvionix CNPC solutions are managed through a software/services solution called SkyLine™. SkyLine is what is known by RTCA DO-377A[2] as a C2 link Communications Service Provider (C2CSP) platform.

SkyLine is a cloud-based solution which communicates in real-time to all components of the CNPC link system (including all ARS and GRS) and provides real-time telemetry, health and status, radio performance statistics to a remote pilot in command (RPIC), flight crew, or other operations personnel. SkyLine has many additional features including data storage, detect and avoid (DAA) functionality, and frequency allocations which are covered elsewhere in SkyLine documentation (UAV-1005905-001). Features of SkyLine in this document cover only the interaction associated with GRS installation and configuration. SkyLine is available as an application/service from uAvionix or as an API for integration into Uncrewed Traffic Management (UTM) or Ground Control Station (GCS) platforms.

When SkyLine is used with multiple GRS, SkyLine manages make-before-break (MBB) functionality to allow roaming of a single ARS from one GRS to another in a safety-case compliant manner.

The use of SkyLine is required for configuration and setup of uAvionix ARS and GRS.

[2] Minimum Aviation System Performance Standards (MASPS) for C2 Link Systems Supporting Operations of Unmanned Aircraft Systems in U.S. Airspace

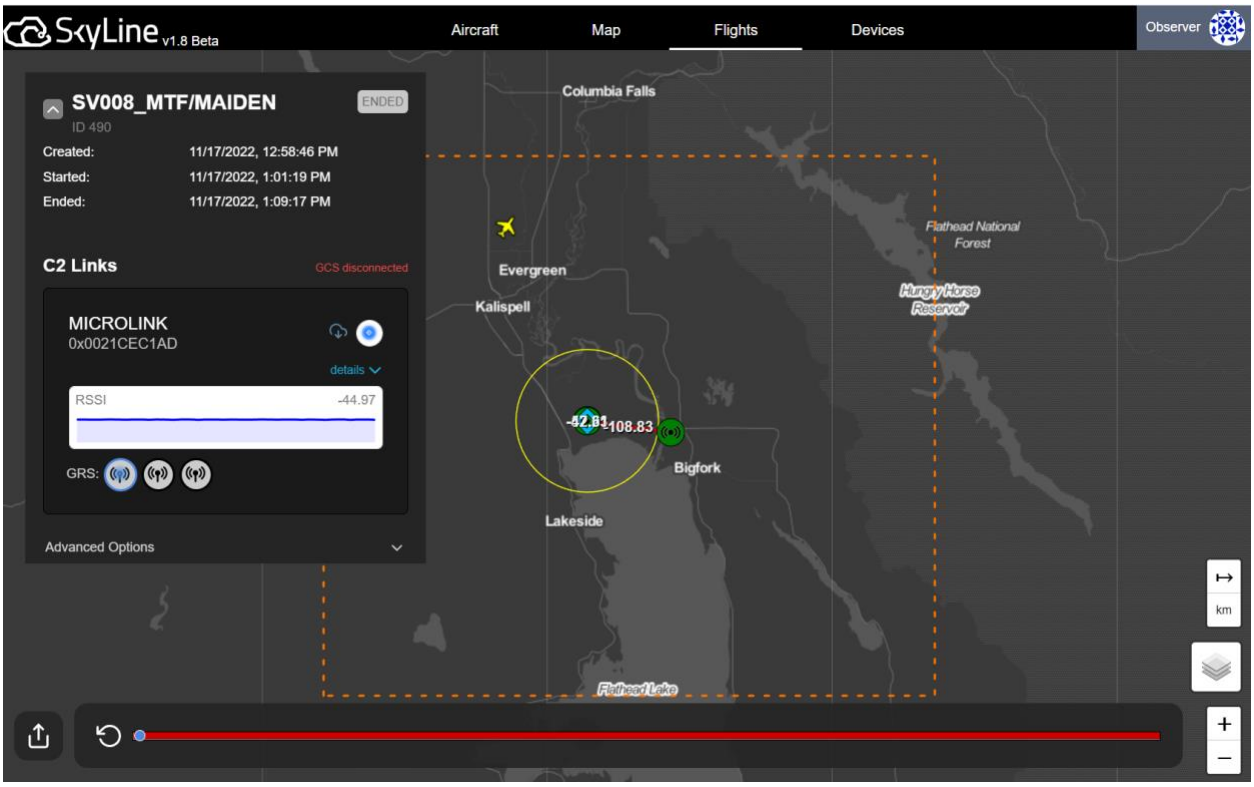

Figure 2: SkyLine display screen

10.1 GRS Solutions

uAvionix offers multiple GRS options depending on customer needs. Some factors which determine which ARS is selected include frequencies used and frequency authorizations required, locations flown, desired range, and mounting/installation preferences.

Error! Reference source not found. provides a comparison matrix between GRS models to aid in product selection Figure 1.

GRS	ISM	C-Band	Backhaul	Transmit Power	Region
SkyStation915POE	X		IP/POE	2W EIRP	North America
SkyStation915LTE	X		LTE	2W EIRP	North America
SkyStation5060POE		X	IP/POE	80W EIRP	Global with license
SkyStation5060LTE		X	LTE	2W EIRP	Global with license

Table 1: GRS Comparison Matrix

The following paragraphs provide a high-level overview of each GRS option.

10.1.1 ISM GRS

10.1.1.1 SkyStation915POE

Previously known as “SkyStation2”, SkyStation915POE is an FCC and IC approved, aviation grade, Beyond Visual Line of Sight (BVLOS) C2 datalink radio designed for long-range mission-critical UAS operations. SkyStation915POE leverages 1T2R diversity with omnidirectional dipole antennas.

SkyStation915POE GRS is compatible with the following uAvionix ARS:

- SkyLink915
- SkyLink915micro
- muLTElink915

SkyStation915POE is an IP67 weatherproof, Power over Ethernet (PoE) Class1 4W network connected GRS which provides connectivity to the SkyLine system through the M12 X-Code Ethernet PoE connection which must be connected to an internet-connected Local Area Network (LAN).

Figure 3: SkyStation915POE

10.1.1.2 SkyStation915LTE

SkyStation915LTE is an FCC and IC approved, aviation grade, Beyond Visual Line of Sight (BVLOS) C2 datalink radio designed for long-range mission-critical UAS operations.

SkyStation915LTE GRS is compatible with the following uAvionix ARS:

- SkyLink915
- SkyLink915micro
- muLTElink915

SkyStation915LTE is a battery powered (Dewalt 20V MAX 'POWER STACK'), portable network connected GRS which provides connectivity to the SkyLine system through the integrated LTE connection. LTE is provided for backhaul connectivity only and does not provide C2 functionality to the UA.

Figure 4: SkyStation915LTE

10.1.2 C Band GRS

10.1.2.1 SkyStation5060POE

Previously known as “SkyLink GRS”, SkyStation5060POE is a RTCA DO-362A compliant BVLOS C2 datalink radio designed for long-range mission-critical UAS operations. SkyStation5060POE is a bi-directional, Multiple Input Single Output (MISO) architecture.

SkyStation5060POE GRS is compatible with the following uAvionix ARS:

- SkyLink5060
- SkyLink5060micro
- muLTElink5060

SkyStation5060POE is a weatherproof, IP67, Power over Ethernet (PoE) network connected GRS which provides connectivity to the SkyLine system through the PoE connection which must be connected to an internet-connected Local Area Network (LAN).

Figure 5: SkyStation5060POE

10.1.2.2 SkyStation5060LTE

SkyStation5060LTE is an FCC and IC approved, aviation grade BVLOS C2 datalink radio designed for long-range mission-critical UAS operations. SkyStation5060LTE is a bi-directional, Multiple Input Single Output (MISO) architecture.

SkyStation5060LTE GRS is compatible with the following uAvionix ARS:

- SkyLink5060
- SkyLink5060micro
- muLTElink5060

SkyStation5060 LTE is a battery powered; portable network connected to GRS which provides connectivity to the SkyLine system through the integrated LTE connection. LTE is provided for backhaul connectivity only and does not provide C2 functionality to the UA.

Figure 6: SkyStation5060LTE

11 Installation

SkyLink GRS radios connect to the SkyLine system through the backhaul interface, either Ethernet or LTE depending on the model of GRS. GPS input is required for proper timing of frequency hopping and transmission of messages, the GPS module is provided as either an integral component of the GRS for the 915 models, or as a separate hub for the 5060 models. General information is provided in this section, follow the installation specifications later in this document for specific power, antenna and wiring information.

11.1 Tower Mount / POE Model Installations

11.1.1 SkyStation915POE Installation

11.1.1.1 SkyStation915POE GRS Physical Installation

The SkyStation915POE GRS mounting bracket is angled 6° upward to maximize airborne coverage. The required GPS is integral to the SkyStation915POE and no additional input is required.

1. Secure the mounting bracket to a pole with the included stainless steel hose clamps.
2. Align the GRS with the mounting bracket and slide the GRS into place over the end of the bracket. The bracket will now hold the GRS in place.
3. Use the included mounting screw(s) to fasten the GRS to the bracket.
4. Attach the GRS antennas and tighten.

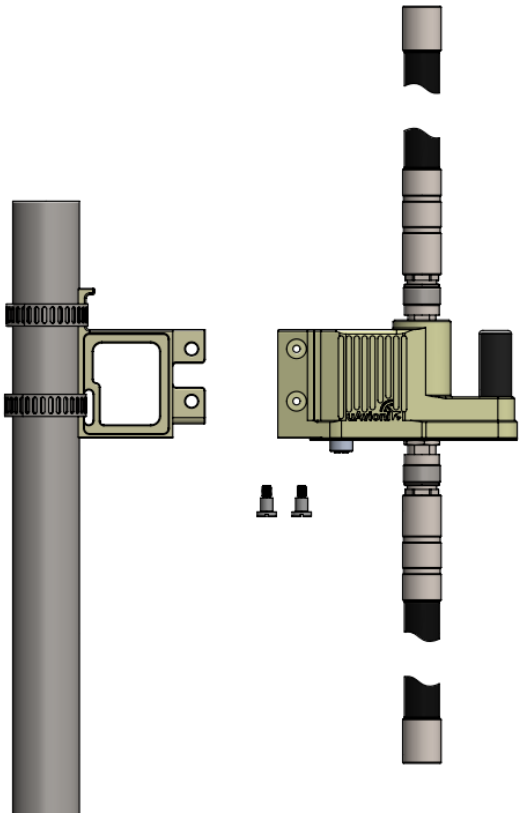

Figure 7: skyStation915POE Installation Components

11.1.1.2 SkyStation915POE GRS Network Connection

The SkyStation915POE GRS connects to a network via POE using an M12 X-Coded connector.

Parameter	Value
Standard	**803.3af (802.3at Type1)**
Maximum power	Class 1, 4W
Voltage Range	37 – 57V
Supported Cabling	Shielded Cat 3 and Shielded Cat 5
Maximum Cable Length	100 meters

Table 2: POE Specifications

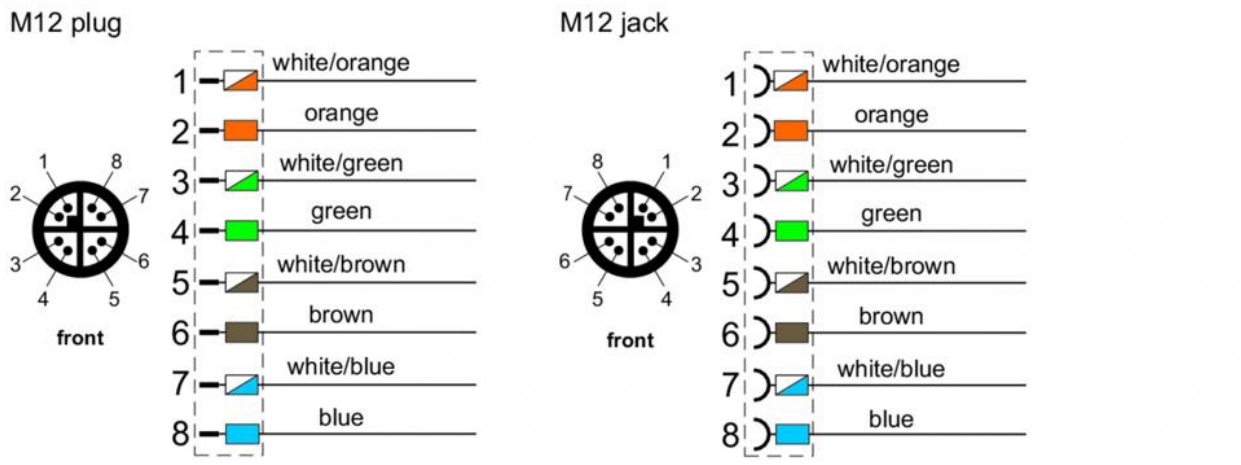

Table 3: M12 Wiring Diagram

11.1.2 SkyStation5060POE Installation

11.1.2.1 SkyStation5060POE GRS Physical Installation

The SkyStation5060POE GRS mounting bracket is angled 6° upward to maximize airborne coverage. The required GPS is provided through an external SkyStation HUB GPS device.

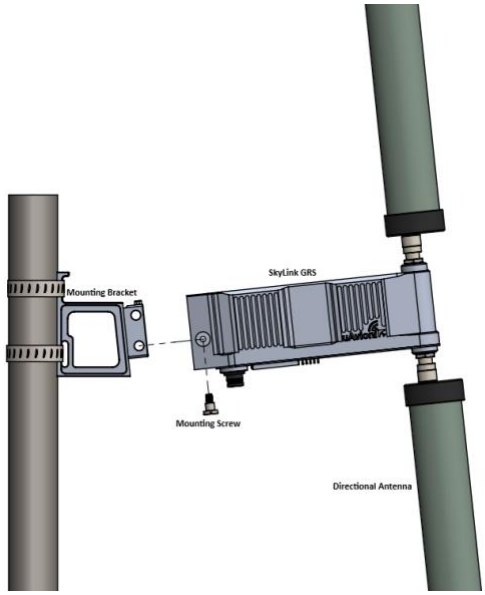

Figure 8: SkyStation5060POE Installation

1. Secure the mounting bracket to a pole with the included stainless steel hose clamps.
2. Align the GRS with the mounting bracket and slide the GRS into place over the end of the bracket. The bracket will now hold the GRS in place.
3. Use the included mounting screw(s) to fasten the GRS to the bracket.
4. Attach the GRS antennas, tighten, and adjust orientation.
5. A directional arrow on the end cap of each antenna denotes the transmit and receive direction of the antenna. The antennas have 110 degrees of horizonal sector coverage (55 degrees on either side of the directional arrow). Point *both* antenna arrows in the direction of your operational area for best performance. See
6. Figure 9.

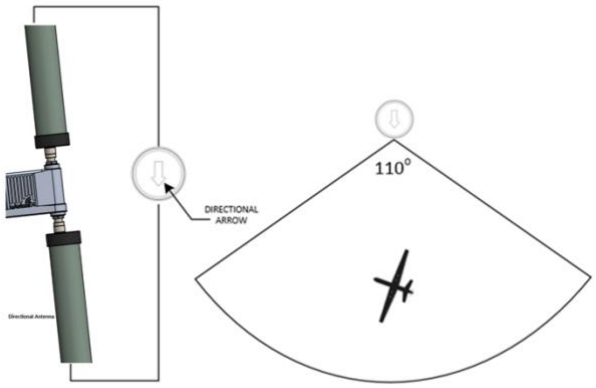

Figure 9: Alignment of SkyStation5060POE Orientation

11.1.2.2 SkyStation Hub Physical Installation

The SkyStation Hub Mounting Bracket is *not* angled. The Hub mounts perpendicular to the pole, and the GPS antenna should point up. Position the hub away from the GRS to avoid interference.

1. Fasten the Hub Mounting Bracket to a pole with the included stainless steel hose clamps.
2. Align the Hub with the Mounting Bracket and slide the Hub into place.
3. Use the included mounting screw to fasten the Hub to the bracket.

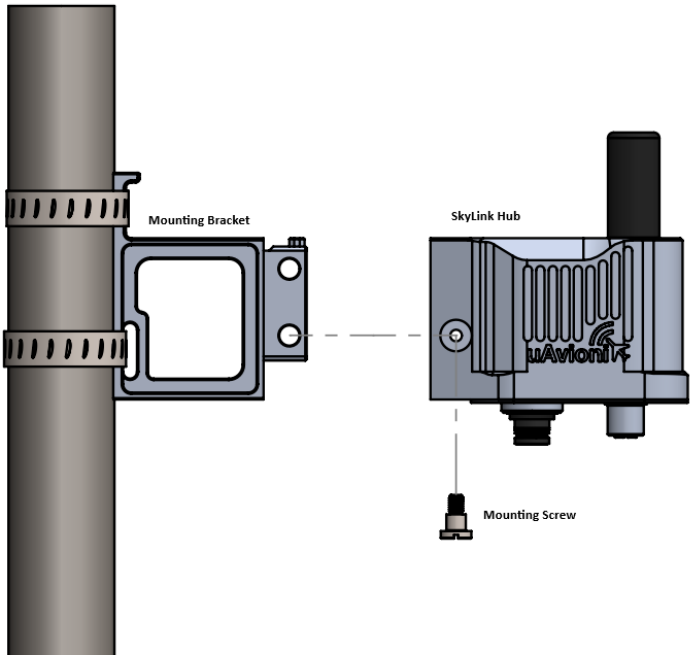

Figure 10: SkyStation Hub Installation

11.1.2.3 SkyStation5060POE GRS Network Connection

The SkyStation5060POE GRS connects to a network via **POE++** using an M12 X-Coded connector.

Parameter	Value
Standard	**803.3bt (Type4 POE++)**
Maximum power	Class 4, 40W
Voltage Range	41 – 57V
Supported Cabling	Shielded Cat 3 and Shielded Cat 5
Maximum Cable Length	100 meters

Table 4: POE++ Specifications

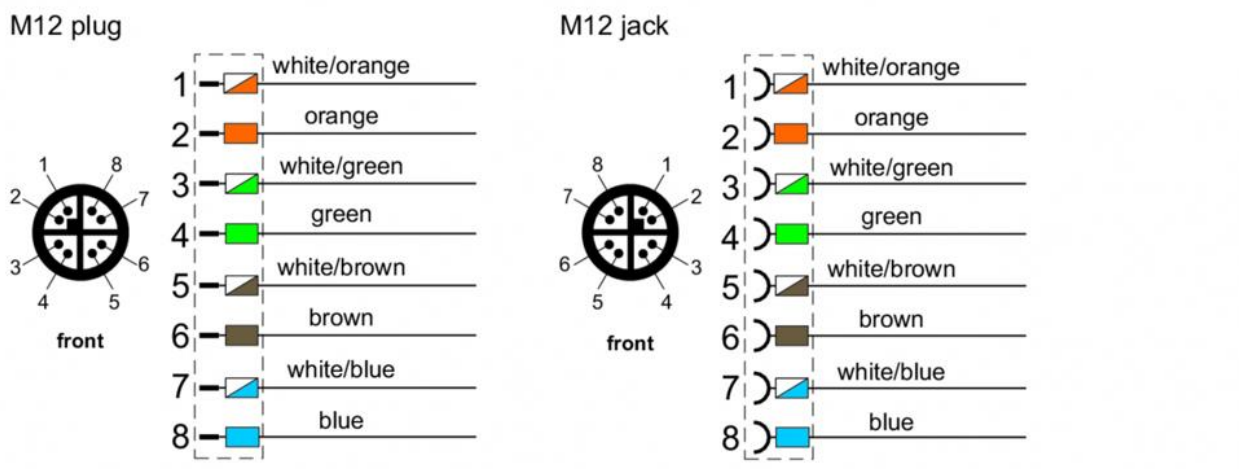

Table 5: M12 Wiring Diagram

11.2 Portable / LTE Model Installations

11.2.1 SkyStation915LTE Physical Installation

SkyStation915LTE is a complete standalone all-in-one GRS that requires no physical mounting or physical network connection. Preconfigured, integrated LTE provides backhaul connectivity to the SkyLine cloud.

1. Install a charged compatible DeWalt battery into battery cradle. Next, confirm the battery is firmly latched into place. SkyStation915LTE is designed to be compatible with the DEWALT POWERSTACK™ 5ah battery and power adapters. See **Error! Reference source not found.** for compatible solutions.

DeWalt Part Number	Description	Estimated Run Time
DCBP034	DeWalt 20V MAX POWERSTACK™	12 HRS

Table 6: Compatible Batteries and Corded Power Adapters

2. Attach two ISM omnidirectional antennas and two LTE omnidirectional antennas tightly. All antennas are vertically polarized and should be positioned perpendicular to the ground.
3. Optional – SkyStation915LTE can be mounted on a standard camera tripod using the included ¼-20 extension attachment.

11.2.2 SkyStation5060LTE Physical Installation

SkyStation5060LTE is a complete standalone all-in-one GRS that requires no physical mounting or physical network connection. Preconfigured, integrated LTE provides backhaul connectivity to the SkyLine cloud.

1. Install a charged compatible DeWalt battery into battery cradle. Next, confirm the battery is firmly latched into place. SkyStation915LTE is designed to be compatible with the DEWALT POWERSTACK™ 5ah battery and power adapters. See **Error! Reference source not found.** for compatible solutions.

DeWalt Part Number	Description	Estimated Run Time
DCBP034	DeWalt 20V MAX POWERSTACK™	12 HRS

Table 7: Compatible Batteries and Corded Power Adapters

2. Attach the C-Band omnidirectional antennas and the LTE omnidirectional antenna tightly. All antennas are vertically polarized and should be positioned perpendicular to the ground.
3. Optional – SkyStation5060LTE can be mounted on a standard camera tripod using the included ¼-20 extension attachment.

12 Configuration

Configuration requires registering the ARS and GRS with SkyLine and configuring your autopilot and GRS to communicate to the ARS and GRS respectively.

Configuration of the SkyStation915POE and SkyStation5060POE are identical This section will refer to all models as “SkyStation”.

To configure the SkyStation:

1. Connect the SkyStation915POE device to a POE or SkyStation5060POE to POE++ switch on a network with a DHCP server via the M12 X-Coded ethernet port. SkyStation915LTE and SkyStatio5060LTE need to be powered by a charged battery and can be connected to an ethernet Switch.
2. Use a network scanning tool (e.g. Advanced IP Scanner) to look for a device named “SkyStation-XXXX” (XXXX should match the four hex characters of the last two bytes of the device’s MAC address). See Figure 11.

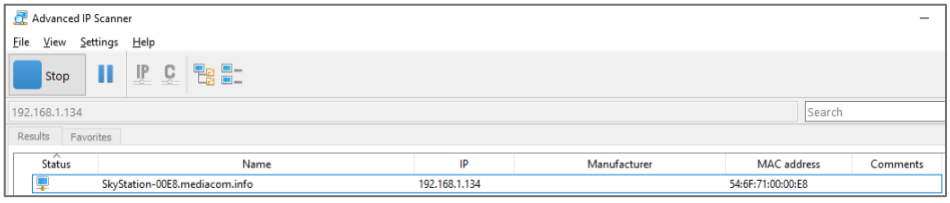

Figure 11: Example of Advanced IP Scanner showing a SkyStation IP Address

3. Use a web browser (e.g. Chrome) to navigate to the IP address revealed by the network scanning tool. (e.g. http://192.168.1.134).

4. A website similar to Figure 12 is displayed. Update the “Websocket URL” field to the websocket URL for the specific SkyLine POD to connect to. This will be obtained from uAvionix support.

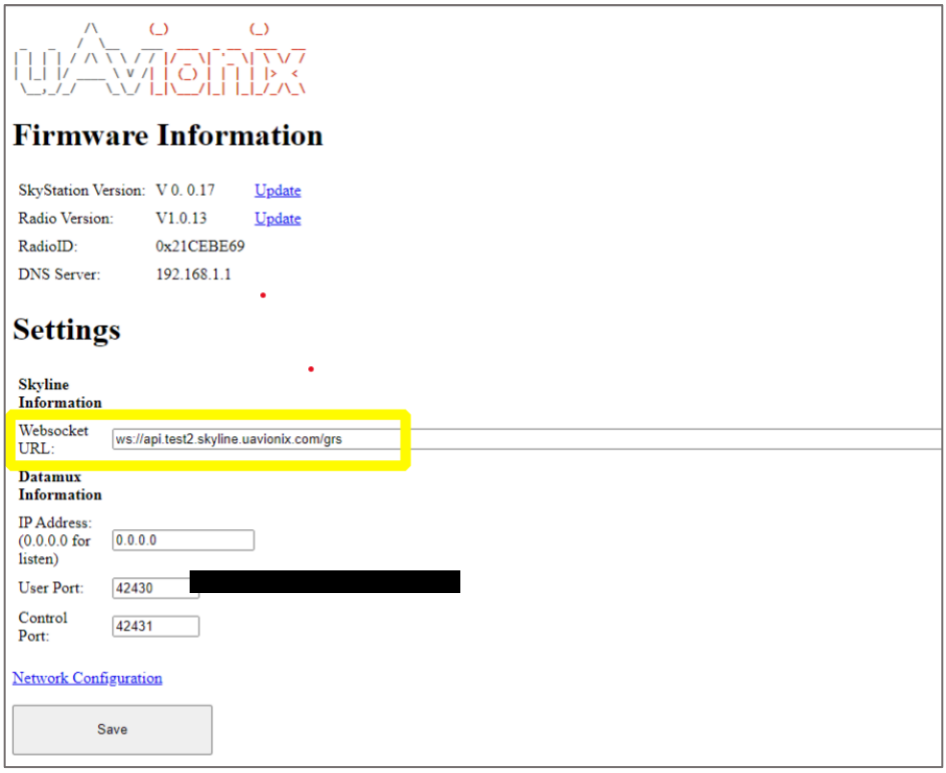

Figure 12: Sample SkyStationPOE Configuration Screen

5. Click “Save” button to update device configuration.
6. Go to the specific SkyLine POD (e.g. https://test2.skyline.uavionix.com) and confirm that the device appears under Devices > GRS. The device will be named the Radio ID (shown on webpage – e.g. 0x0021CEBE69). See Figure 13.

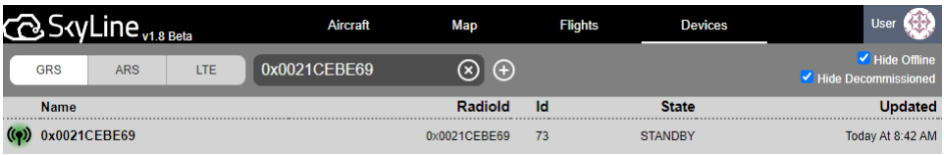

Figure 13: Connecting device under Devices>GRS

13 GRS Link Switching and Roaming (Ground) Logic

This section will be useful for UAS operators and engineers.

The GRS (Ground Radio Station) uses SkyDM (SkyLine DataMux) to manage both **link switching** (between mediums/paths) and **roaming** (between multiple GRS within a medium). SkyDM is the key component that multiplexes the C2 links during a flight.

13.1 Link Switching

Link Switching chooses the primary link medium/paths (e.g., LTE vs Satcom) on the ground.

- **Inputs**: 1-second average of received user data on all links.
- **Scope**: Evaluates and switches between *different link mediums/paths* (e.g., LTE vs. Satcom).
- **Prioritization**: When the current active link becomes inactive (no data for >1 second), chooses an active link with the highest received rate (if multiple).
- **Evaluation cadence**: Every 1 second with double-hysteresis, consistent with muLTElink.
- **Trigger**: Switch occurs when a link is disqualified (0 user data, poor RSSI, or loss of connectivity).
- **Behavior**: Prioritizes stability with hysteresis to avoid unnecessary flapping.

13.2 Roaming (Within a Link)

Roaming chooses the *lead GRS* within a given link when multiple GRS are available.

- **Scope**: Roaming operates *within a single link* when multiple GRS are available.
- **Inputs**: Network connectivity status, RSSI strength, and reception of ARS heartbeats.
- **Qualification**: Each GRS is qualified using this combination of factors.
- **Evaluation cadence**: Every 1.5 seconds.
- **Hysteresis**: Single hysteresis applied to reduce unnecessary swaps.

- **Selection**: Chooses the *lead GRS* from qualified candidates; prefers strongest RSSI if all else equal.

13.3 Operator Takeaway

- **Primary vs. Lead distinction**: Operators should note that link switching chooses the *primary link medium*, while roaming chooses the *lead GRS* within that link.

14 Support

For additional questions or support please visit:

http://www.uavionix.com/support/

15 Appendix A

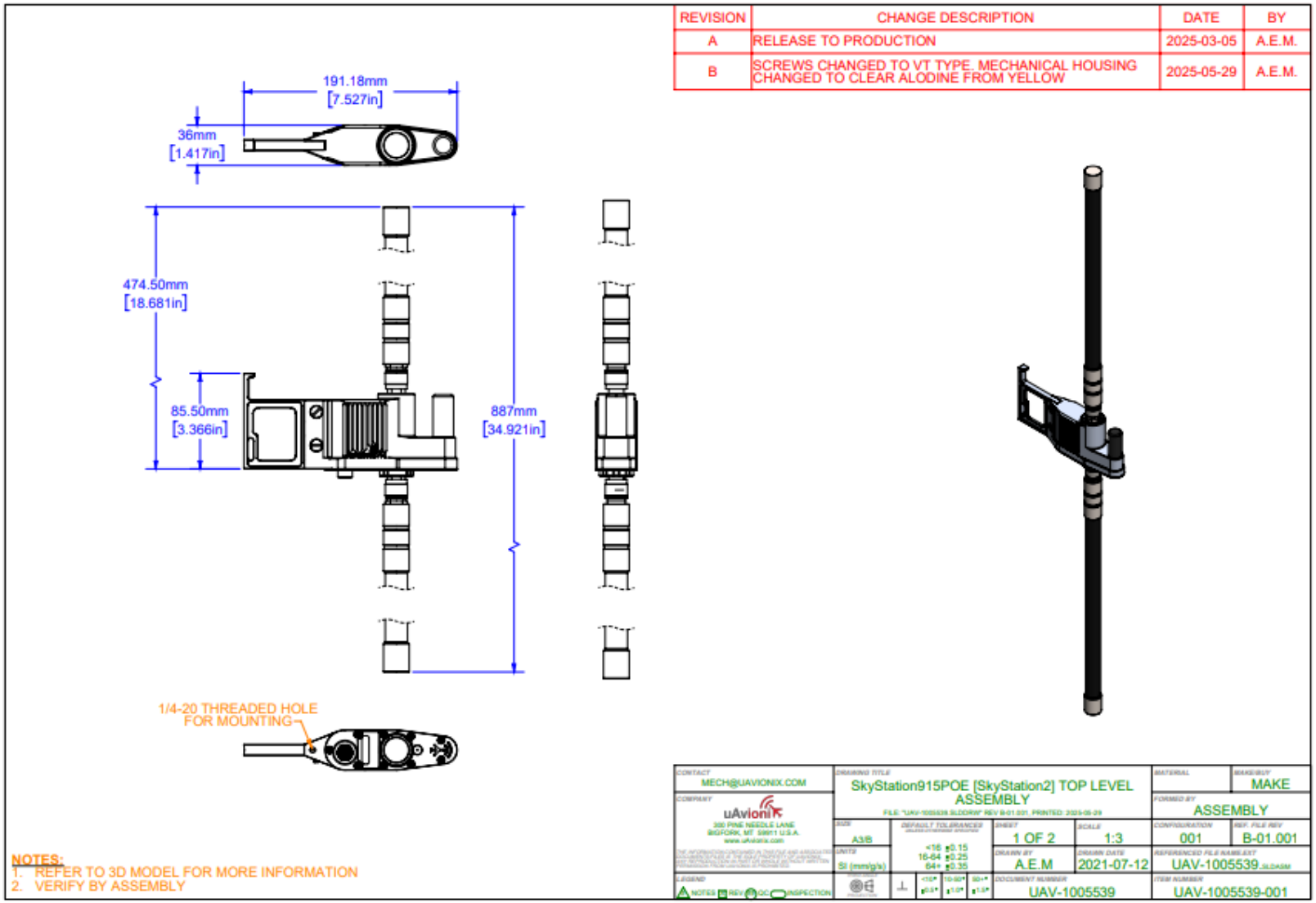

Figure 14: SkyStation915POE Top Level Assembly

16 Appendix B

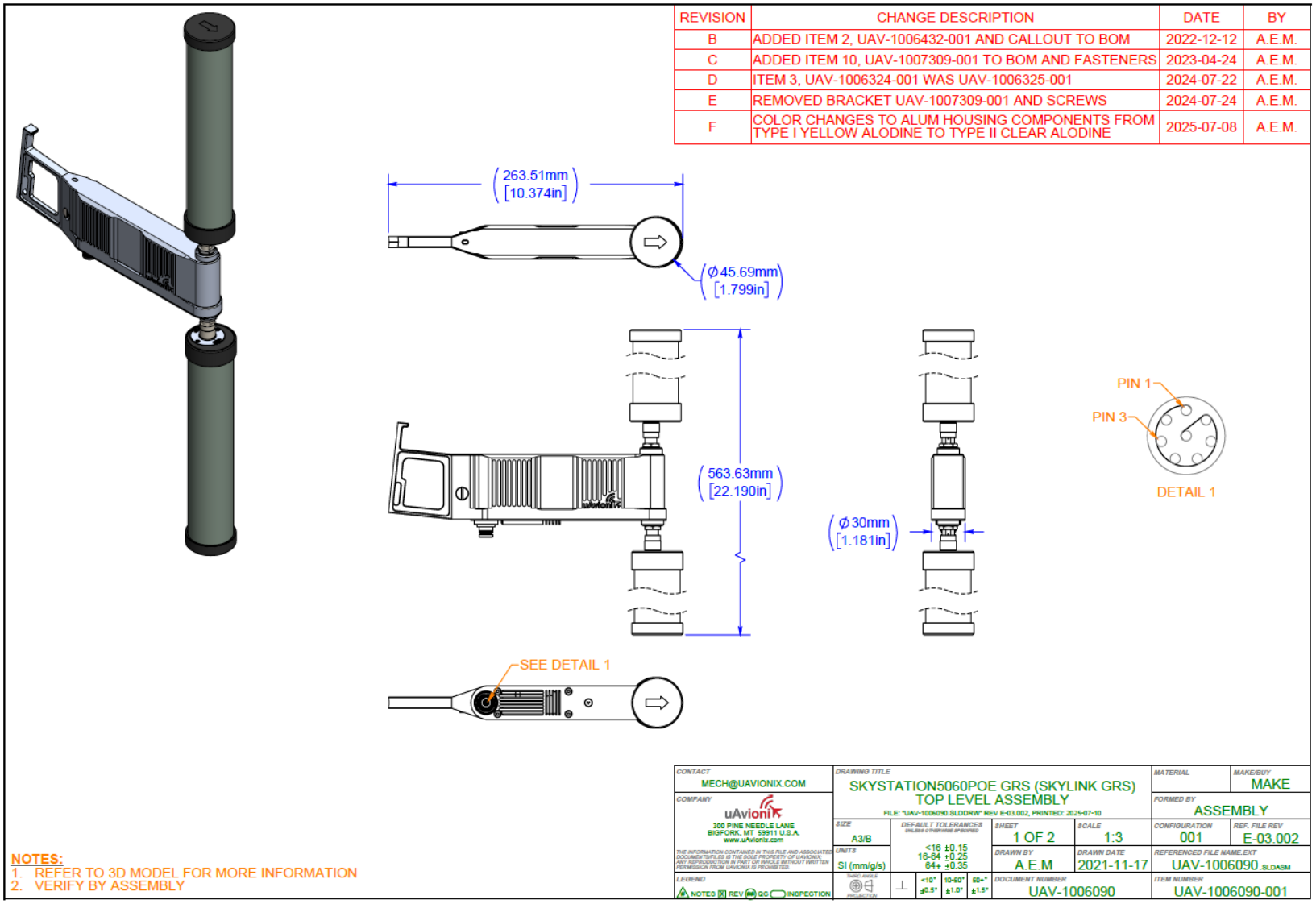

Figure 15: SkyLink GRS Top Level Assembly

17 Appendix C

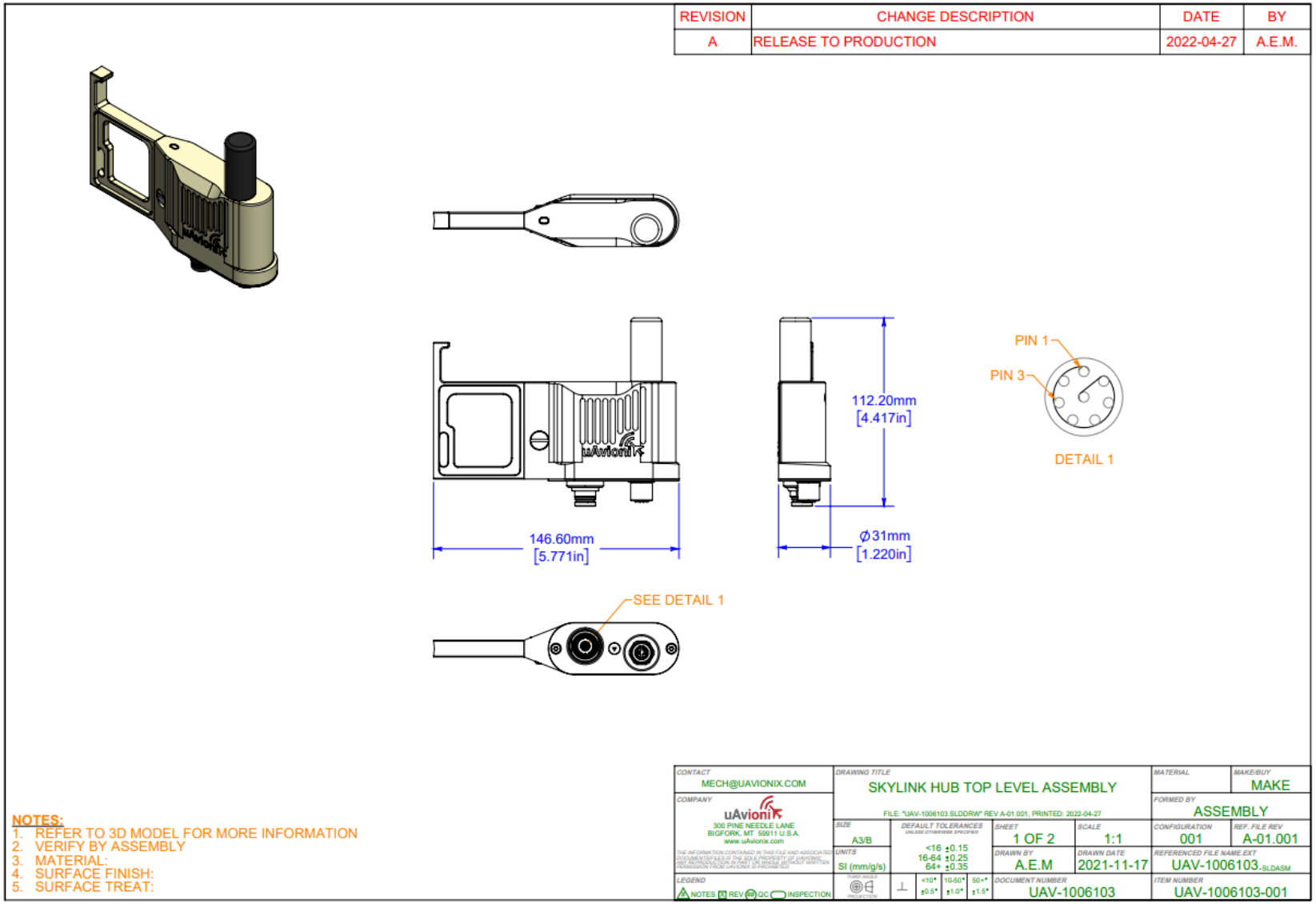

Figure 16: SkyLink Hub Top Level Assembly

18 Appendix D

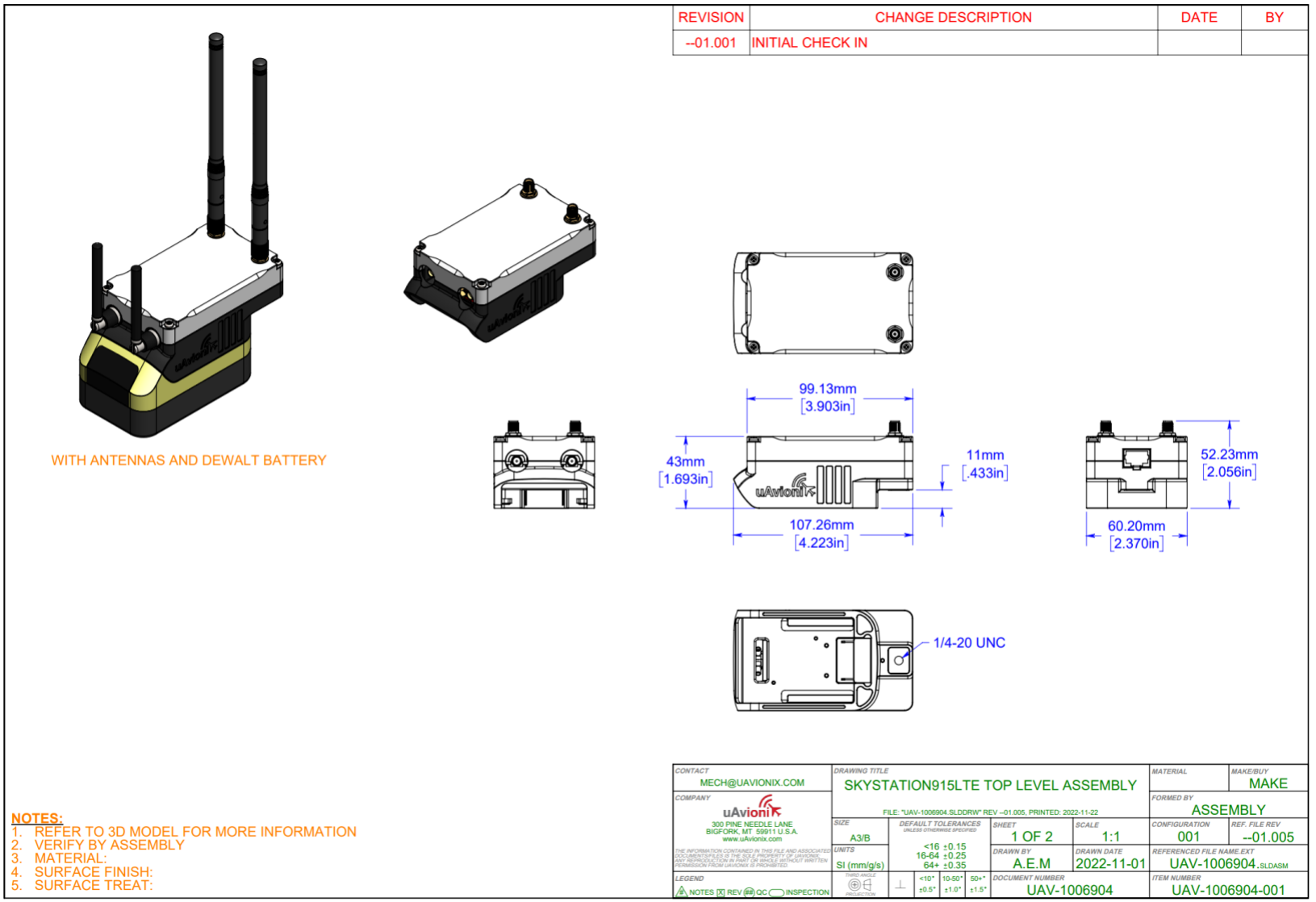

Figure 17: SkyStation915LTE Top Level Assembly

19 Appendix E

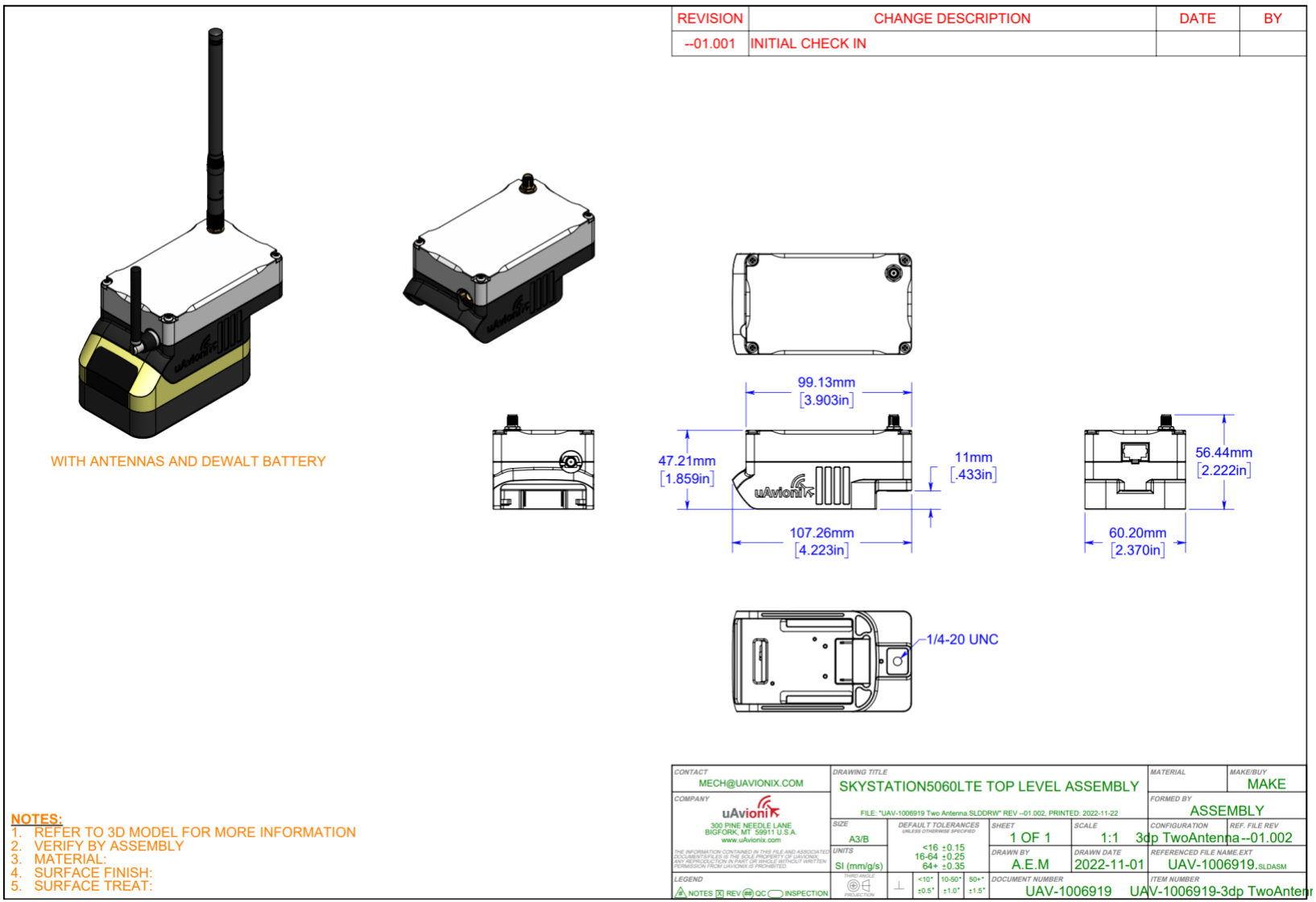

Figure 18: SkyStation5060LTE Top Level Assembly