



StreamCaster MIMO Radio

Basic User Manual

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Notice

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Silvus Technologies warrants the performance of its products to the specifications applicable at the time of sale in accordance with Silvus Technologies' standard warranty.

Revision History

| Version | Date | Changes |
|---------|-------------------|--|
| 1.0 | February 5, 2025 | 1 st release |
| 1.1 | February 28, 2025 | -235 Models EU/CE certifications added |

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1. General Safety Information

The information that follows, together with local site regulations, should be studied by personnel concerned with the operation or maintenance of the equipment, to ensure awareness of potential hazards.

Switch off supplies before removing covers or disconnecting any RF cables, and before inspecting damaged cables or antennas.

Avoid standing in front of high gain antennas (such as a dish) and never look into the open end of a waveguide or cable where strong RF power may be present.

Users are strongly recommended to return any equipment that requires RF servicing to Silvus Technologies.

CAUTION: This system contains MOS devices. Electro-Static Discharge (ESD) precautions should be employed to prevent accidental damage.

1.1 Health & Safety

Exposure to Non-Ionizing (RF) Radiation/Safe Working Distances

The safe working distance from a transmitting antenna may be calculated from the relationship:

$$\frac{P_T \cdot G_B}{\sqrt{D}} = \frac{1}{4\pi \cdot 10 \cdot w}$$

In which D = safe working distance (meters)

PT = total transmit power (watts)

GR = antenna gain ratio = $10^{\frac{G}{10}}$ where G is the antenna gain in dBi.

w = maximum allowed RF power density (mW/cm²)

The maximum allowed RF power density value is determined by reference to regulatory safety guidelines for exposure of the human body to non-ionizing radiation. It is important to note that the guidelines adopted differ throughout the world and are from time-to-time re-issued with revised guidelines. For use in the United States, one can find the FCC guideline at the following link as of this writing:

[“https://transition.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet65/oet65.pdf”](https://transition.fcc.gov/Bureaus/Engineering_Technology/Documents/bulletins/oet65/oet65.pdf).

Specifically, page 67 of this link contains the table of RF power density limits for different frequency bands.

Below is a table of some example safe distances calculated based on the FCC guidelines using the limits for occupational/controlled exposure. For countries other than the US, please use the limits in the local guideline to adjust the calculation.

| Frequency | Antenna | | | Transmitter Power | | | | | FCC limits |
|-----------|----------------|------------|-----------------|--------------------------------|------|------|------|------|--------------------------|
| | Type | Gain (dBi) | Gain Ratio (GR) | 1W | 2W | 4W | 10W | 30W | |
| 2400 MHz | Omni | 3 | 2 | 0.06 | 0.08 | 0.11 | 0.18 | 0.31 | 5 mW/cm ² |
| 1370 MHz | Sector | 20 | 100 | 0.42 | 0.59 | 0.84 | 1.32 | 2.29 | 4.567 mW/cm ² |
| 4700 MHz | Parabolic Dish | 35 | 3162 | 2.24 | 3.17 | 4.5 | 7.1 | 12.3 | 5 mW/cm ² |
| | | | | Minimum Safe Distance (meters) | | | | | |

Table 1 Safe Working Distances

Important Note: It must be remembered that any transmitting equipment radiating power at frequencies of 100kHz and higher, has the potential to produce thermal and a-thermal effects upon the human body.

To be safe:

- Operators should not stand or walk in front of any high gain antenna such as dish antennas, nor should they allow anyone else to do so.
- Operators should not operate any RF transmitter or power amplifier with any of its covers removed, nor should they allow anyone else to do so.

General Safety Notes

- A flashing/steady Red LED status indication is a normal condition and is not meant to convey a fault condition.
- The Power Disconnect Device for the product is the connector for the external AC/DC Adapter or other DC power source.
- Although the Low Voltage DC powered units are approved for Outdoor use (Dust/Temporary Immersion), the optional AC power option with AC/DC power supply is only certified for indoor use.
- The unit housing serves as a heatsink and must be mounted on a non-combustible surface.
- The units are not User Serviceable. Contact the manufacturer for further instructions on servicing or repair.

- All symbols, markings and warning statements marked on the equipment are shown below for reference.

Product Symbols

This table describes the symbols marked on the device.

| Symbol | | Description |
|---|-----------------------------|--|
|  | Caution Read User Manual | Please follow all instructions in this User Manual Including all warnings, cautions, and precautions before using the Organelle. Unit is not user serviceable. Contact the manufacturer if defective or damaged. |
|  | RoHS Compliant | The product is compliant with the RoHS 2 Directive 2011/65/EU (RoHS 2). (Note: This Symbol may not be marked on device) |
|  | CE | Product complies with the European Union Low Voltage Directive (LVD), RoHS 2 and EMC Directives. |
|  | HOT SURFACE SYMBOL | Please avoid bodily contact with the product housing and do not mount the product on a combustible surface. |
|  | Disposal | Per the European WEEE Directive, please dispose the product in accordance with local regulations |

Figure 1 Product Symbols with Definition

- Product cleaning should only be done with a soft cloth and mild detergent, do not use any solvents that might remove case markings or labels.
- The unit, at the end of its useful life is to be disposed in accordance with local regulations or may be returned to the manufacturer.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment and/or equipment performance may be impaired.

2. Introduction

The StreamCaster family of MIMO radios was designed with operator ease of use in mind. Each radio is capable of operating in a multitude of configurations that are accessed via simple web pages within the radio. Settings such as transmit power, frequency, channel bandwidth, link adaptation and range control can be accessed by simply using a web browser to log into any radio within the network. This user manual contains all essential information for the user to configure the StreamCaster radio as well as how to run an iperf network test.

3. StreamCaster Network

Each StreamCaster MIMO radio that is loaded with StreamScape 5 firmware has a fixed static IP address in the range of 172.16.xx.yy to 172.32.xx.yy network which is on the 255.240.0.0 subnet mask. The radio operates as a network switch; the user equipment does not need to be on the same subnet as the radio during operation. It is possible to setup a secondary IP address and subnet on the radio if the user finds this feature convenient. Setting up a secondary IP address is useful if the user wishes to access the radio's web interface in their network.

4. StreamCaster Hardware Overview

4.1 Hardware Interfaces

SC4400E

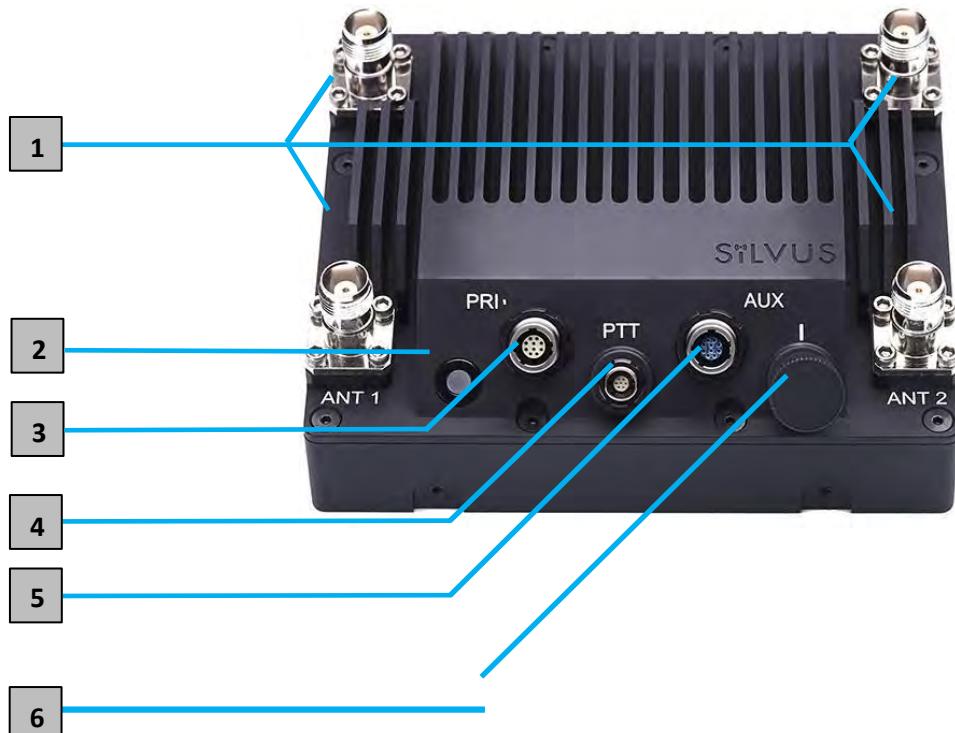


Figure 2 StreamCaster 4400E Ruggedized Enclosure

- 1** RF Channels 1-4 Connectors [TNC Female]
- 2** Bi-Color Status LED
 - Red – Radio is in the process of booting up
 - Flashing Green – Radio is fully booted but not wirelessly connected to any other radio
 - Green – Radio is wirelessly connected to at least one other radio
 - Flashing Red – Spectrum Scan in Progress
 - Flashing Red – Radio has recovered from a bad state.
 - Rapid Flashing Green – When the multi position switch is rotate to a new position, LED will rapidly flash green while new settings are being applied. LED will resume normal indication after settings have been applied.
- 3** Power (9-20V), Ethernet, and Serial Port Connector [ODU GK0YAR-P10UC00-000L]
- 4** Push-to-Talk (PTT) Connector [ODU GKCWAM-P07UB00-000L]
- 5** AUX Connector [ODU GK0YCR-P10UC00-000L]

6 Power Switch [15-Position Rotating]

SC4200EP

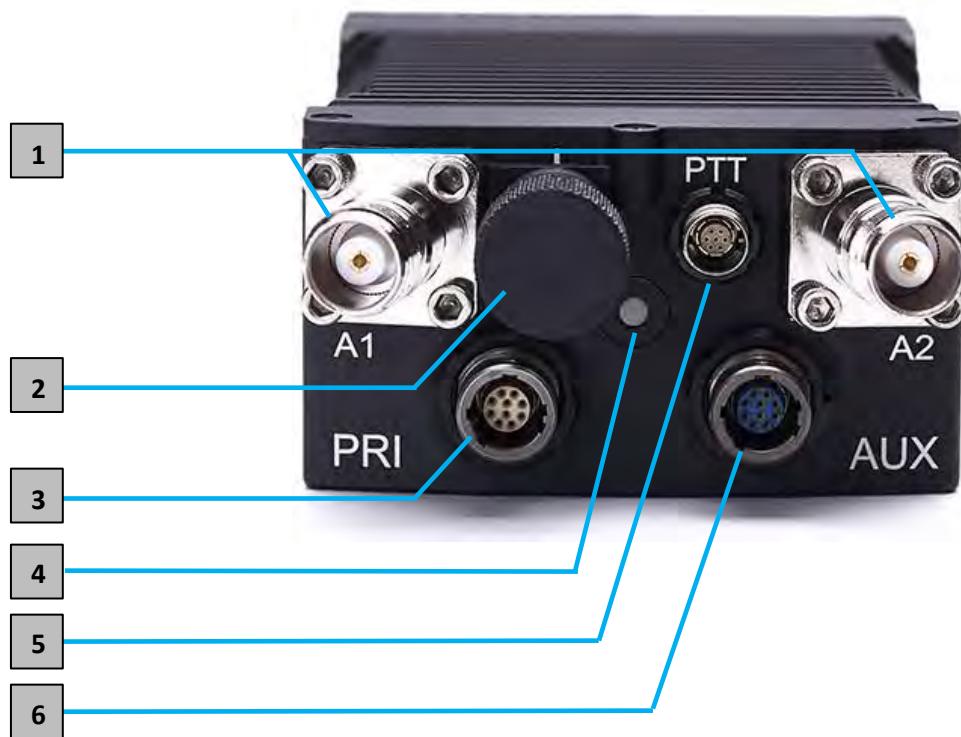


Figure 3 StreamCaster 4200EP Ruggedized Enclosure

- 1** RF Channels 1-2 Connectors [TNC Female]
- 2** Power Switch [15-Position Rotating]
- 3** Power (EB Version Only, 9-20V), Ethernet, and Serial Port Connector [ODU GK0YAR-P10UC00-000L]
- 4** Bi-Color Status LED
 - Red – Radio is in the process of booting up
 - Flashing Green – Radio is fully booted but not wirelessly connected to any other radio
 - Green – Radio is wirelessly connected to at least one other radio
 - Flashing Red – Spectrum Scan in Progress
 - Flashing Red – Radio has recovered from a bad state.
 - Rapid Flashing Red for 1 second – The battery is less than or equal to 20%. LED will blink red rapidly for 1 second then go back to normal. This will repeat every 5 seconds.
 - Rapid Flashing Green – When the multi position switch is rotate to a new position, LED will rapidly flash green while new settings are being applied. LED will resume normal indication after settings have been applied.

- 5** Push-to-Talk (PTT) Connector [ODU GKCWAM-P07UB00-000L]
- 6** AUX Connector [ODU GK0YCR-P10UC00-000L]

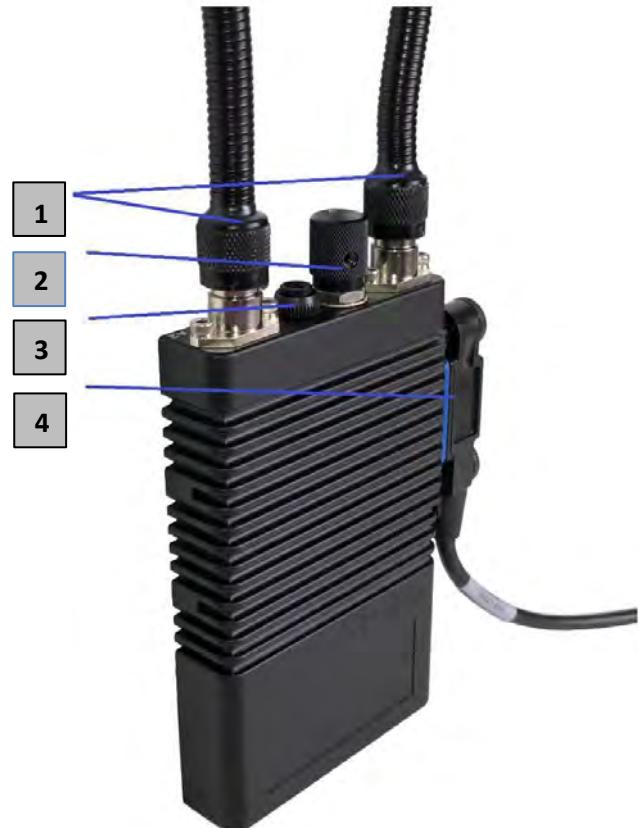
SL4200

Figure 4 StreamCaster SL4200 Ruggedized Enclosure

- 1** RF Channels 1-2 Connectors [TNC Female]
- 2** Power Switch [2-Position Rotating]
- 3** Bi-Color Status LED
 - Red – Radio is in the process of booting up
 - Flashing Green – Radio is fully booted but not wirelessly connected to any other radio
 - Green – Radio is wirelessly connected to at least one other radio
 - Flashing Red – Spectrum Scan in Progress
 - Flashing Red – Radio has recovered from a bad state and has reverted to factory default settings.
 - Rapid Flashing Red for 1 second – The battery is less than or equal to 20%. LED will blink red rapidly for 1 second then go back to normal. This will repeat every 5 seconds.

4 20-pin pogo style connector

- 8-32VDC input / USB-C PD (9VDC)
- 2x USB 2.0 (Host / OTG)
- Serial RS-232
- +5VDC output

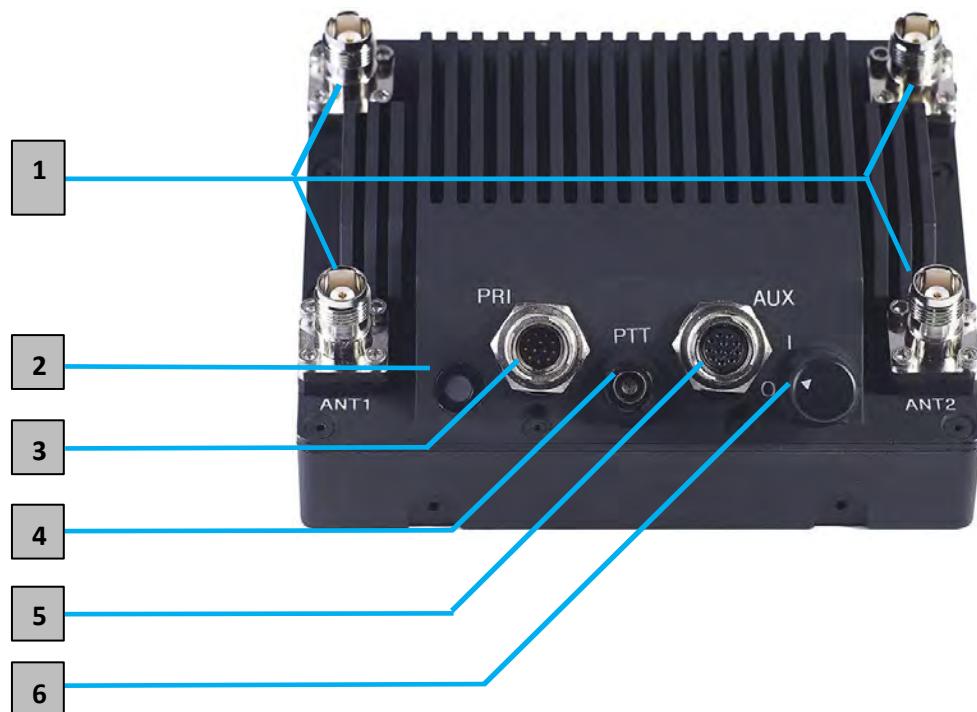
SC4400:

Figure 5 StreamCaster 4400 Ruggedized Enclosure

- 1** RF Channels 1-4 Connectors [TNC Female]
- 2** Bi-Color Status LED
 - Red – Radio is in the process of booting up
 - Flashing Green – Radio is fully booted but not wirelessly connected to any other radio
 - Green – Radio is wirelessly connected to at least one other radio
 - Flashing Red – Spectrum Scan in Progress
 - Flashing Red – Radio has recovered from a bad state.
- 3** Power (9-20V), Ethernet, and Serial Port Connector [Hirose LF10WBRB-12PD]
- 4** Push-to-Talk (PTT) Connector [ODU GKCWAM-P07UB00-000L]
- 5** AUX Connector [Hirose LF10WBRB-12SD]
- 6** Power Switch [2-Position Rotating]

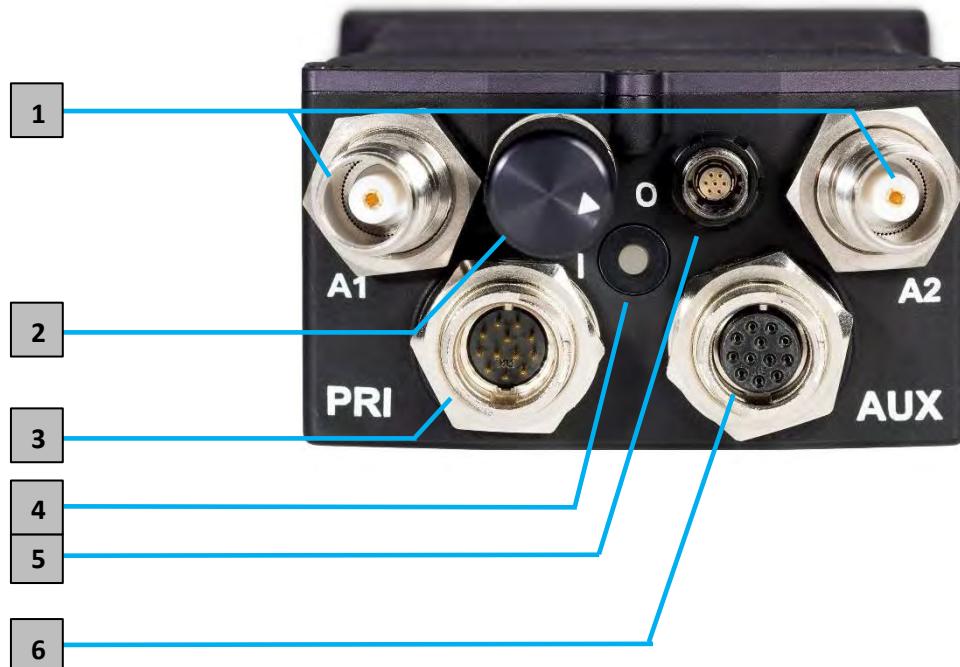
SC4200:

Figure 6 StreamCaster 4200 Ruggedized Enclosure

- 1** RF Channels 1-2 Connectors [TNC Female]
- 2** Power Switch [2-Position Rotating]
- 3** Power (EB Version Only, 9-20V), Ethernet, and Serial Port Connector [Hirose LF10WBRB-12PD]
- 4** Bi-Color Status LED
 - Red – Radio is in the process of booting up
 - Flashing Green – Radio is fully booted but not wirelessly connected to any other radio
 - Green – Radio is wirelessly connected to at least one other radio
 - Flashing Red – Spectrum Scan in Progress
 - Flashing Red – Radio has recovered from a bad state.
- 5** Push-to-Talk (PTT) Connector [ODU GKCWAM-P07UB00-000L]
- 6** AUX Connector [Hirose LF10WBRB-12SD]

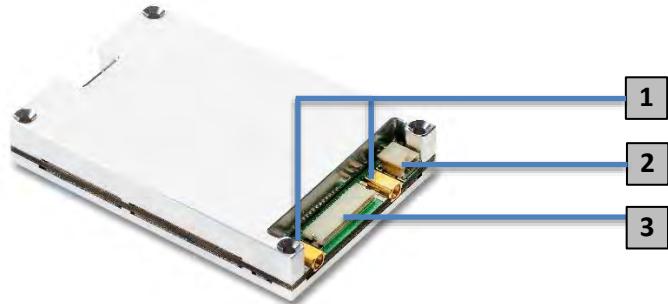
SL/LC5200:

Figure 7 StreamCaster SL4200 OEM

- 1** RF Channels 1-2 Connectors [SMPM Female]
- 2** Power Connector [JST SM02B-SFKH-TF]
- 3** I/O Connector [JST SM14B-SHLS-TF(LF)(SN)]

4.2 Connector Pinouts

4.2.1 SC4400E Pinouts

| SC4400E Primary Power/Ethernet/Serial Connector Pinout | | | |
|--|--------------------------------|-----------------------------------|--|
| Enclosure PWR/COMM (GK0YAR-P10UC00-000L) | Signal | Switchcraft Pinout (EN3C2F16X) | Color of wires coming from ODU connector |
| 1 | 5V OUT (For External GPS Puck) | NC | Pink |
| 2 | GND IN | 2 | Yellow/Blue |
| 3 | VCC IN | 1 | Green/Violet |
| 4 | ETH0_MX2N (RX-) | NC | Black |
| 5 | ETH0_MX2P (RX+) | NC | Brown |
| 6 | ETH0_MX1P (TX+) | NC | Red |
| 7 | RS232_RXD | NC | Gray |
| 8 | RS232_TXD | NC | White |
| 9 | GND | NC | Light Green |
| 10 | ETH0_MX1N (TX-) | NC | Orange |

Table 2 SC4400E Primary Power/Ethernet/Serial Connector Pinout

*color scheme is valid for cables built after 6/1/19

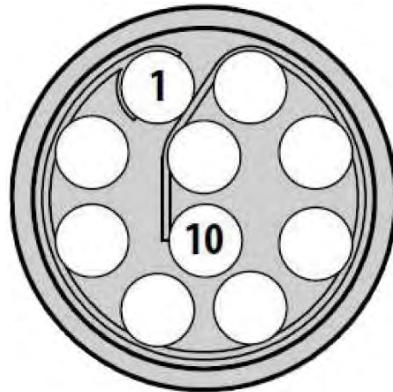


Figure 8 SC4400E Primary Power/Serial/Ethernet Pinout Diagram (Radio Side)

| SC4400E RS-232 Pinout | | |
|-----------------------|--------|---------------------------------|
| RS-232 (DB9) | Signal | Switchcraft Pinout (EN3C6FX) |
| 3 | TxD | 2 |
| 2 | RxD | 1 |
| NC | NC | 4 |
| NC | 5V OUT | 6 |
| NC | NC | 5 |
| 5 | Ground | 3 |

Table 3 SC4400E Serial and GPS Pinout

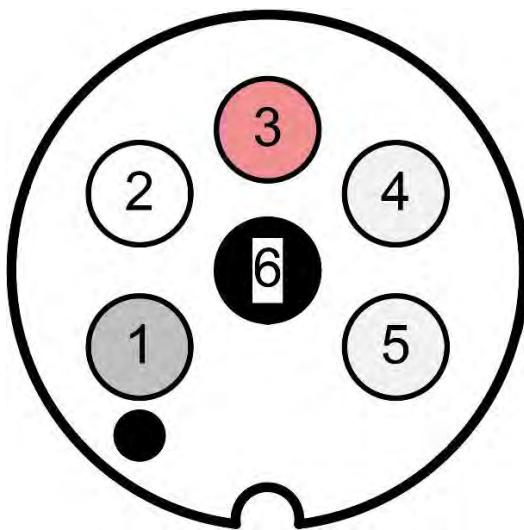


Figure 9 Switchcraft connector on Primary/Power cable

| SC4400E AUX Connector Pinout | | |
|--|---------------------|---|
| Enclosure AUX (GK0YCR-P10UC00-000L) | Signal | Color of wires coming from ODU connector |
| 1 | USB GND | Yellow/Blue |
| 2 | USB1_D- | Red |
| 3 | USB1_VBUS | Green |
| 4 | USBO_VBUS | Violet |
| 5 | GPIO1 (BDA control) | Pink |
| 6 | USBO_D+ | Black |
| 7 | USBO_D- | Brown |
| 8 | GND | Light Green |
| 9 | USB1_ID | Gray |
| 10 | USB1_D+ | Orange |

Table 4 SC4400E USB/GPIO Connector Pinout

*color scheme is valid for cables built after 6/1/19

**(USB1 is USB 2.0 OTG, USBO is USB 2.0 Host Mode Only)

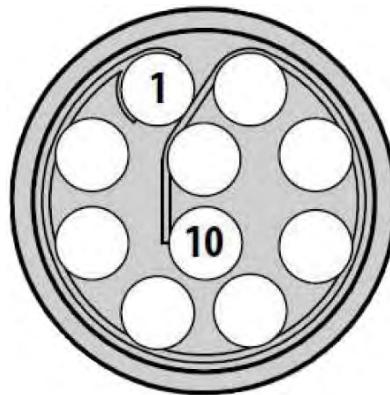


Figure 10 SC4400E AUX Pinout Diagram (Radio Side)

| SC4400E PTT Connector | |
|--|---------------------------|
| Enclosure PTT Connector (ODU GKCWAM-P07UB00-000L) | Signal |
| 1 | 5V_OUT (Up to 400mA) |
| 2 | COR/DUAL_PTT |
| 3 | AUDIO_GND |
| 4 | PTT |
| 5 | SPEAKER_OUT |
| 6 | MIC_IN |
| 7 | RESERVED (Do Not Connect) |

Table 5 SC4400E PTT Connector Pinout

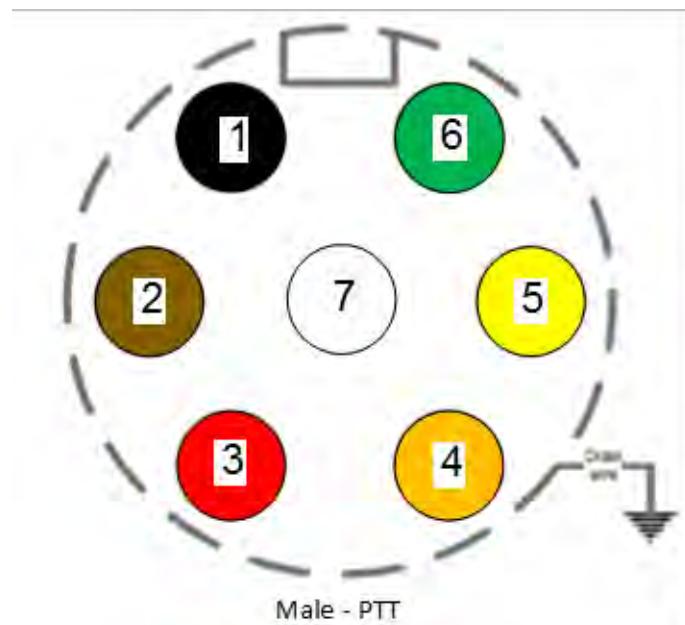


Figure 11 SC4400E PTT Pinout Diagram (Cable Side)

4.2.2 SC4200EP Pinouts

| SC4200EP Primary Power/Ethernet/Serial Connector Pinout | | | |
|---|--------------------------------|-----------------------------------|--|
| Enclosure PWR/COMM (GKOYAR-P10UC00-000L) | Signal | Switchcraft Pinout (EN3C2F16X) | Color of wires coming from ODU connector |
| 1 | 5V OUT (For External GPS Puck) | NC | Pink |
| 2 | GND IN | 2 | Yellow/Blue |
| 3 | VCC IN | 1 | Green/Violet |
| 4 | ETH0_MX2N (RX-) | NC | Black |
| 5 | ETH0_MX2P (RX+) | NC | Brown |
| 6 | ETH0_MX1P (TX+) | NC | Red |
| 7 | RS232_RXD | NC | Gray |
| 8 | RS232_TXD | NC | White |
| 9 | GND | NC | Light Green |
| 10 | ETH0_MX1N (TX-) | NC | Orange |

Table 6 SC4200EP Primary Power/Ethernet/Serial Connector Pinout

*color scheme is valid for cables built after 6/1/19

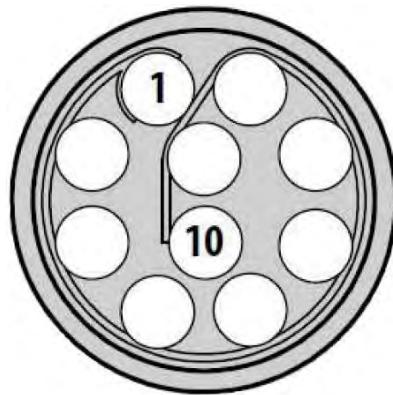


Figure 12 SC4200EP Primary Power/Serial/Ethernet Pinout Diagram (Radio Side)

| SC4200EP RS-232 Pinout | | |
|------------------------|--------|------------------------------|
| RS-232 (DB9) | Signal | Switchcraft Pinout (EN3C6FX) |
| 3 | TxD | 2 |
| 2 | RxD | 1 |
| NC | NC | 4 |
| NC | 5V OUT | 6 |
| NC | NC | 5 |
| 5 | Ground | 3 |

Table 7 SC4200EP Serial and GPS Pinout

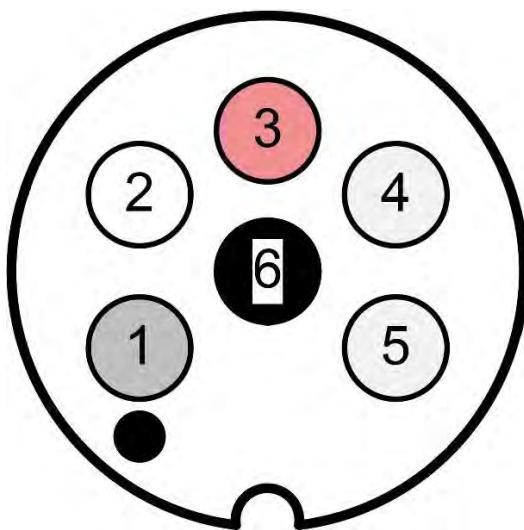


Figure 13 Switchcraft connector on Primary/Power cable

| SC4200EP AUX Connector Pinout | | |
|--|---------------------|---|
| Enclosure AUX (GK0YCR-P10UC00-000L) | Signal | Color of wires coming from ODU connector |
| 1 | USB GND | Yellow/Blue |
| 2 | USB1_D- | Red |
| 3 | USB1_VBUS | Green |
| 4 | USB0_VBUS | Violet |
| 5 | GPIO1 (BDA control) | Pink |
| 6 | USB0_D+ | Black |
| 7 | USB0_D- | Brown |
| 8 | GND | Light Green |
| 9 | USB1_ID | Gray |
| 10 | USB1_D+ | Orange |

Table 8 SC4200EP AUX USB/GPIO Connector Pinout (USB1 is USB 2.0 OTG, USB0 is USB 2.0 Host Mode Only)

*color scheme is valid for cables built after 6/1/19

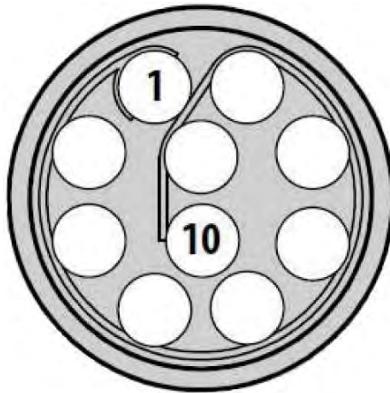


Figure 14 SC4200EP AUX Pinout Diagram (Radio Side)

| SC4200EP PTT Connector | |
|--|---------------------------|
| Enclosure PTT Connector (ODU GKCWAM-P07UB00-000L) | Signal |
| 1 | 5V_OUT (Up to 400mA) |
| 2 | COR/DUAL_PTT |
| 3 | AUDIO_GND |
| 4 | PTT |
| 5 | SPEAKER_OUT |
| 6 | MIC_IN |
| 7 | RESERVED (Do Not Connect) |

Table 9 SC4200EP PTT Connector Pinout

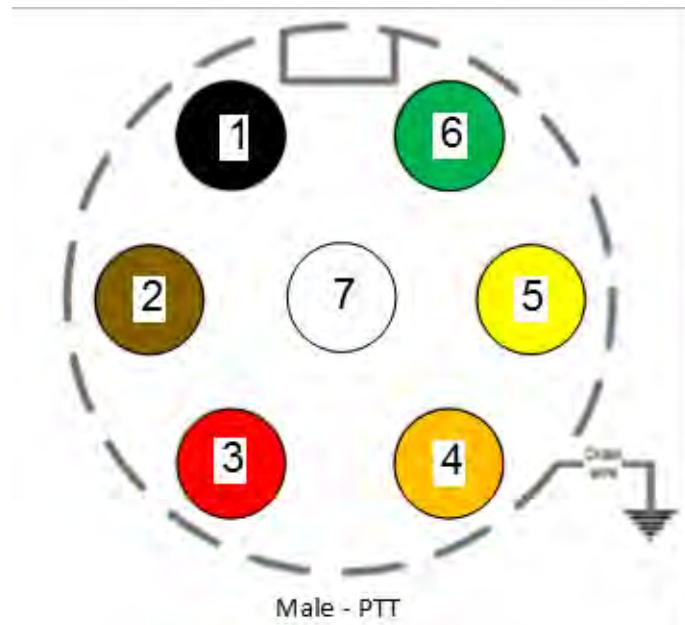


Figure 15 SC4200EP PTT Pinout Diagram (Cable Side)

4.2.3 SL4200 Pinouts

| SL4200 POGO Connector Pinout | |
|------------------------------|---|
| Pin | Signal |
| 1 | Vbat 8-32 VDC input * |
| 2 | RS232 TXD |
| 3 | RS232 RXD |
| 4 | GPIO1 |
| 5 | CC2 (PD mode-config) |
| 6 | CC1 (CC) (PD mode-config) |
| 7 | USB PD VBUSS (+9 VDC) * |
| 8 | USB0 Vbus (USB 0 always in host mode) |
| 9 | USB0 D+ |
| 10 | USB0 D- |
| 11 | USB0_GND |
| 12 | N/C |
| 13 | N/C |
| 14 | GND * |
| 15 | USB1_GND |
| 16 | USB1 D+ |
| 17 | USB1 D- |
| 18 | USB1 ID (Gnd for Host Mode; Float for Client mode) |
| 19 | N/C |
| 20 | VCC_5V0 OUT * (500 ma max (GPS Puck); connect to USB1 Vbus in host mode (e.g, USB-A pin 1)) |

Table 10 SL4200 POGO Pinout

*Note: Pins 1,7,14,20 rated for 3A, 36V

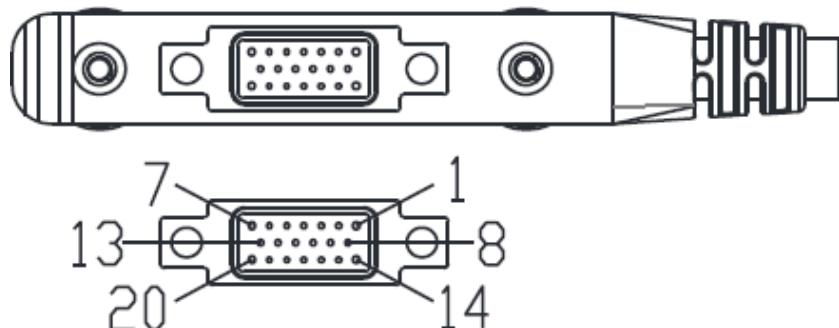


Figure 16 SL4200 20-pin POGO connector

| Supported USB 1 Modes | Wiring instruction |
|--|---|
| USB-PD and USB 2.0 from the same source | USB1_ID floating and USB1 in client mode. Connect VCC_5V to USB1_VBUS on the pogo plug side or in the cable |
| USB 1 as client but not using USB-PD or PD comes from a different source | USB1_ID floating and USB1 in client mode, standard USB 2.0 wiring |
| USB 1 as host but not using USB-PD or PD comes from a different source | USB1_ID grounded and USB1 in host mode, standard USB 2.0 wiring |

Table 11 SL4200 supported USB modes

4.2.4 SC4400 Pinouts

| SC4400 Power/Ethernet/Serial Connector Pinout | | |
|---|--------------------------------|-----------------------------------|
| Enclosure PWR/COMM (LF10WBRB-12PD) | Signal | Switchcraft Pinout (EN3C2F16X) |
| 1 | 5V OUT (For External GPS Puck) | NC |
| 2 | GND IN | 2 |
| 3 | GND IN | 2 |
| 4 | VCC IN | 1 |
| 5 | VCC IN | 1 |
| 6 | 100-Base T ETH0 M2N (RX-) | NC |
| 7 | 100-Base T ETH0 M2P (RX+) | NC |
| 8 | 100-Base T ETH0 M1P (TX+) | NC |
| 9 | RS232_RXD | NC |
| 10 | RS232_TXD | NC |
| 11 | RS232_GND | NC |
| 12 | 100-Base T ETH0 M1N (TX-) | NC |

Table 12 SC4400 Primary Power/Ethernet/Serial Connector Pinout

| SC4400 RS-232 and PS/2 (GPS) Pinout | | | |
|-------------------------------------|------------|--------|---------------------------------|
| RS-232 | PS/2 (GPS) | Signal | Switchcraft Pinout (EN3C6FX) |
| 3 | 4 | TxD | 2 |
| 2 | 5 | RxD | 1 |
| NC | NC | NC | 4 |
| NC | 2 | 5V OUT | 6 |
| NC | NC | NC | 5 |
| 5 | 1 | Ground | 3 |

Table 13 SC4400 Serial and GPS Pinout

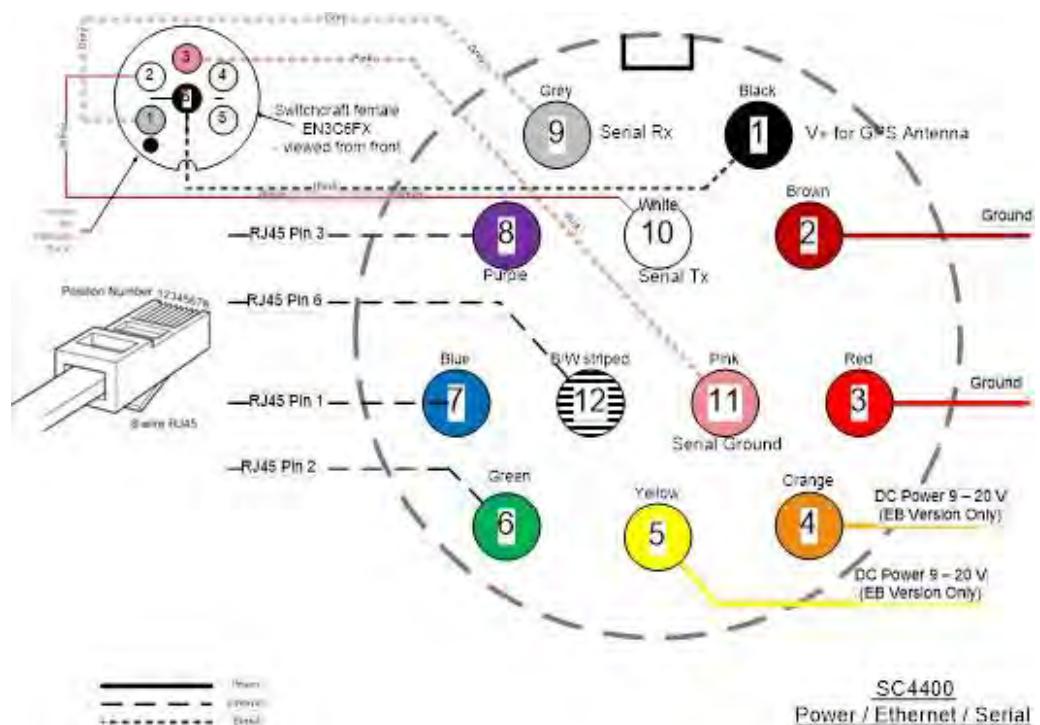


Figure 17 SC4400 Power (Optional)/Serial/Ethernet Pinout Diagram (Cable Side)

| SC4400 AUX Connector Pinout | |
|----------------------------------|---------------------------|
| Enclosure AUX (LF10WBRB-12SD) | Signal |
| 1 | USB1_GND |
| 2 | USB1_D- |
| 3 | USB1_VBUS |
| 4 | USBO_VBUS |
| 5 | GPIO1 (PA Enable 3.3V) |
| 6 | USBO_D+ |
| 7 | USBO_D- |
| 8 | RESERVED (Do Not Connect) |
| 9 | GND |
| 10 | USB1_Sense |
| 11 | USB1_D+ |
| 12 | USBO_GND |

Table 14 SC4400 AUX USB/GPIO Connector Pinout (USB1 is USB 2.0 OTG, USBO is USB 2.0 Host Mode Only)

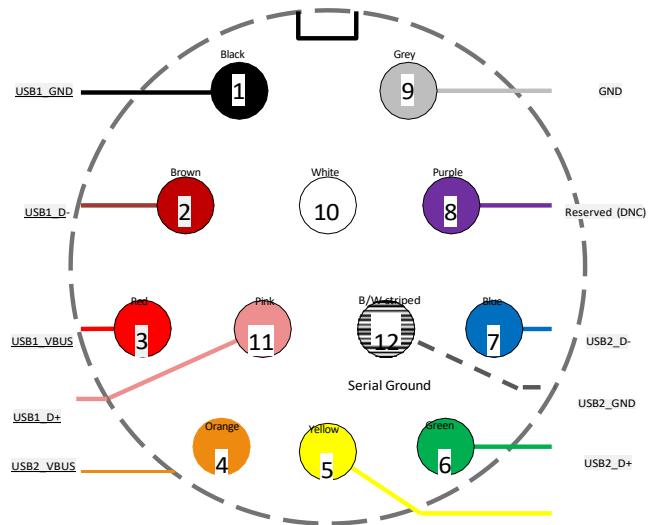


Figure 18 SC4400 AUX Pinout Diagram (Cable Side)

SC4400 USB
/GPIO

| SC4400 PTT Connector | |
|--|---------------------------|
| Enclosure PTT Connector (ODU GKCWAM-P07UB00-000L) | Signal |
| 1 | RESERVED (Do Not Connect) |
| 2 | RESERVED (Do Not Connect) |
| 3 | AUDIO_GND |
| 4 | PTT |
| 5 | SPEAKER_OUT |
| 6 | MIC_IN |
| 7 | RESERVED (Do Not Connect) |

Table 15 SC4400 PTT Connector Pinout

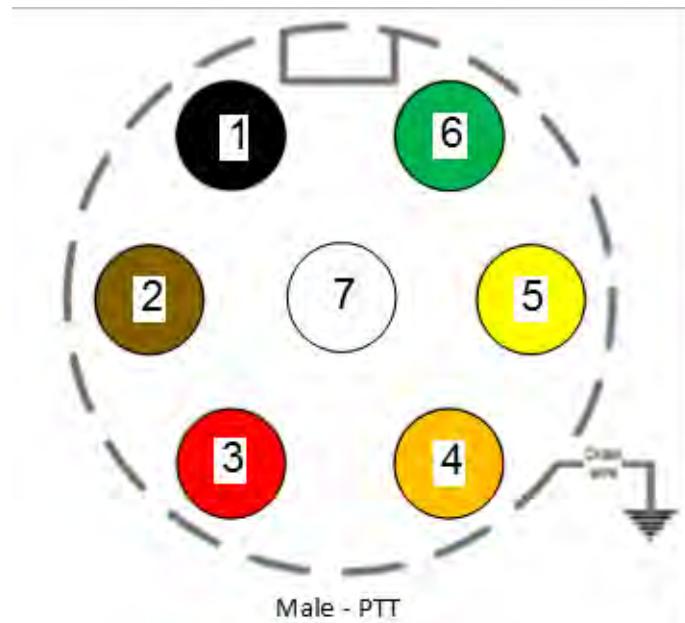


Figure 19 SC4400 PTT Pinout Diagram (Cable Side)

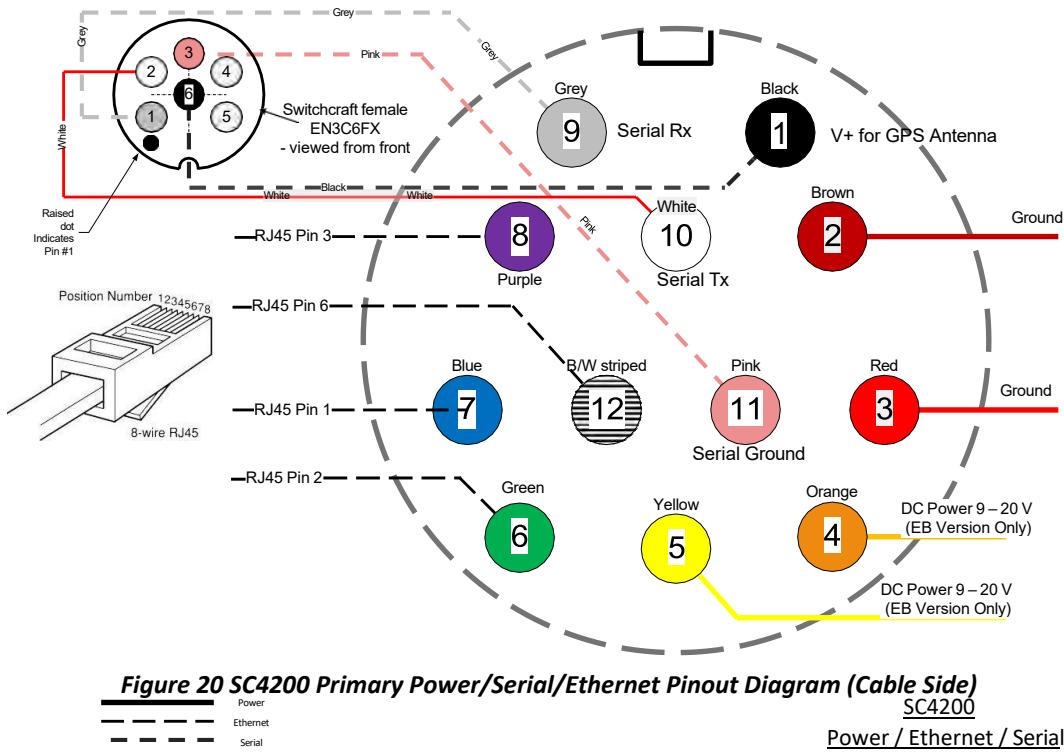
4.2.5 SC4200 Pinouts

| SC4200 Power/Ethernet/Serial Connector Pinout | | |
|---|-------------------------------------|-----------------------------------|
| Enclosure PWR/COMM (LF10WBRB-12PD) | Signal | Switchcraft Pinout (EN3C2F16X) |
| 1 | 5V OUT (For External GPS Puck) | NC |
| 2 | GND IN (External Power Option Only) | 2 |
| 3 | GND IN (External Power Option Only) | 2 |
| 4 | VCC IN (External Power Option Only) | 1 |
| 5 | VCC IN (External Power Option Only) | 1 |
| 6 | 100-Base T ETH0 M2N (RX-) | NC |
| 7 | 100-Base T ETH0 M2P (RX+) | NC |
| 8 | 100-Base T ETH0 M1P (TX+) | NC |
| 9 | RS232_RXD | NC |
| 10 | RS232_TXD | NC |
| 11 | RS232_GND | NC |
| 12 | 100-Base T ETH0 M1N (TX-) | NC |

Table 16 SC4200 Primary Power/Ethernet/Serial Connector Pinout

| SC4200 RS-232 and PS/2 (GPS) Pinout | | | |
|-------------------------------------|------------|--------|---------------------------------|
| RS-232 | PS/2 (GPS) | Signal | Switchcraft Pinout (EN3C6FX) |
| 3 | 4 | TxD | 2 |
| 2 | 5 | RxD | 1 |
| NC | NC | NC | 4 |
| NC | 2 | 5V OUT | 6 |
| NC | NC | NC | 5 |
| 5 | 1 | Ground | 3 |

Table 17 SC4200 Serial and GPS Pinout



| SC4200 AUX Connector Pinout | |
|----------------------------------|---------------------------|
| Enclosure AUX (LF10WBRB-12SD) | Signal |
| 1 | USB1_GND |
| 2 | USB1_D- |
| 3 | USB1_VBUS |
| 4 | USBO_VBUS |
| 5 | GPIO1 (PA Enable 3.3V) |
| 6 | USBO_D+ |
| 7 | USBO_D- |
| 8 | RESERVED (Do Not Connect) |
| 9 | GND |
| 10 | USB1_Sense |
| 11 | USB1_D+ |
| 12 | USBO_GND |

Table 18 SC4200 AUX USB/GPIO Connector Pinout (USB1 is USB 2.0 OTG, USBO is USB 2.0 Host Mode Only)

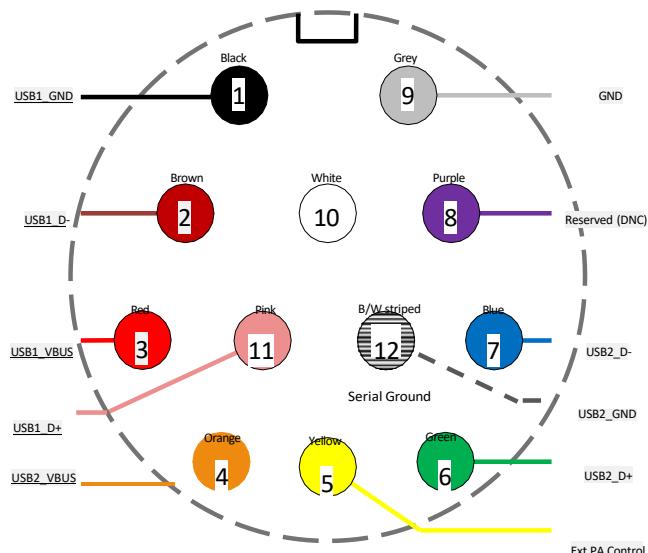


Figure 21 SC4200 AUX Pinout Diagram (Cable Side)

SC4200 USB /
GPIO

| SC4200 PTT Connector | |
|--|---------------------------|
| Enclosure PTT Connector (ODU GKCWAM-P07UB00-000L) | Signal |
| 1 | RESERVED (Do Not Connect) |
| 2 | RESERVED (Do Not Connect) |
| 3 | AUDIO_GND |
| 4 | PTT |
| 5 | SPEAKER_OUT |
| 6 | MIC_IN |
| 7 | RESERVED (Do Not Connect) |

Table 19 SC4200 PTT Connector Pinout

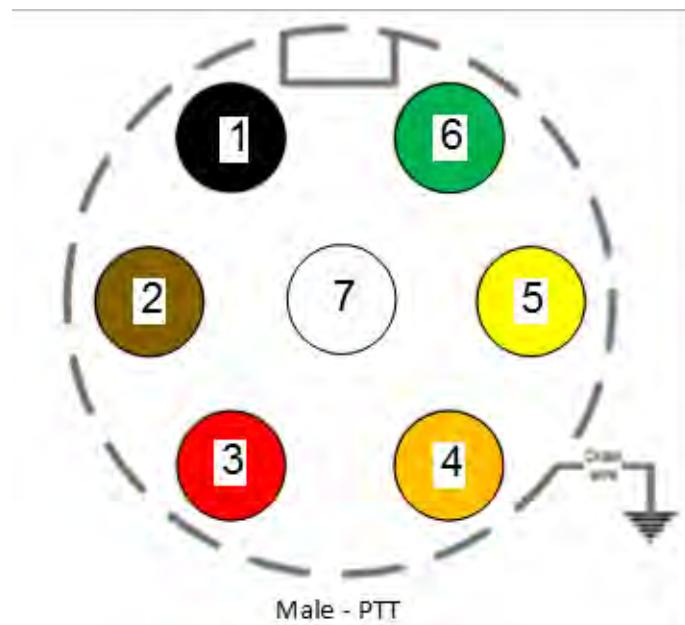


Figure 22 SC4200 PTT Pinout Diagram (Cable Side)

4.2.6 SL/LC 5200 Pinouts

| SL/LC5200 I/O Connector Pinout | | |
|--------------------------------|-------------|---|
| Pin # | Description | Comments/Notes |
| 1 | ETH0_MX0_P | Ethernet TX+/BI_DA+ |
| 2 | ETH0_MX0_N | Ethernet TX-/BI_DA- |
| 3 | ETH0_MX1_P | Ethernet RX+/BI_DB+ |
| 4 | ETH0_MX1_N | Ethernet RX-/BI_DB- |
| 5 | VCC_5V0_ACC | 5V accessory supply (Pins 5 and 6 combined provide up to 1.0A Continuous) |
| 6 | USBO_VBUS | USB 5V supply |
| 7 | USBO_D_P | USB Data + |
| 8 | USBO_D_N | USB Data - |
| 9 | USBO_ID | USB OTG ID pin |
| 10 | RESERVED | |
| 11 | RS232_TXD | RS232 transmit data |
| 12 | RS232_RXD | RS232 receive data |
| 13 | GPIO1 | Reserved, Do Not Connect |
| 14 | GND | Ground |

Table 20 SL/LC5200 I/O Connector Pinout

| SL/LC5200 PWR Connector Pinout | | |
|--------------------------------|-------------|----------------------------|
| Pin # | Description | Comments/Notes |
| 1 | VBAT_IN | Input voltage range 9V-36V |
| 2 | GND | Ground connection |

Table 21 SL/LC5200 Power Connector Pinout

4.3 Mechanical and Operating Specifications

SC4400E:

Mechanical

| | |
|------------------------|--|
| • Ambient Temp. | -40° to +65° C |
| • IP Rating | IP-68 (Dust / Submersible in Water to 20m)** |
| • Dimensions | 5.25" x 4.5" x 1.8" (Excluding Connectors) |
| • Weight | 2.5 lbs. (40 oz./1.13 kg.) |
| • Color | Black Anodized |
| • Mounting | 4-Hole Mounting Pattern |

Power

| | |
|---|---|
| • Voltage/Current | 9 – 20 VDC (± 5%), 5A |
| • Power Consumption | 8 W – 100 W @ 20 W TX Power 8 W – 43 W @ 8 W TX Power 8 W – 24 W @ 1 W TX Power |
| • Optional External Power Supply (for indoor only) | 12VDC, 5A |

Interfaces

| | |
|-----------------------------|---|
| • RF | 4 x TNC(f) [N(f) Optional] |
| • Primary | Ruggedized Push/Pull Connector [1 x Ethernet, 1 x RS232, DC Input] |
| • Auxiliary | Ruggedized Push/Pull Connector [1 x USB 2.0 Host, 1 x USB 2.0 OTG] |
| • PTT (Push-to-Talk) | Ruggedized Break away Connector (Front Panel) |
| • Status Indicator | Tri-Color LED |
| • Control Interface | Multi-Position Switch 13 presets plus zeroize crypto |

Web-Based StreamScape™ Network Manager

Mechanical – OEM

| | |
|------------------------|---------------------------|
| • Dimensions | 4.29" x 3.3" x 0.82" |
| • Weight | 9.1 oz (w/ Outer Shields) |
| • RF Connectors | SMP (m) |

(**) Must have all connectors mated with IP68+ cables/antennas

SC4200EP:

Mechanical

- **Ambient Temp.** -40° to +65° C
- **IP Rating** IP-68 (Dust / Submersible in Water up to 20m)**
- **Dimensions** 4.00" x 2.63" x 1.51" (Excluding Connectors)
- **Weight** 0.94 lbs. (15 oz./0.43 kg.)
- **Color** Black Anodized
- **Mounting** 4-Hole Mounting Pattern (Through-Hole)

Power

- **Voltage/Current** 9 – 20 VDC (± 5%), 5A
- **Power Consumption** 4.8 W – 48 W @ 10W TX Power
4.8 W – 24 W @ 4W TX Power
4.8 W – 16 W @ 1W TX Power
- **Battery Life** Up to 12 Hours (6.8Ah MBITR Battery)
- **Power Options** Twist-Lock Battery or Front Panel
- **Optional External Power Supply (for indoor only)** 12VDC, 5A

Interfaces

- **RF** TNC(f) (2 Each)
- **Primary** Ruggedized Push/Pull Connector (Front Panel)
1 x Ethernet, 1x RS232, DC Input (Optional)
- **Auxiliary** Ruggedized Push/Pull Connector (Front Panel)
1 x USB 2.0 Host, 1 x USB 2.0 OTG
- **PTT (Push-to-Talk)** Ruggedized Breakaway Connector (Front Panel)
- **Status Indicator** Tri-Color LED
- **Management Interface** Multi-Position Switch
13 presets plus zeroize crypto

Web-Based StreamScape™ Network Manager

Mechanical – OEM

- **Dimensions** 3.61" x 2.15" x 0.71"
- **Weight** 4.1 oz (w/ Outer Shields)
- **RF Connectors** SMP (m)

(**) Must have all connectors mated with IP68+ cables/antennas

SL4200:

Mechanical

- **Ambient Temp.** -40° to +65° C
- **IP Rating** IP-67 (Dust / Submersible in Water up to 1m)**
- **Dimensions** 119 x 74 x 18 mm (Excluding Connectors)
- **Weight** 295 grams
- **Color** Black Anodized Aluminum

Power

- **Voltage/Current** 8-32VDC input / USB-C PD (9VDC)
- **Power Consumption** 4.8 W – 17 W @ 1 W TX Power

Interfaces

- **RF** TNC(f) (2 Each)
- **Power/Data** 20-pin “POGO” style connector
8-32VDC input / USB-C PD (9VDC)
2x USB 2.0 (Host / OTG)
Serial RS-232
+5VDC output
- **Status Indicator** Tri-Color LED
- **Management Interface** On/Off Switch
Web-Based StreamScape™ Network Manager

Mechanical – OEM

- **Dimensions** 0.45" x 2.15" (ears: 2.74")x 3.83"
- **Weight** 105 g (Module)
45 g (PCBA only)
- **RF Connectors** SMA

(**) Must have all connectors mated with IP67+ cables/antennas

SC4400:

Mechanical

- **Ambient Temp.** -40° to +65° C
- **IP Rating** IP-67 (Dust / Immersion in Water up to 1m)**
- **Dimensions** 5.25" x 4.5" x 1.8" (Excluding Connectors)
- **Weight** 2.5 lbs. (40 oz./1.13 kg.)
- **Color** Black Anodized
- **Mounting** 4-Hole Mounting Pattern

Power

- **Voltage/Current** 9 – 20 VDC (± 5%), 5A
- **Power Consumption** 8 W – 43 W @ 8 W TX Power
8 W – 24 W @ 1 W TX Power
- **Optional External Power Supply (for indoor only)** 12VDC, 5A

Interfaces

- **RF** 4 x TNC(f)
[N(f) Optional]
- **Primary** Ruggedized Circular Connector
[1 x Ethernet, 1 x RS232, DC Input]
- **Auxiliary** Ruggedized Circular Connector
[1 x USB 2.0 Host, 1 x USB 2.0 OTG]
- **PTT (Push-to-Talk)** Ruggedized Break away Connector (Front Panel)
- **Status Indicator** Tri-Color LED
- **Management Interface** Web-Based StreamScape™ Network Manager

Mechanical – OEM

- **Dimensions** 4.29" x 3.3" x 0.82"
- **Weight** 9.1 oz (w/ Outer Shields)
- **RF Connectors** SMP (m)

(**) Must have all connectors mated with IP67+ cables/antennas

SC4200:
Mechanical

| | |
|------------------------|--|
| • Ambient Temp. | -40° to +65° C |
| • IP Rating | IP-67 (Dust / Immersion in Water up to 1m)** |
| • Dimensions | 4.00" x 2.63" x 1.51" (Excluding Connectors) |
| • Weight | 0.94 lbs. (15 oz./0.43 kg.) |
| • Color | Black Anodized |
| • Mounting | 4-Hole Mounting Pattern (Through-Hole) |

Power

| | |
|---|--|
| • Voltage/Current | 9 – 20 VDC (± 5%), 5A |
| • Power Consumption | 4.8 W – 24 W @ 4W TX Power |
| • Battery Life | 4.8 W – 16 W @ 1W TX Power |
| • Power Options | Up to 12 Hours (6.8Ah MBITR Battery) |
| • Optional External Power Supply (for indoor only) | Twist-Lock Battery <u>or</u> Front Panel |
| | 12VDC, 5A |

Interfaces

| | |
|-------------------------------|---|
| • RF | TNC(f) (2 Each) |
| • Primary | Ruggedized Circular Connector (Front Panel) |
| • Auxiliary | 1 x Ethernet, 1x RS232, DC Input (Optional) |
| • PTT (Push-to-Talk) | Ruggedized Circular Connector (Front Panel) |
| • Status Indicator | 1 x USB 2.0 Host, 1 x USB 2.0 OTG |
| • Management Interface | Ruggedized Break away Connector (Front Panel) |
| | Tri-Color LED |
| | Web-Based StreamScape™ Network Manager |

Mechanical – OEM

| | |
|------------------------|---------------------------|
| • Dimensions | 3.61" x 2.15" x 0.71" |
| • Weight | 4.1 oz (w/ Outer Shields) |
| • RF Connectors | SMP (m) |

() Must have all connectors mated with IP67+ cables/antennas**

SL/LC5200:**Mechanical - OEM**

- **Ambient Temp.** -40° to +85° C
- **Dimensions** 63.5 x 44.5 x 10.4 mm
- **Weight** 26 g (Bare PCB), 52 g (With Shields)

Power

- **Voltage/Current** 9 – 36 VDC (± 5%), 5A
- **Power Consumption** 4 - 13 W @ 2W TX Power

Interfaces

- **RF** SMPM(f) (2 Each)
- **I/O** JST SM14B-SHLS-TF(LF)(SN)
- **Power** JST SM02B-SFKH-TF
- **Management Interface** Web-Based StreamScape™ Network Manager

4.3.1 SC4400E Enclosure Mechanical Drawing

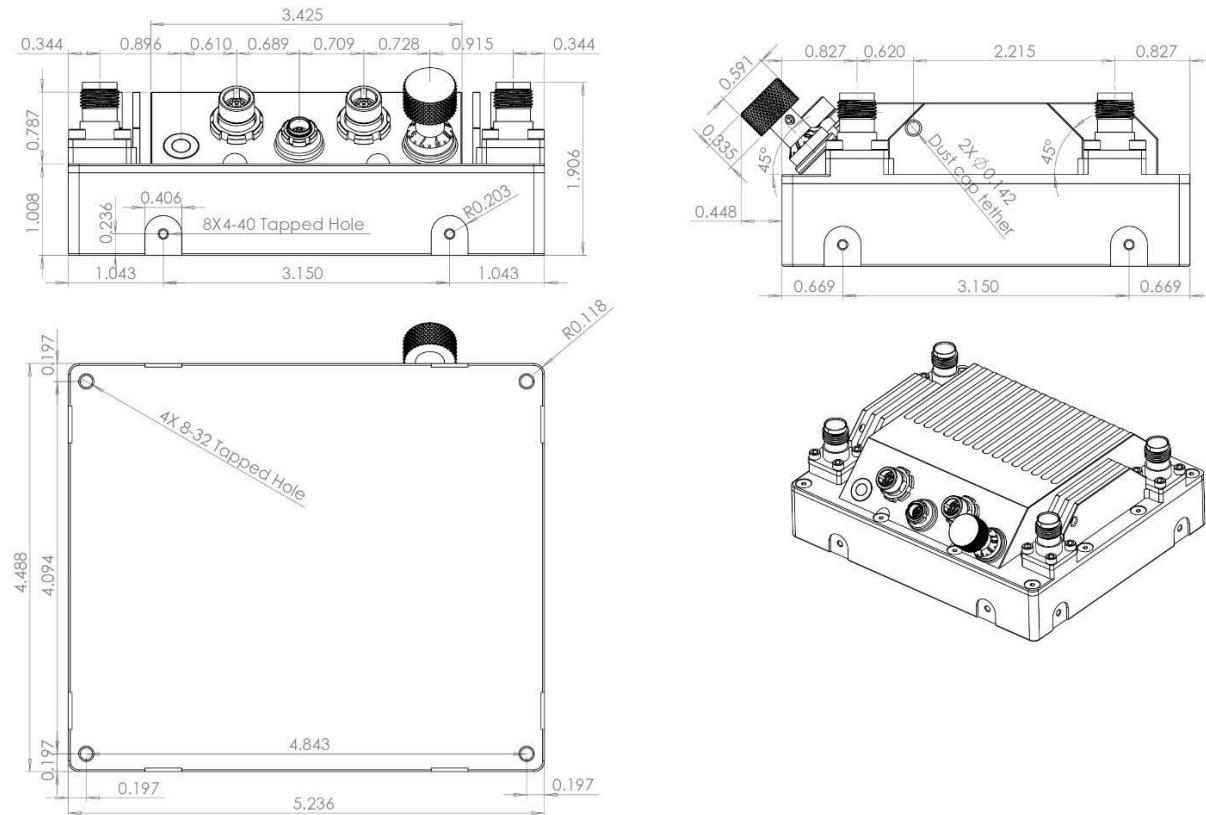


Figure 23 SC4400E Mechanical Drawing (top) and Mounting Pattern (bottom)

*Tapped mounting holes are available on bottom (8-32) and on the sides (4-40) of radio as indicated in

4.3.2 SC4200EP Enclosure Mechanical Drawing

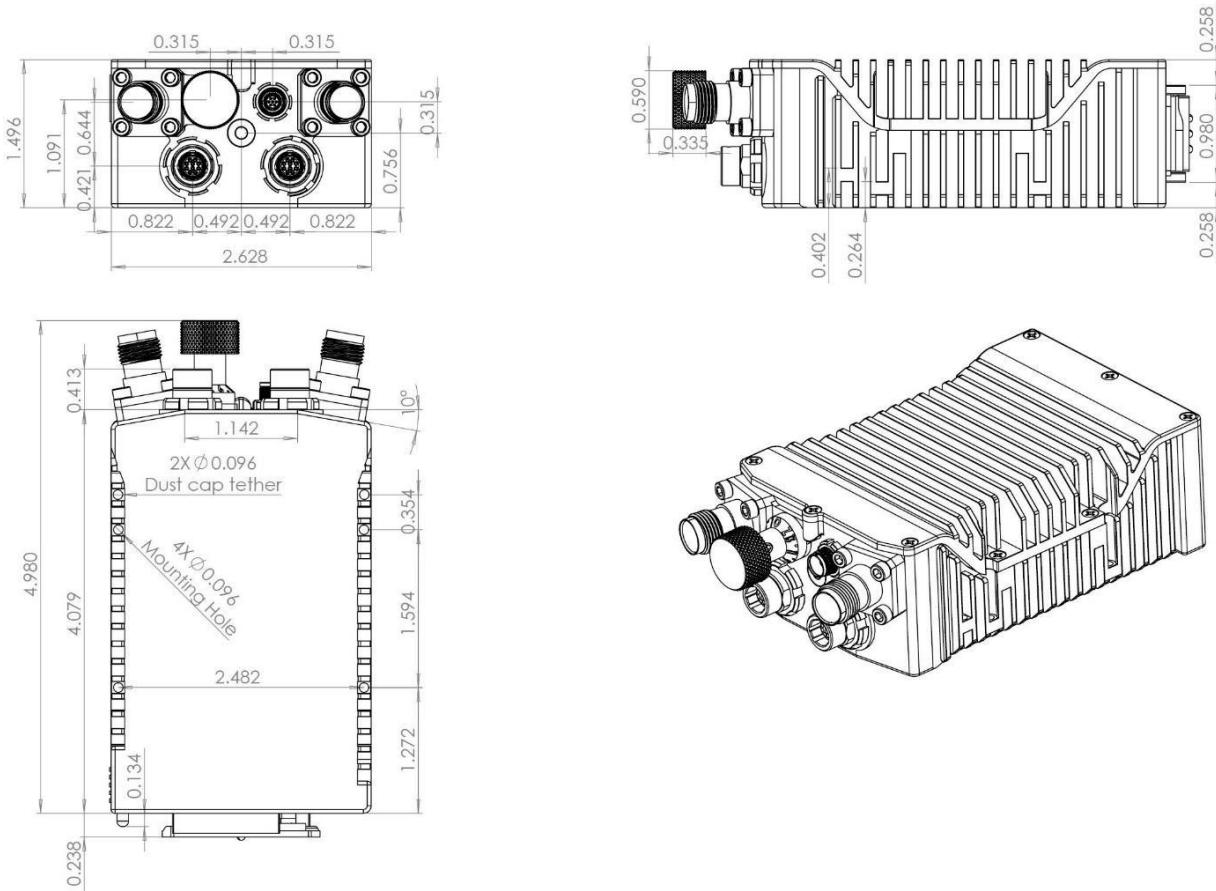


Figure 24 SC4200EP Mechanical Drawing (top) and Mounting Pattern (bottom)

*mounting holes utilize <https://www.mcmaster.com/96006a234> or equivalent. Hex head (5/64" drive), 2-56 thread, head diameter 9/64"; stainless steel; 3/8" length or longer

4.3.3 SL4200 Enclosure Mechanical Drawing

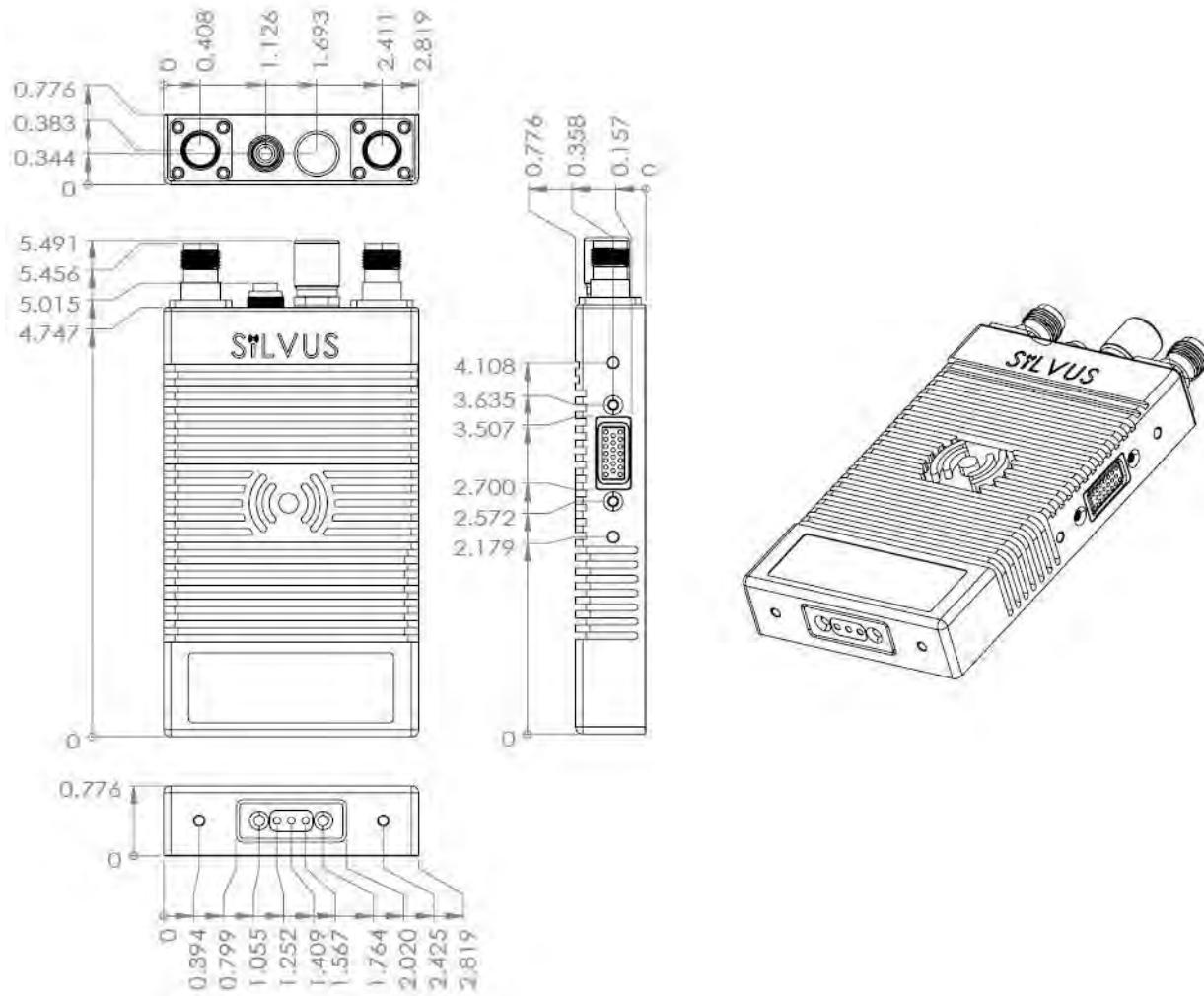
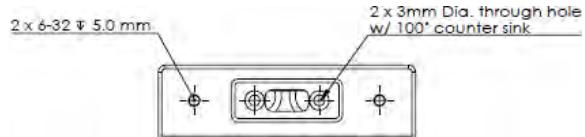


Figure 25 SL4200 Mechanical Drawing

* Tapped mounting holes are available on bottom 6-32 screw, 0.196inch (5.0mm) depth.



4.3.4 SC4400 Enclosure Mechanical Drawing

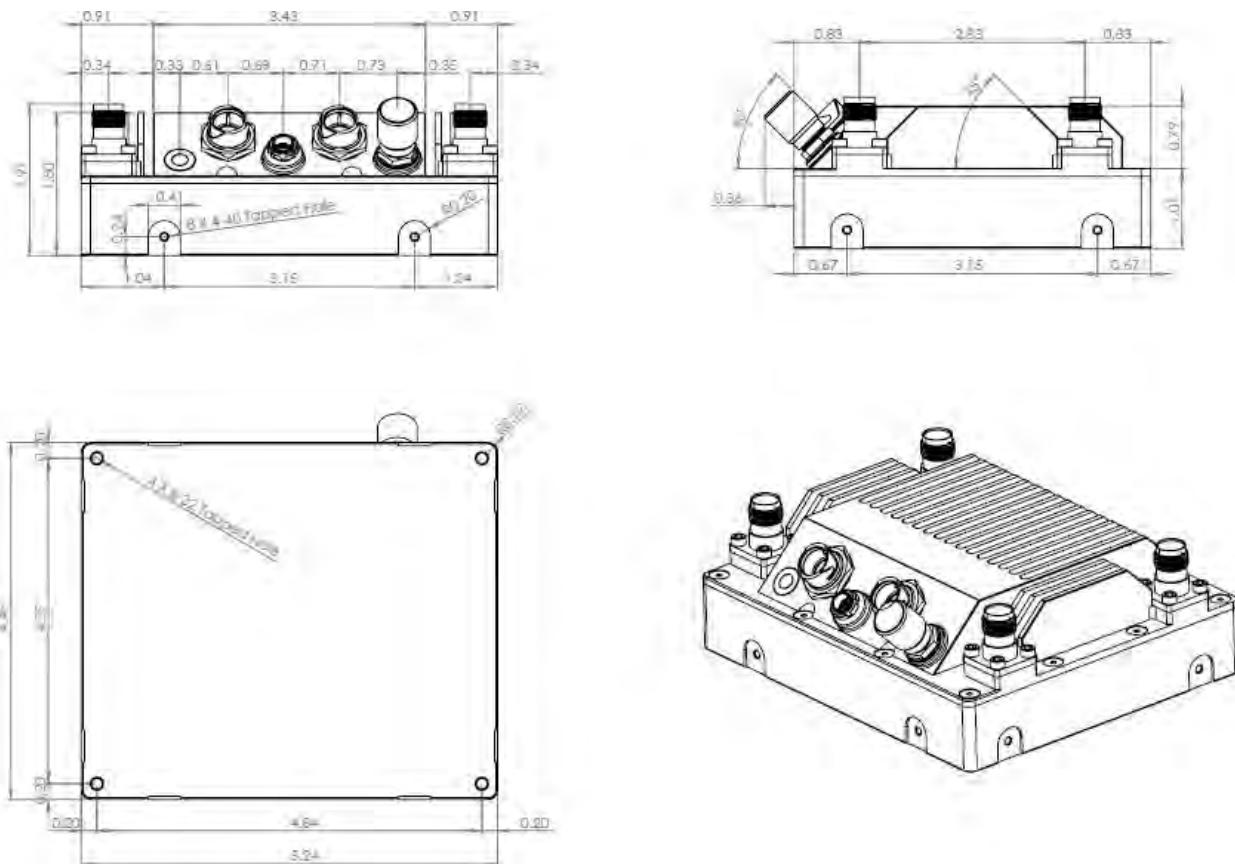


Figure 26 SC4400 Mechanical Drawing (top) and Mounting Pattern (bottom)

*Tapped mounting holes are available on bottom (8-32) and on the sides (4-40) of radio as indicated in

4.3.5 SC4200 Enclosure Mechanical Drawing

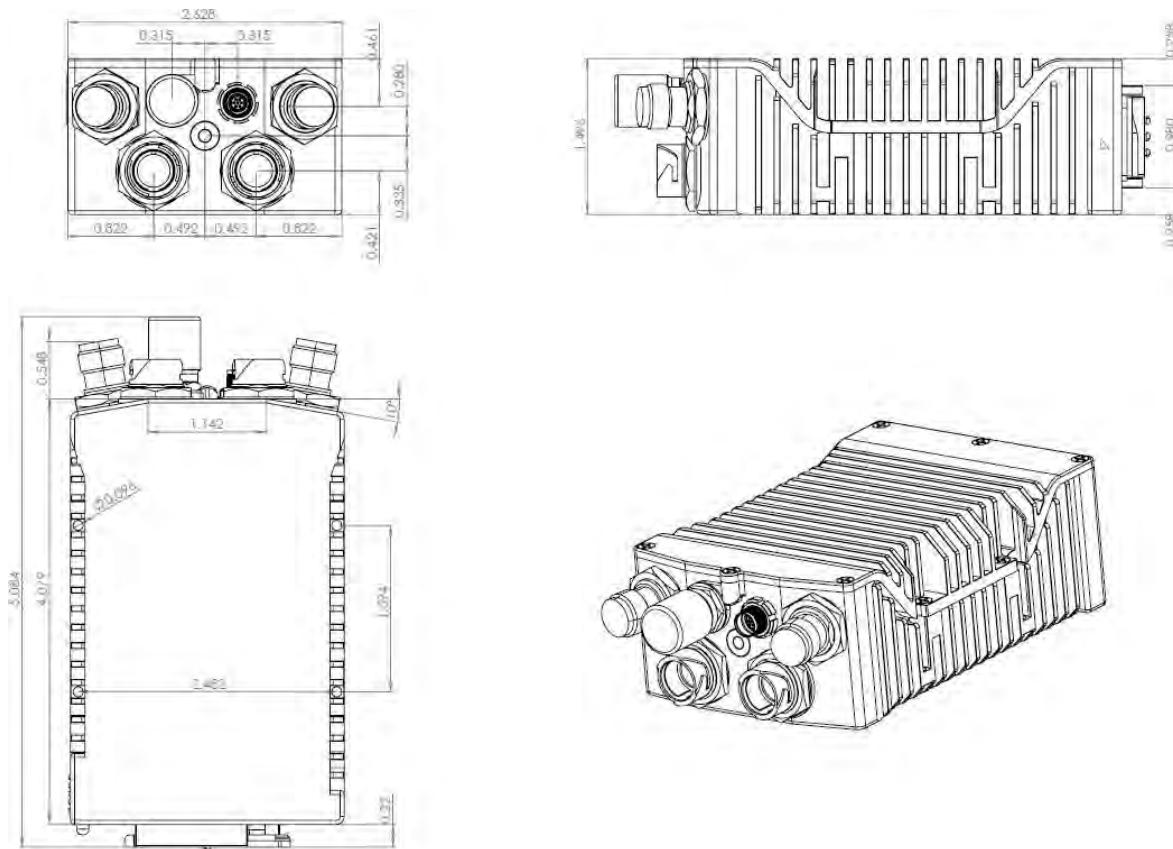


Figure 27 SC4200 Mechanical Drawing (top) and Mounting Pattern (bottom)

*mounting holes utilize <https://www.mcmaster.com/96006a234> or equivalent. Hex head (5/64" drive), 2-56 thread, head diameter 9/64"; stainless steel; 3/8" length or longer

4.3.6 SL/LC5200 Enclosure Mechanical Drawing

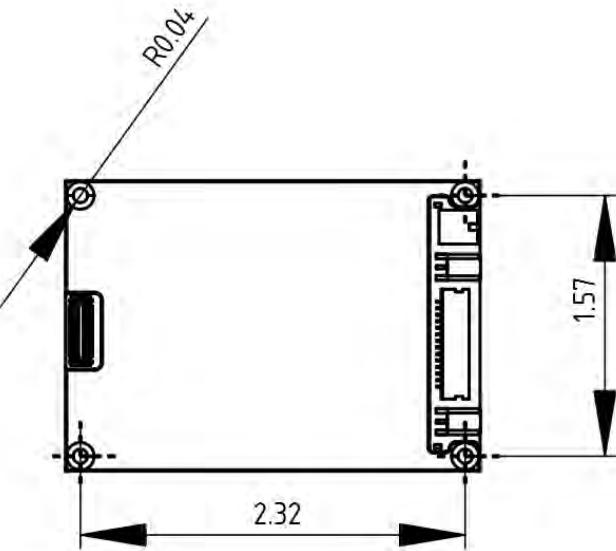


Figure 28 SL5200 OEM Top View (Dimensioned)

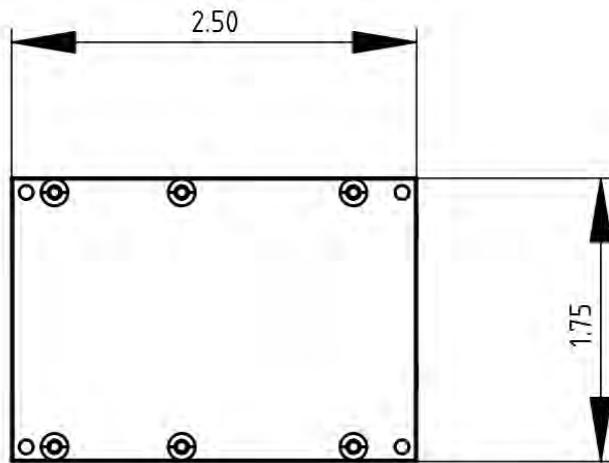


Figure 29 SL5200 OEM Bottom View (Dimensioned)

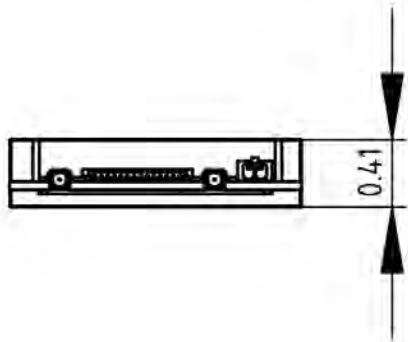


Figure 30 SL5200 OEM End View (Dimensioned)

(note: For exact dimensions, please refer to STEP file)

4.4 SC4400E Specifications

General

- **Waveform** Mobile Networked MIMO (MN-MIMO™)
- **Modulation** BPSK, QPSK, 16-QAM, 64-QAM
- **Channel Bandwidth** 5, 10 & 20 MHz (1.25*, 2.5*)
- **Encryption** DES Standard, AES/GCM 128/256 Optional (FIPS 140-2 Level 2 certified), Suite B
- **Tuning Step Size** 1kHz
- **Data Rates** Up to 100 Mbps (Adaptive)
- **Error Correction** 1/2, 2/3, 3/4, 5/6
- **Antenna Processing** Spatial Multiplexing, Space-Time Coding, TX Eigen Beamforming, RX Eigen Beamforming
- **No. of Spatial Streams** 1-2
- **No. of Antennas** 4

Performance

- **Latency** 7ms Average (20MHz BW)
- **Sensitivity** -102 dBm @ 5MHz BW
- **Frequency Bands** Bands from 400MHz to 6GHz Available
- **Onboard Storage** Dual Band Optional
- **Onboard Storage** 64 GB*

Frequency Band Options

| <u>Band (Freq. Code)</u> | <u>Frequency Range</u> | <u>Band (Freq. Code)</u> | <u>Frequency Range</u> |
|--------------------------|------------------------|--------------------------|------------------------|
| UHF (042) | 400-450 | Low C Band (455) | 4400-4700 |
| ISM 900 (091) | 902-928 | Federal C-1 (467) | 4400-4940 |
| L Band (137) | 1350-1390 | High C Band (485) | 4700-5000 |
| Upper L (181) | 1780-1850 | 5.2GHz ISM (520) | 5150-5250 |
| Broadcast B (206) | 2025-2110 | 5.8GHz ISM (580) | 5725-5875 |
| Federal S (225) | 2200-2300 | | |
| S Band (235) | 2200-2500 | | |
| 2.4GHz ISM (245) | 2400-2500 | | |

(All bands listed in MHz)

Note: If band of interest is not listed, please contact a sales representative

Footnote: (*) in development

4.5 SC4200EP Specifications

General

- **Waveform** Mobile Networked MIMO (MN-MIMO™)
- **Modulation** BPSK, QPSK, 16-QAM, 64-QAM
- **Channel Bandwidth** 5, 10 & 20 MHz (1.25*, 2.5*)
- **Encryption** DES Standard, AES/GCM 128/256 Optional (FIPS 140-2 Level 2 certified), Suite B
- **Tuning Step Size** 1kHz
- **Data Rates** Up to 100 Mbps (Adaptive)
- **Error Correction** 1/2, 2/3, 3/4, 5/6
- **Antenna Processing** Spatial Multiplexing, Space-Time Coding, TX Eigen Beamforming, RX Eigen Beamforming
- **No. of Spatial Streams** 1-2
- **No. of Antennas** 2

Performance

- **Latency** 7ms Average
- **Sensitivity** -99 dBm @ 5MHz BW
- **Frequency Bands** Bands from 400MHz to 6GHz Available
- **Onboard Storage** Dual Band Optional
- **Onboard Storage** 64 GB*

Frequency Band Options

| <u>Band (Freq. Code)</u> | <u>Frequency Range</u> | <u>Band (Freq. Code)</u> | <u>Frequency Range</u> |
|--------------------------|------------------------|--------------------------|------------------------|
| UHF (042) | 400-450 | Low C Band (455) | 4400-4700 |
| ISM 900 (091) | 902-928 | Federal C-1 (467) | 4400-4940 |
| L Band (137) | 1350-1390 | High C Band (485) | 4700-5000 |
| Upper L (181) | 1780-1850 | 5.2GHz ISM (520) | 5150-5250 |
| Broadcast B (206) | 2025-2110 | 5.8GHz ISM (580) | 5725-5875 |
| Federal S (225) | 2200-2300 | | |
| S Band (235) | 2200-2500 | | |
| 2.4GHz ISM (245) | 2400-2500 | | |

(All bands listed in MHz)

Note: If band of interest is not listed, please contact a sales representative

Footnote: (*) in development

SC4400E/SC4200EP PTT

Supported Mic Type

Moving Coil or Condenser
(Software Configurable)

- **Max Avg. Speaker Output Power** 2.65W with 4 Ohm Speaker Impedance
- **MIC Bias** 2.15V or 3V (Software Configurable); Applied via a 2K Ohm Resistor
- **Recommended Speaker Impedance (Handset)** 4 Ohm to 16 Ohm
- **Recommended Speaker Impedance (Headset)** 75 Ohm to 300 Ohm
- **Recommended MIC impedance** <= 1K Ohm
- **Peak Speaker Output Voltage** 5.5V
- **Absolute MIC Input Voltage** 3.3V

4.6 SL4200 Specifications

General

| | |
|---------------------------------|---|
| • Waveform | Mobile Networked MIMO (MN-MIMO™) |
| • Modulation | BPSK, QPSK, 16-QAM, 64-QAM |
| • Channel Bandwidth | 1.25, 2.5 or 5 MHz |
| • Encryption | DES Standard, AES/GCM 128/256 Optional (FIPS 140-2) |
| • Tuning Step Size | 1kHz |
| • Data Rates | Up to 20 Mbps (Adaptive) |
| • Error Correction | 1/2, 2/3, 3/4, 5/6 |
| • Antenna Processing | Spatial Multiplexing, Space-Time Coding, |
| • No. of Spatial Streams | TX Eigen Beamforming, RX Eigen Beamforming 1-2 |
| • No. of Antennas | 2 |

Performance

| | |
|--------------------------|-----------------------------------|
| • Latency | 28ms Average (5MHz BW) |
| • Sensitivity | -104 dBm @ 1.25MHz BW |
| • Frequency Bands | 2.2 - 2.5 GHz 4.4-4.94 GHz |
| | (additional bands in development) |

4.7 SC4400 Specifications

General

- **Waveform** Mobile Networked MIMO (MN-MIMO™)
- **Modulation** BPSK, QPSK, 16-QAM, 64-QAM
- **Channel Bandwidth** 5, 10 & 20 MHz (1.25*, 2.5*)
- **Encryption** DES Standard, AES/GCM 128/256 Optional (FIPS 140-2 Level 2 certified), Suite B
- **Tuning Step Size** 1kHz
- **Data Rates** Up to 100 Mbps (Adaptive)
- **Error Correction** 1/2, 2/3, 3/4, 5/6
- **Antenna Processing** Spatial Multiplexing, Space-Time Coding, TX Eigen Beamforming, RX Eigen Beamforming
- **No. of Spatial Streams** 1-2
- **No. of Antennas** 4

Performance

- **Latency** 7ms Average (20MHz BW)
- **Sensitivity** -102 dBm @ 5MHz BW
- **Frequency Bands** Bands from 400MHz to 6GHz Available
- **Onboard Storage** Dual Band Optional
- **Onboard Storage** 64 GB*

Frequency Band Options

| <u>Band (Freq. Code)</u> | <u>Frequency Range</u> | <u>Band (Freq. Code)</u> | <u>Frequency Range</u> |
|--------------------------|------------------------|--------------------------|------------------------|
| UHF (042) | 400-450 | Low C Band (455) | 4400-4700 |
| ISM 900 (091) | 902-928 | Federal C-1 (467) | 4400-4940 |
| L Band (137) | 1350-1390 | Federal C-2 (469)* | 4400-4990 |
| Upper L (181) | 1780-1850 | High C Band (485) | 4700-5000 |
| Broadcast B (206) | 2025-2110 | 5.2GHz ISM (520) | 5150-5250 |
| Federal S (225) | 2200-2300 | 5.8GHz ISM (580) | 5725-5875 |
| S Band (235) | 2200-2500 | | |
| 2.4GHz ISM (245) | 2400-2500 | | |

(All bands listed in MHz)

Note: If band of interest is not listed, please contact a sales representative

Footnote: (*) in development

4.8 SC4200 Specifications

General

| | |
|---------------------------------|---|
| • Waveform | Mobile Networked MIMO (MN-MIMO™) |
| • Modulation | BPSK, QPSK, 16-QAM, 64-QAM |
| • Channel Bandwidth | 5, 10 & 20 MHz (1.25*, 2.5*) |
| • Encryption | DES Standard, AES/GCM 128/256 Optional (FIPS 140-2 Level 2 certified), Suite B |
| • Tuning Step Size | 1KHz |
| • Data Rates | Up to 100 Mbps (Adaptive) |
| • Error Correction | 1/2, 2/3, 3/4, 5/6 |
| • Antenna Processing | Spatial Multiplexing, Space-Time Coding, TX Eigen Beamforming, RX Eigen Beamforming |
| • No. of Spatial Streams | 1-2 |
| • No. of Antennas | 2 |

Performance

| | |
|--------------------------|-------------------------------------|
| • Latency | 7ms Average |
| • Sensitivity | -99 dBm @ 5MHz BW |
| • Frequency Bands | Bands from 400MHz to 6GHz Available |
| | Dual Band Optional |
| • Onboard Storage | 64 GB* |

Frequency Band Options

| <u>Band (Freq. Code)</u> | <u>Frequency Range</u> | <u>Band (Freq. Code)</u> | <u>Frequency Range</u> |
|--------------------------|------------------------|--------------------------|------------------------|
| UHF (042) | 400-450 | Low C Band (455) | 4400-4700 |
| ISM 900 (091) | 902-928 | Federal C-1 (467) | 4400-4940 |
| L Band (137) | 1350-1390 | Federal C-2 (469)* | 4400-4990 |
| Upper L (181) | 1780-1850 | High C Band (485) | 4700-5000 |
| Broadcast B (206) | 2025-2110 | 5.2GHz ISM (520) | 5150-5250 |
| Federal S (225) | 2200-2300 | 5.8GHz ISM (580) | 5725-5875 |
| S Band (235) | 2200-2500 | | |
| 2.4GHz ISM (245) | 2400-2500 | | |

(All bands listed in MHz)

Note: If band of interest is not listed, please contact a sales representative

Footnote: (*) in development

SC4400/SC4200 PTT

Supported Mic Type

Moving Coil or Condenser
(Software Configurable)

- **Max Avg. Speaker Output Power** 2.65W with 4 Ohm Speaker Impedance
- **MIC Bias** 2.15V or 3V (Software Configurable); Applied via a 2K Ohm Resistor
- **Recommended Speaker Impedance (Handset)** 4 Ohm to 16 Ohm
- **Recommended Speaker Impedance (Headset)** 75 Ohm to 300 Ohm
- **Recommended MIC impedance** <= 1K Ohm
- **Peak Speaker Output Voltage** 5.5V
- **Absolute MIC Input Voltage** 3.3V

4.9 SL/LC5200 Specifications

General

- **Waveform** Mobile Networked MIMO (MN-MIMO™)
- **Modulation** BPSK, QPSK, 16-QAM, 64-QAM
- **Channel Bandwidth** 5, 10 & 20 MHz (1.25*, 2.5*)
- **Encryption** DES Standard, AES/GCM 128/256 Optional (FIPS 140-2 Level 2 certified), Suite B
- **Tuning Step Size** 1KHz

| | |
|---------------------------------|--|
| • Data Rates | Up to 100 Mbps (Adaptive) |
| • Error Correction | 1/2, 2/3, 3/4, 5/6 |
| • Antenna Processing | Spatial Multiplexing, Space-Time Coding, |
| | TX Eigen Beamforming, RX Eigen Beamforming |
| • No. of Spatial Streams | 1-2 |
| • No. of Antennas | 2 |

Performance

| | |
|--------------------------|---|
| • Latency | 7ms Average |
| • Sensitivity | -101 dBm @ 5MHz BW |
| • Frequency Bands | Bands from 400MHz to 6GHz Available Dual Band Optional |

Frequency Band Options

| <u>Band (Freq. Code)</u> | <u>Frequency Range</u> | <u>Band (Freq. Code)</u> | <u>Frequency Range</u> |
|--------------------------|------------------------|--------------------------|------------------------|
| L Band (139) | 1350-1440 | | |
| S Band (235) | 2200-2500 | | |

(All bands listed in MHz)

Note: If band of interest is not listed, please contact a sales representative

Footnote: (*) in development

SC4400/SC4200 PTT

Supported Mic Type

Moving Coil or Condenser
(Software Configurable)

- Max Avg. Speaker Output Power** 2.65W with 4 Ohm Speaker Impedance
- MIC Bias** 2.15V or 3V (Software Configurable); Applied via a 2K Ohm Resistor
- Recommended Speaker Impedance (Handset)** 4 Ohm to 16 Ohm
- Recommended Speaker Impedance (Headset)** 75 Ohm to 300 Ohm
- Recommended MIC impedance** <= 1K Ohm
- Peak Speaker Output Voltage** 5.5V
- Absolute MIC Input Voltage** 3.3V

5. Web Interface

5.0 Getting Started

Connect a laptop to the StreamCaster radio using the supplied Ethernet cable and turn on the radio. Users can type “ping <IP address>” in order to determine whether the radio is fully booted. A web configuration will then be available by typing the radio IP address in a web browser. Please ensure that your laptop is on the same subnet as the radio (172.20.xx.xx by default). Users will initially see the link distance warning, then be directed to the Local Radio Configuration page. (See **Figure 27 Initial boot up warning**) You will be able to navigate to various configuration pages from the drop-down menu on the left-hand side. On the right, you can open additional details about the radio by selecting the four squares icon on the top right of the screen. After selecting, you will see details such as local radio IP, VIP, Node Label, temperature, voltage, and an option to use night mode or not. Night mode will have a dark background and below screen shots are an example of the GUI in night mode. Throughout the user interface, if there is a red bar below the parameter you will be able to click on it for either additional notes about the parameter or see additional options.

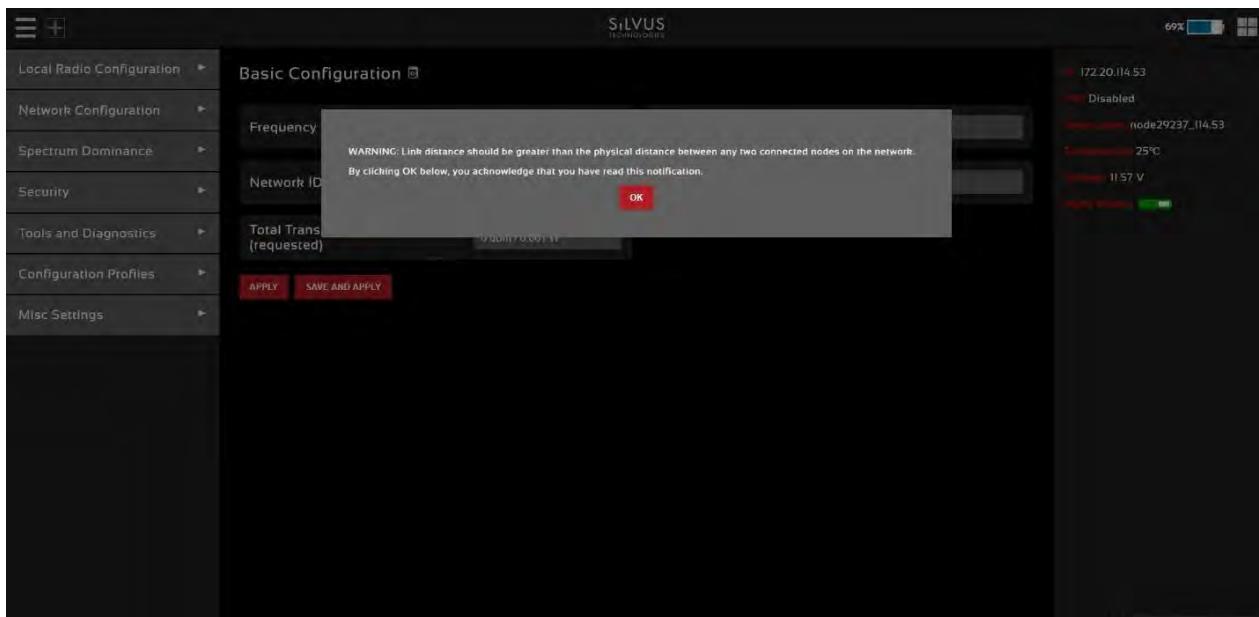


Figure 31 Initial boot up warning

Upon first boot up and login to the GUI, you will see a warning message. This message is meant to emphasize the importance of having the correct link distance setting.

5.1 Local Radio Configuration

The first group of configurations on the left side of the GUI is the Local Radio Configurations. This group of parameters can help adjust your network to perform better in various environments, conditions, and applications. You will be able to adjust the radio's RF characteristics, networking parameters, BDA configurations, serial/USB configurations, and PTT settings.

5.1.1 RF

The RF section of the Local Radio Configurations will let you adjust some Basic configurations as well as some Advanced parameters. These configurations will optimize the link performance in different types of deployments. To get radios to link and form a mesh network the center frequency, bandwidth, network ID, and Link Distance parameters in the Basic configuration page need to all match. To optimize the network's performance, you can make some adjustments to the MAC settings under the Advanced section.

5.1.1.1 Basic

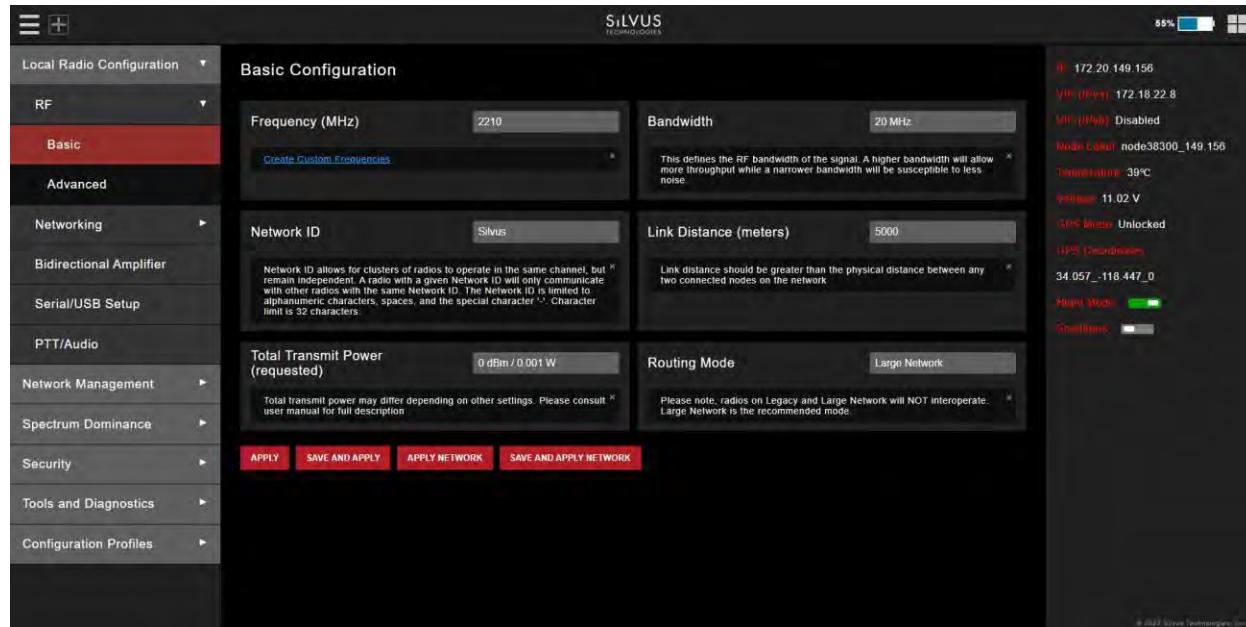


Figure 32 Basic Configuration Page

This page is used to set basic configurations. A brief description of each parameter is given below.

- **Frequency:** This defines the frequency of the signal. There is a drop-down menu for frequency selection. The frequency choices will vary depending on the StreamCaster model(s) you are using. In the additional information section of the frequency section (click on the red bar directly below), you can select a link that will take you to create custom frequencies. Please see Section 8 Custom Frequency Plan for “Create Custom Frequencies” access and installation instructions.
- **Bandwidth:** This defines the RF bandwidth of the signal. A higher bandwidth will allow more throughput while a narrower bandwidth will be susceptible to less noise.
- **Network ID:** Network ID allows for clusters of radios to operate in the same channel but remain independent. A radio with a given Network ID will only communicate with other radios with the same Network ID. The Network ID is limited to alphanumeric characters, spaces, and the special character '-'. Character limit is 32 characters.
- **Link Distance:** Set to an approximate maximum distance between any two nodes in meters, e.g., 5000 for 5km (default). It is important to set the link distance to allow enough time for packets to propagate over the air. Failing to set the link distance to an approximate maximum distance can result in over the air collisions and a degradation of performance. It is recommended to set the link distance 10-15% greater than the actual maximum distance. Please note that this value should be set the same on all radios in the network.
- **Total Transmit Power:** This defines the total power of the signal (power is divided equally between the radio antenna ports). There is also an option to ‘Enable Max Power’ which will allow the radio to push to the highest TX power it can support. This will be slightly different on each radio.
- **Routing Mode:** Please note radios on Legacy and Large Network will NOT interoperate. Large network routing was designed to allow networks with a higher node count. However, there are marginal benefits even if operating smaller networks.
- **Apply:** Apply the new values. Values will change back to the default setting after reboot.
- **Save and Apply:** Apply the new values and set the new values as the default.
- **Apply Network:** Apply the new values to all nodes currently on the network.
- **Save and apply network:** Apply the new values and set the new values as the default to all nodes currently on the network.

5.1.1.2 Advanced

Modulation Modes and Receiver Sensitivity

- Note that listed sensitivity values were measured using a controlled and cabled setup. Actual results may vary by +/- 2dB. Table assumes link distance of 5000m. 10ms, 20ms, and 40ms burst time for 20, 10, and 5MHz bandwidth respectively. 1600 byte Fragmentation Threshold.
- * Modes supported under the AUTO MCS option.
- * Modes supported under the EXTENDED AUTO MCS option in addition to AUTO MCS modes.
- * Modes currently not supported

| NSS | MCS | Coding Rate | PHY Throughput (Mbps) | UDP User Throughput (Mbps) | SC4400/3500/3800 Sensitivity | SC4200/3822 SL4200 Sensitivity |
|-----|-----|-------------|-----------------------|----------------------------|------------------------------|--------------------------------|
| 1 | 0 | BPSK 1/2 | 0.41 | 0.27 | -108 | -105 |
| 1 | 1 | QPSK 1/2 | 0.81 | 0.55 | -106 | -103 |
| 1 | 2 | QPSK 3/4 | 1.22 | 0.82 | -103 | -100 |
| 1 | 3 | 16-QAM 1/2 | 1.63 | 1.10 | -101 | -98 |
| 1 | 4 | 16-QAM 3/4 | 2.44 | 1.65 | -98 | -95 |
| 1 | 5 | 64 QAM 2/3 | 3.25 | 2.20 | -93 | -90 |
| 1 | 6 | 64 QAM 3/4 | 3.66 | 2.47 | -91 | -88 |
| 1 | 7 | 64 QAM 5/6 | 4.06 | 2.75 | -86 | -83 |
| 2 | 8 | BPSK 1/2 | 0.81 | 0.55 | -106 | -103 |
| 2 | 9 | QPSK 1/2 | 1.63 | 1.10 | -103 | -100 |
| 2 | 10 | QPSK 3/4 | 2.44 | 1.65 | -100 | -97 |
| 2 | 11 | 16-QAM 1/2 | 3.25 | 2.20 | -97 | -94 |
| 2 | 12 | 16-QAM 3/4 | 4.88 | 3.30 | -94 | -91 |
| 2 | 13 | 64 QAM 2/3 | 6.50 | 4.35 | -90 | -87 |
| 2 | 14 | 64 QAM 3/4 | 7.31 | 4.75 | -88 | -85 |
| 2 | 15 | 64 QAM 5/6 | 8.13 | 5.10 | -83 | -80 |

Table 22 MCS vs. Sensitivity Chart (1.25MHz Bandwidth)*

| NSS | MCS | Coding Rate | PHY Throughput (Mbps) | UDP User Throughput (Mbps) | SC4400/3500/3800 Sensitivity | SC4200/3822 SL4200 Sensitivity |
|-----|-----|-------------|-----------------------|----------------------------|------------------------------|--------------------------------|
| 1 | 0 | BPSK 1/2 | 0.81 | 0.55 | -104.5 | -101.5 |
| 1 | 1 | QPSK 1/2 | 1.63 | 1.10 | -102.5 | -99.5 |
| 1 | 2 | QPSK 3/4 | 2.44 | 1.65 | -99.5 | -96.5 |
| 1 | 3 | 16-QAM 1/2 | 3.25 | 2.20 | -97.5 | -94.5 |
| 1 | 4 | 16-QAM 3/4 | 4.88 | 3.30 | -94.5 | -91.5 |
| 1 | 5 | 64 QAM 2/3 | 6.50 | 4.40 | -89.5 | -86.5 |
| 1 | 6 | 64 QAM 3/4 | 7.31 | 4.95 | -87.5 | -84.5 |
| 1 | 7 | 64 QAM 5/6 | 8.13 | 5.5 | -82.5 | -79.5 |
| 2 | 8 | BPSK 1/2 | 1.63 | 1.10 | -102.5 | -99.5 |
| 2 | 9 | QPSK 1/2 | 3.25 | 2.20 | -99.5 | -96.5 |
| 2 | 10 | QPSK 3/4 | 4.88 | 3.30 | -96.5 | -93.5 |
| 2 | 11 | 16-QAM 1/2 | 6.50 | 4.40 | -94.5 | -91.5 |
| 2 | 12 | 16-QAM 3/4 | 9.75 | 6.60 | -90.5 | -87.5 |
| 2 | 13 | 64 QAM 2/3 | 13.00 | 8.70 | -86.5 | -83.5 |
| 2 | 14 | 64 QAM 3/4 | 14.63 | 9.50 | -84.5 | -81.5 |
| 2 | 15 | 64 QAM 5/6 | 16.25 | 10.20 | -79.5 | -76.5 |

Table 23 MCS vs. Sensitivity Chart (2.5MHz Bandwidth)*

| NSS | MCS | Coding Rate | PHY Throughput (Mbps) | UDP User Throughput (Mbps) | SC4400/3500/3800 Sensitivity | SC4200/3822 SL4200 Sensitivity |
|-----|-----|-------------|-----------------------|----------------------------|------------------------------|--------------------------------|
| 1 | 0 | BPSK 1/2 | 1.63 | 1.03 | -102 | -99 |
| 1 | 1 | QPSK 1/2 | 3.25 | 2.06 | -100 | -97 |
| 1 | 2 | QPSK 3/4 | 4.88 | 3.09 | -97 | -94 |
| 1 | 3 | 16-QAM 1/2 | 6.50 | 4.12 | -95 | -92 |
| 1 | 4 | 16-QAM 3/4 | 9.75 | 6.18 | -92 | -89 |
| 1 | 5 | 64 QAM 2/3 | 13.00 | 8.25 | -87 | -84 |
| 1 | 6 | 64 QAM 3/4 | 14.63 | 9.28 | -85 | -82 |
| 1 | 7 | 64 QAM 5/6 | 16.25 | 10.30 | -80 | -77 |
| 2 | 8 | BPSK 1/2 | 3.25 | 2.06 | -100 | -97 |
| 2 | 9 | QPSK 1/2 | 6.50 | 4.12 | -97 | -94 |
| 2 | 10 | QPSK 3/4 | 9.75 | 6.18 | -94 | -91 |
| 2 | 11 | 16-QAM 1/2 | 13.00 | 8.25 | -91 | -89 |
| 2 | 12 | 16-QAM 3/4 | 19.50 | 12.38 | -88 | -85 |
| 2 | 13 | 64 QAM 2/3 | 26.00 | 16.21 | -84 | -81 |
| 2 | 14 | 64 QAM 3/4 | 29.25 | 17.62 | -82 | -79 |
| 2 | 15 | 64 QAM 5/6 | 32.50 | 18.94 | -77 | -74 |

Table 24 MCS vs. Sensitivity Chart (5MHz Bandwidth)*

| NSS | MCS | Coding Rate | PHY Throughput (Mbps) | UDP User Throughput (Mbps) | SC4400/3500/3800 Sensitivity | SC4200/3822 SL4200 Sensitivity |
|-----|-----|-------------|-----------------------|----------------------------|------------------------------|--------------------------------|
| 1 | 0 | BPSK 1/2 | 3.25 | 2.48 | -99 | -96 |
| 1 | 1 | QPSK 1/2 | 6.50 | 4.96 | -97 | -94 |
| 1 | 2 | QPSK 3/4 | 9.75 | 7.40 | -94 | -91 |
| 1 | 3 | 16-QAM 1/2 | 13.00 | 9.90 | -92 | -89 |
| 1 | 4 | 16-QAM 3/4 | 19.50 | 14.80 | -89 | -86 |
| 1 | 5 | 64 QAM 2/3 | 26.00 | 19.90 | -84 | -82 |
| 1 | 6 | 64 QAM 3/4 | 29.25 | 22.40 | -82 | -80 |
| 1 | 7 | 64 QAM 5/6 | 32.5 | 24.0 | -77 | -78 |
| 2 | 8 | BPSK 1/2 | 6.50 | 4.96 | -97 | -94 |
| 2 | 9 | QPSK 1/2 | 13.00 | 9.90 | -94 | -91 |
| 2 | 10 | QPSK 3/4 | 19.50 | 14.80 | -91 | -88 |
| 2 | 11 | 16-QAM 1/2 | 26.00 | 19.90 | -89 | -86 |
| 2 | 12 | 16-QAM 3/4 | 39.00 | 29.90 | -85 | -82 |
| 2 | 13 | 64 QAM 2/3 | 52.00 | 39.70 | -81 | -79 |
| 2 | 14 | 64 QAM 3/4 | 58.50 | 43.50 | -79 | -77 |
| 2 | 15 | 64 QAM 5/6 | 65.00 | 48.10 | -74 | -75 |

Table 25 MCS vs. Sensitivity Chart (10MHz Bandwidth)*

| NSS | MCS | Coding Rate | PHY Throughput (Mbps) | UDP User Throughput (Mbps) | SC4400/3500/3800 Sensitivity | SC4200/3822 SL4200 Sensitivity |
|-----|-----|-------------|-----------------------|----------------------------|------------------------------|--------------------------------|
| 1 | 0 | BPSK 1/2 | 6.5 | 4.92 | -96 | -93 |
| 1 | 1 | QPSK 1/2 | 13.00 | 9.82 | -94 | -91 |
| 1 | 2 | QPSK 3/4 | 19.50 | 14.73 | -91 | -88 |
| 1 | 3 | 16-QAM 1/2 | 26.00 | 19.65 | -89 | -86 |
| 1 | 4 | 16-QAM 3/4 | 39.00 | 29.47 | -86 | -83 |
| 1 | 5 | 64 QAM 2/3 | 52.00 | 39.29 | -82 | -79 |
| 1 | 6 | 64 QAM 3/4 | 58.50 | 44.20 | -80 | -77 |
| 1 | 7 | 64 QAM 5/6 | 65.00 | 47.45 | -78 | -75 |
| 2 | 8 | BPSK 1/2 | 13.00 | 9.82 | -94 | -91 |
| 2 | 9 | QPSK 1/2 | 26.00 | 19.65 | -91 | -88 |
| 2 | 10 | QPSK 3/4 | 39.00 | 29.47 | -88 | -85 |
| 2 | 11 | 16-QAM 1/2 | 52.00 | 39.29 | -86 | -83 |
| 2 | 12 | 16-QAM 3/4 | 78.00 | 57.04 | -82 | -79 |
| 2 | 13 | 64 QAM 2/3 | 104.00 | 75.00 | -79 | -76 |
| 2 | 14 | 64 QAM 3/4 | 117.00 | 85.00 | -77 | -74 |
| 2 | 15 | 64 QAM 5/6 | 130.00 | 94.00 | -75 | -72 |

Table 26 MCS vs. Sensitivity Chart (20MHz Bandwidth)*

*Sensitivity numbers reflect “typical” values. Actual sensitivity will vary by band.

5.1.2 Bidirectional Amplifier (not available on SL4200)

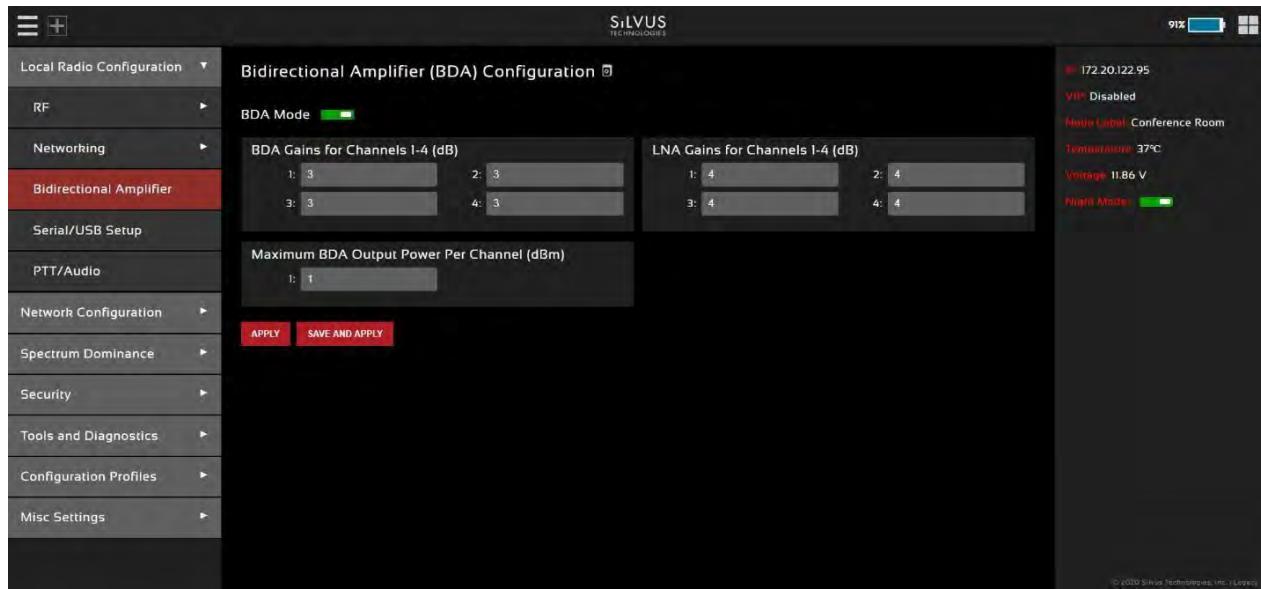


Figure 33 Bidirectional Amplifier (BDA) Configuration Page

The BDA Support page is used to configure the radio to work with an external bi-directional amplifier. These settings should be configured before connecting the amplifier to the radio.

- **BDA Mode:** You can enable or disable the BDA mode here.

Basic Settings:

BDA Gains for Channels 1-4: Enter the gain (dB) for the power amplifier connected to each channel of the radio. This is sometimes labeled as Tx gains.

- **LNA Gains for Channels 1-4:** Enter the gain (dB) for the LNA connected to each channel of the radio. This is sometimes labeled as Rx gains.
- **Maximum BDA Output Power Per Channel (dBm):** Enter the maximum output power for each PA. If the dBm is not listed, you should be able to calculate this from the Watt rating of the amp.
- **Apply:** Apply the new values but does not save them to flash.
- **Save and Apply:** Save the new values to flash and apply.

5.1.3 Serial/USB Setup

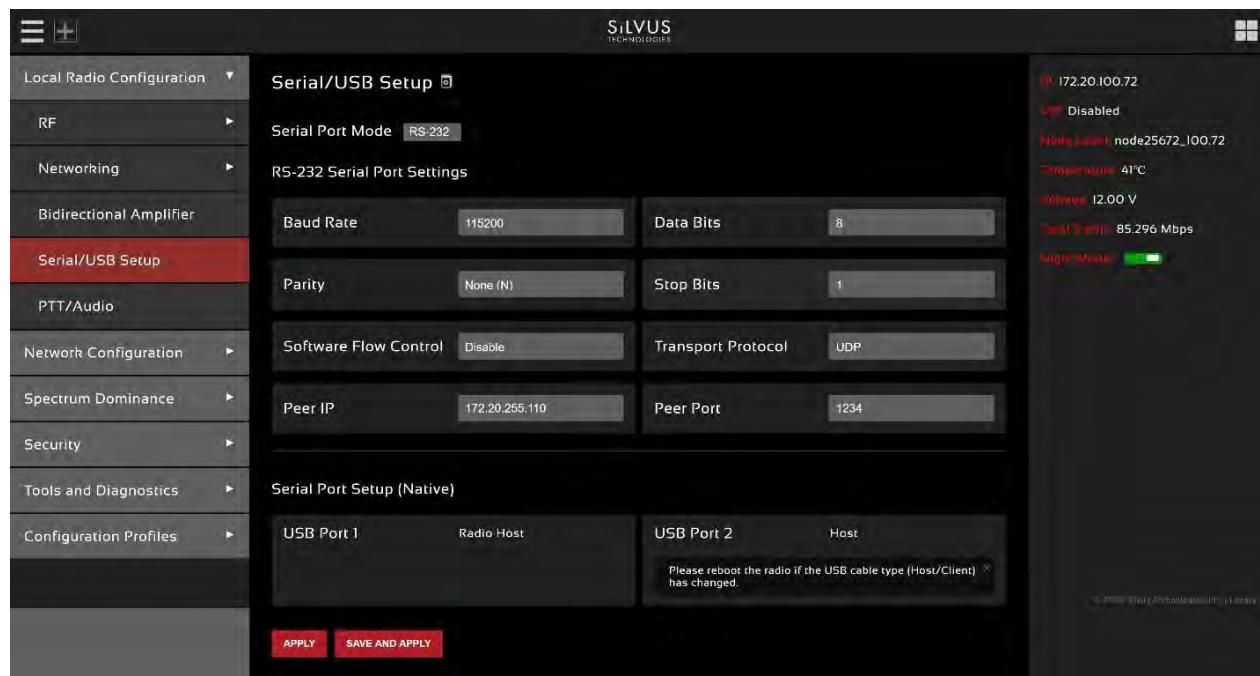


Figure 34 Serial/USB Setup Page

Serial Port Setup:

Each StreamCaster is equipped with one user configurable serial port. A special power cable and null modem cable are required for access to the radio's serial port. A brief description of each parameter is given below.

- **Serial Port Mode:** The user can select one of four available modes for the serial port: *GPS*, *RS232*, *Debug*, and *Disabled*.

- **GPS:** In GPS mode, an external serial GPS module can be connected to and powered from the serial port of the radio. A gpsd service daemon running on the node will make the GPS information available to any user on the network from TCP/IP port 2947. For more information on gpsd please see: <http://catb.org/gpsd/>

In addition, GPS information can be pushed to the radio via the Ethernet or pulled by the radio from a remote device. If using a remote device to obtain GPS, set the GPS mode to remote, the GPS Server IP to the IP address of the remote device, and the Port. The radio will try to connect via TCP to server on local subnet. It will expect data in GPSd format. If GPS information is pushed to the radio via Ethernet, the radio will listen on specified port and expect GPS data as NMEA Formatted UDP packets.

- **RS-232:** The RS-232 mode provides a wireless serial connection between any two serial devices connected to StreamCaster radios on the network. In this mode, the user must configure the RS-232 protocol parameters shown in **Figure 39 Serial/USB Setup Page** above. The transport protocol for the serial data can be set as either TCP or UDP. For data that is sensitive to latency such as command and control data, UDP is recommended. For data that cannot tolerate any data loss, such as telemetry data, TCP is recommended.
 - The Peer IP should be the IP address of the radio on the other end of the RS-232 communication.
 - The Peer IP can be the native or virtual IP address but must be consistent at both ends.
 - Baud rate must match the baud rate of data being sent from the device.
 - Note – An additional 'null modem' cable may be needed at either end, depending upon whether connected device is acting as a terminal or as a control (DTE or DCE)
- **Debug:** The debug mode is used to gain terminal access to the StreamCaster radio and is available for debug or interface purposes (API commands). The user's terminal client should be set to a baud rate of 115200 for console access to the radio.
- **Disabled:** This mode completely disables the serial terminal of the radio.

- **Serial Server:** This will have the same parameter inputs as the RS-232, but will not have a peer IP or transport protocol. This is because you are not trying to connect to just one peer IP. The transport protocol is automatically configured for TCP. On the client side of this connection, ethernet will be used and so the serial port is not configured. It is recommended to configure the serial port as GPS or disabled.
- **Apply:** Apply the new values but does not save them to flash.
- **Save and Apply:** Save the new values to flash and apply.

USB Status (3822/4200/4400):

The USB port on the 3822/4200/4400 can auto-detect whether the connected device is a USB host or client device. The USB cable should not be unplugged while the radio is running.

5.1.4 PTT (push-to-talk) (not available on SL4200)

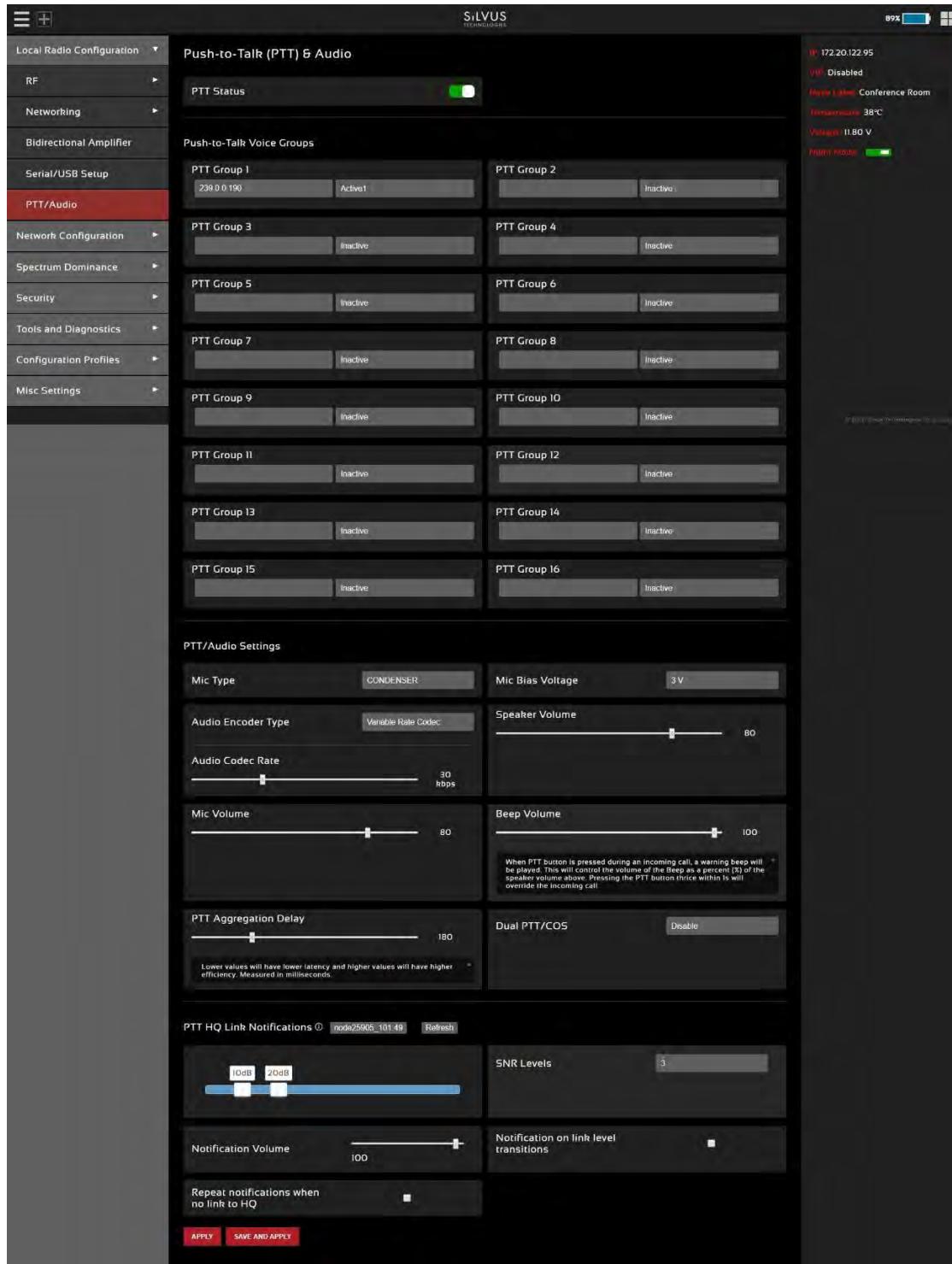


Figure 35 Push-to-Talk (PTT) & Audio Page

The PTT page can be used to configure talk groups (Multicast Groups) and speaker/mic settings for PTT enabled radios. Radios will only communicate with other radios that are subscribed to the same 'Multicast Group'. Radios can be active in multiple talk groups. PTT will always send its multicast traffic using MANET Multicast method. PTT traffic will use port 1234.

Multicast Group – Input the IP address of the multicast group. Radios will only communicate to radios within the same group. There are three different modes to select which dictate how a radio behaves within a group:

- **Active:** Radio may send and receive PTT audio on this group.
- **Inactive:** Group is disabled, no PTT audio will be sent or received.
- **Monitor:** Radio may listen to PTT audio from other users on this group, but may not talk.

Mic Type – Supported MIC types are Moving Coil or Condenser. The input amplification is adjusted based on the Mic Type chosen on this page

Mic Bias Voltage – Options are 90% (3V) or 65% (2.15V).

Audio Encoder Type – Default option is 'Variable Rate Code (OPUS)'. 'G.722 (high quality)' and 'G.711' are also supported for backwards compatibility

Speaker Volume – Moving slider adjusts the gain on the speaker

Mic Volume – Moving slider adjusts the gain on the microphone

Beep Volume + PTT Override – When the PTT button is pressed while another user is speaking, a warning beep will be played. This setting controls the volume of the Beep as a percent (%) of the speaker volume above. Pressing the PTT button three times (and holding on the third) within 1s will allow a user to override the channel and speak.

PTT Aggregation Delay – Lower values will have lower latency and higher values will have higher efficiency. Measured in milliseconds.

Dual PTT/COS – This allows Dual PTT functionality for some mic handsets to talk on two talk groups at the same time. COS is to allow ROIP functionality.

PTT HQ Link Notifications – When the PTT button is pressed twice within 1s, an audio notification will read out the SNR level to the user-specified HQ node. If the level transitions option is enabled, the notification will be played automatically when the SNR crosses the specified thresholds. The SNR thresholds can be set by first choosing the number of levels desired, and then moving the sliders accordingly.

5.2 Tools and Diagnostics

In this section, you will find the sections of the GUI that will provide you with details about the firmware version of the radio. You will also have the option to upload new firmware, as well as access some faults/indicators, factory reset, change languages, and a log tracking some security access to the radio.

5.2.1 Firmware and Licenses

5.2.1.1 Build Information

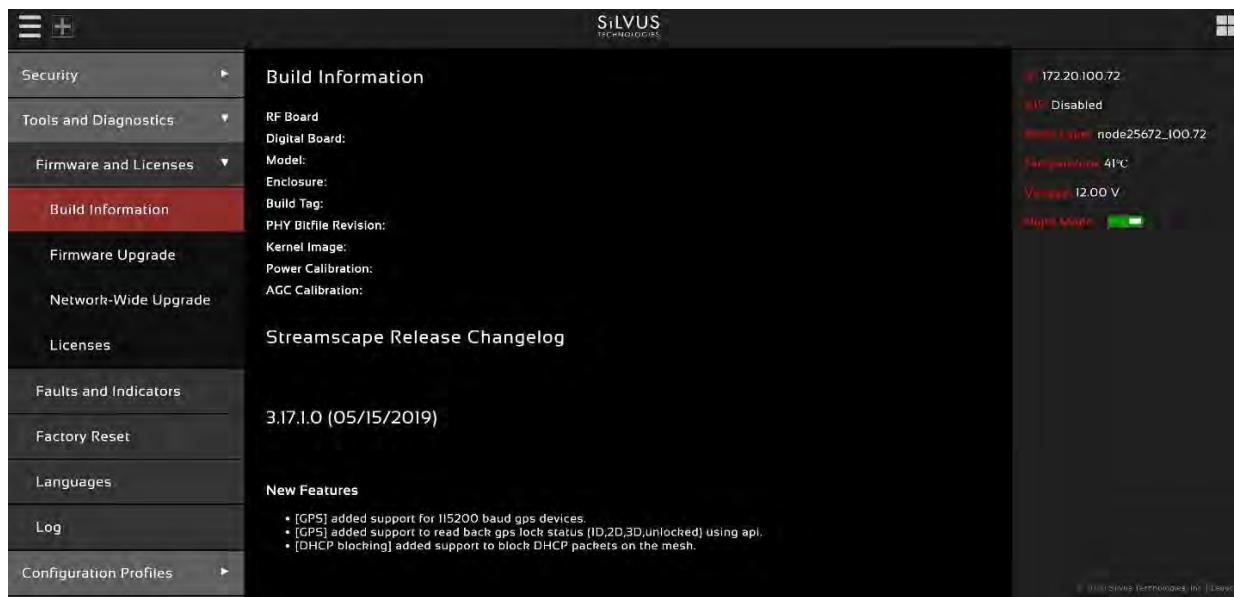


Figure 36 Build Information

The 'Build Information' page provides information about the hardware and firmware loaded onto the radio, as well as the changelog of the currently loaded and past firmware revisions. The current firmware version loaded on the radio will be listed under Build Tag line on this page.

5.2.1.2 Firmware Upgrade

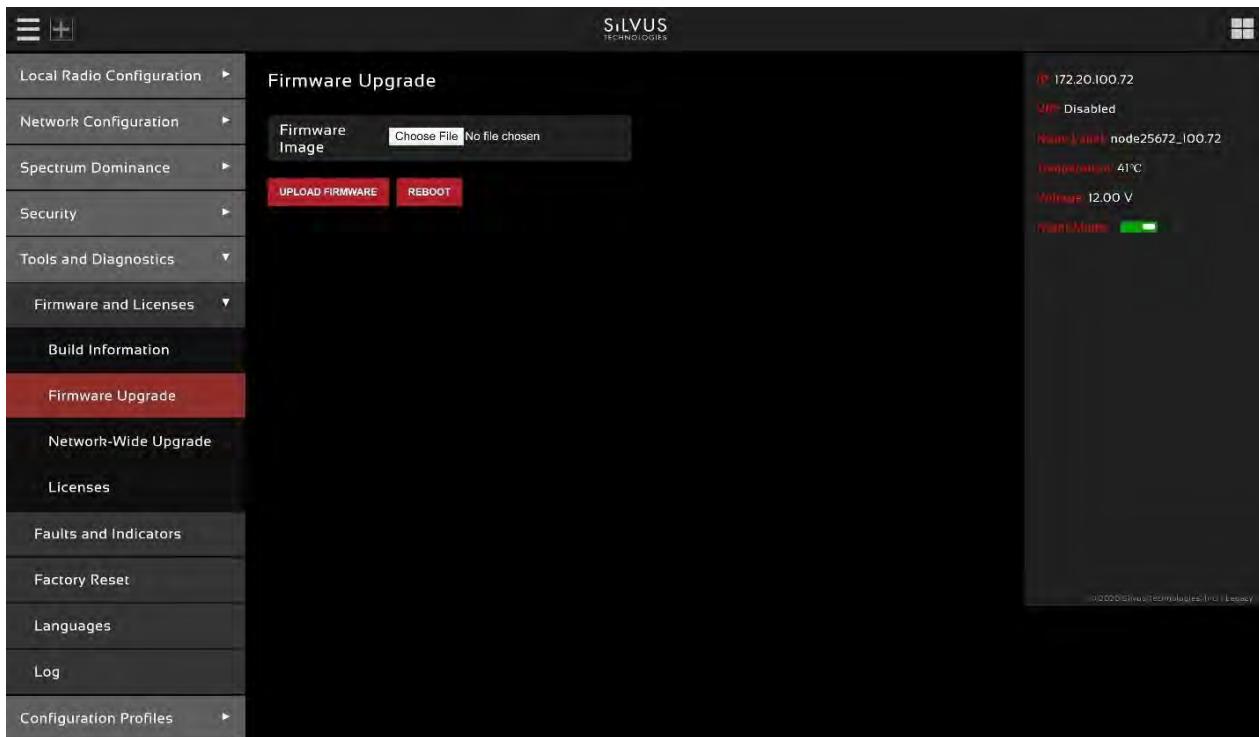


Figure 37 Tools and Diagnostics (Firmware Upgrade)

The firmware can be upgraded by simply choosing the upgrade image from your desktop and uploading it to the radio. This field can be used to upgrade the radio root file system, linux kernel, or uboot.

In firmware version 4.0.3.10 the user manual was removed from the GUI. In firmware version 4.0.3.14 it has been made an option to reload the user manual back into the radio via the firmware upgrade page. Load the user manual image into the firmware image file selector and click upload firmware. This will load the user manual back into the radio.

5.2.1.3 Network-Wide Upgrade

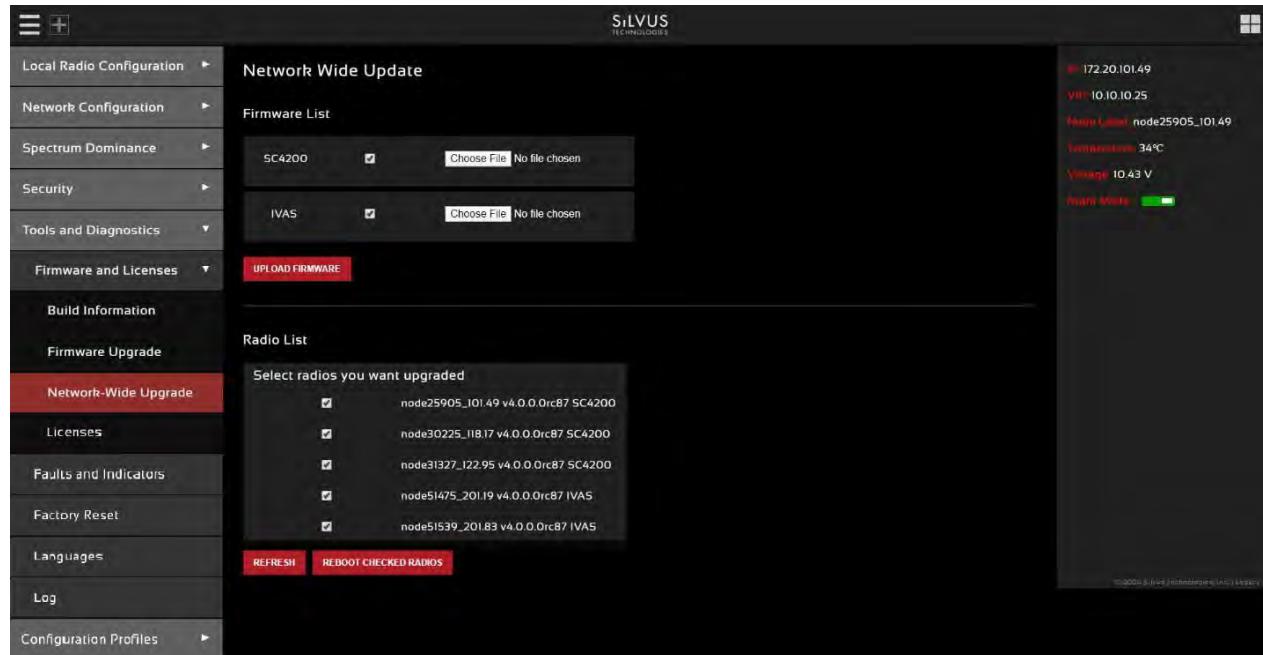


Figure 38 Tools and Diagnostics (Network-wide Upgraded)

Starting with firmware version 3.12.6.8, multiple radios within the same network can be upgraded all at once. Users can simply choose the appropriate firmware file for the corresponding radio models to apply the upgrade to all the radios in the network. Currently, this feature is not available in HTTPS mode.

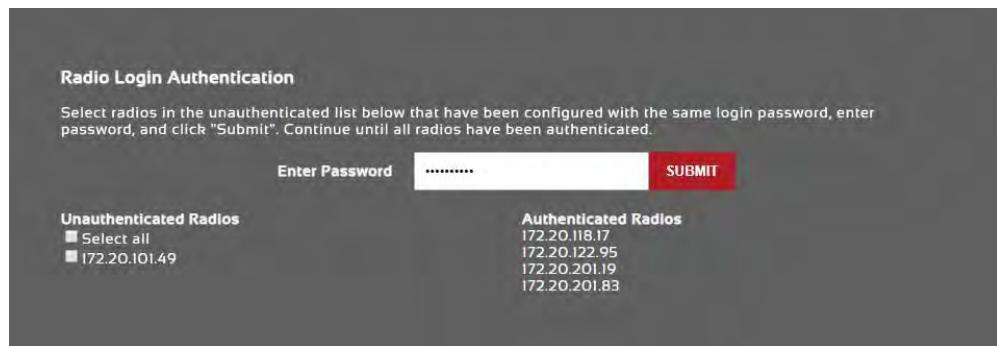


Figure 39 Radio Login Authentication during Network-wide Upgrade

If you attempt a network wide update, and the login authentication is enabled on some radios, you will need to enter the radio's login authentication password in order to proceed. The window asking for the password can be seen on **Figure 85 Radio Login Authentication during Network-Wide Upgrade** above.

5.2.1.4 Licenses

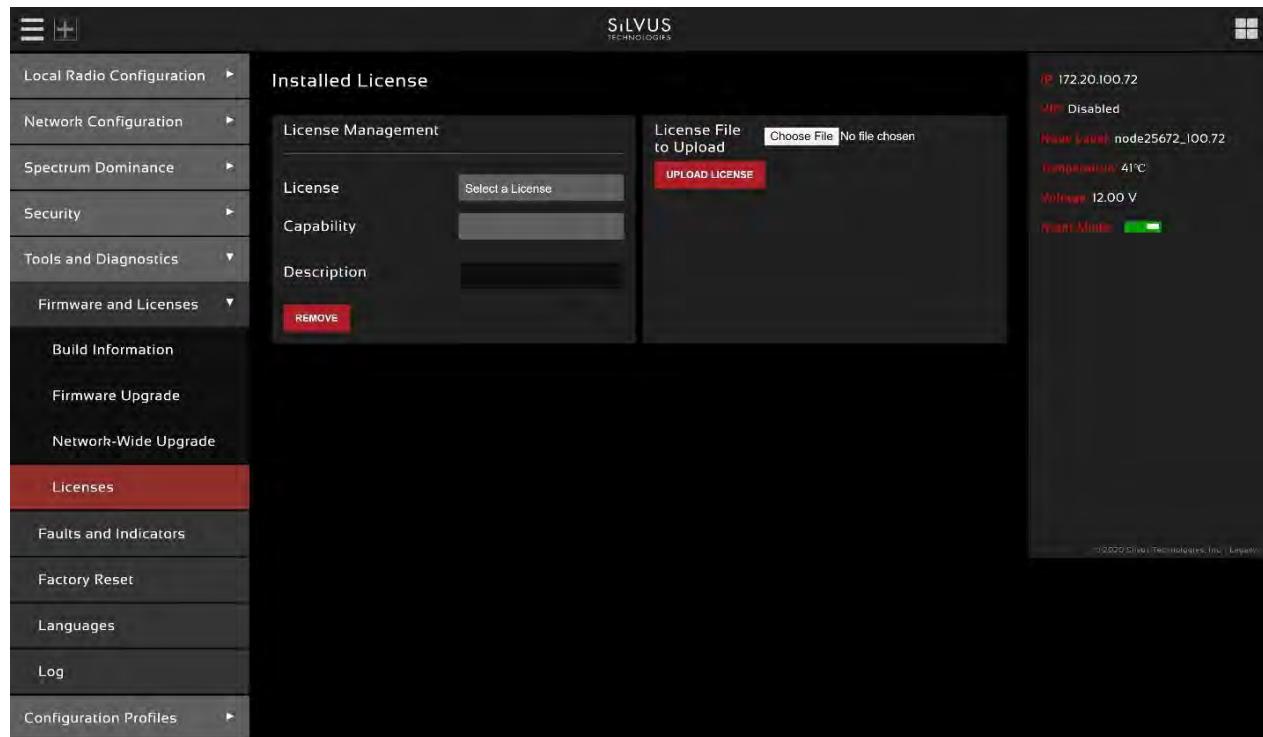


Figure 40 Tools and Diagnostics (Licenses)

Features such as encryption levels and frequency ranges can be enabled by licenses obtained from Silvus. New license keys can be uploaded to the radio on this page. Upload license button will load the license selected to the local radio only. The broadcast license button will load licenses to all radios on the network. Please note that the license files are targeted on an IP specific basis, so the license you use with this feature must incorporate all IP radios in the mesh. If there is a radio without the IP in that license, the upload will fail for that particular radio only.

5.2.2 Faults and Indicators

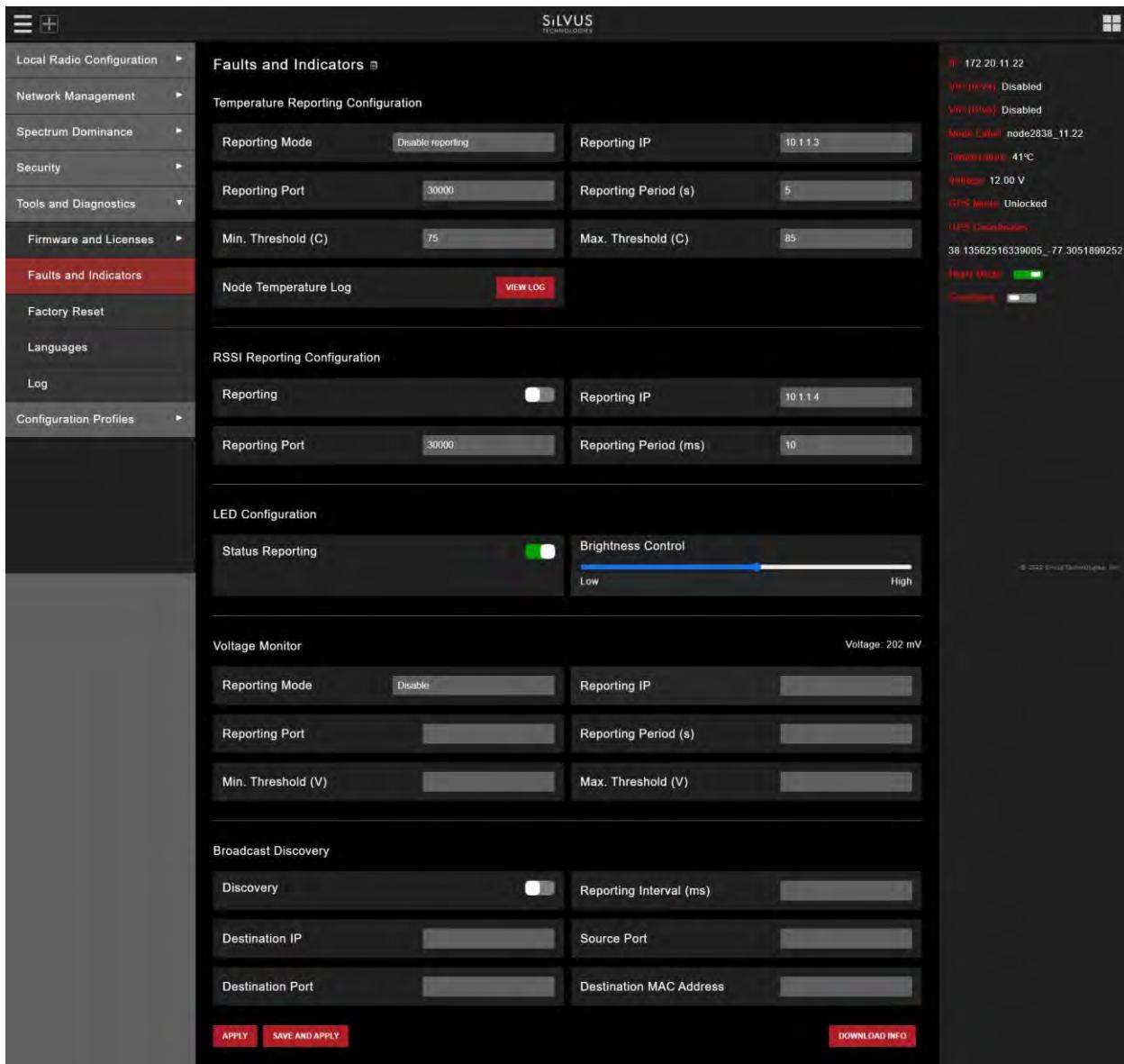
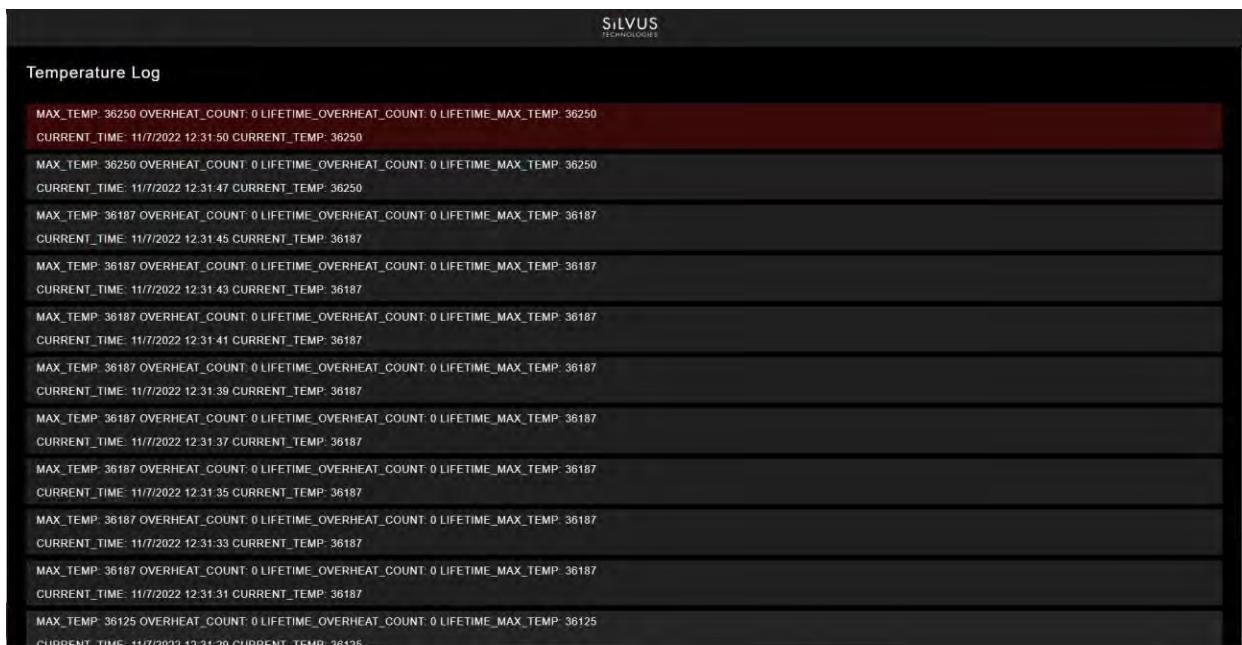


Figure 41 Faults and Indicators Page

The Faults and Indicators page allows the user to specify an IP and Port number for Temperature and RSSI (Receiver Signal Strength Indication) reports to be delivered to. This is useful for users that intend to feed this information into some other platform for analysis and recording. Section 9 gives more information on the format of streaming reports. You can also click on the node temperature log to open another window that shows the current output of what the temperature report would output. See below **Figure 88 Temperature log example**.



The screenshot shows a table titled "Temperature Log" with the following data:

| MAX_TEMP | OVERHEAT_COUNT | LIFETIME_OVERHEAT_COUNT | LIFETIME_MAX_TEMP |
|--------------|--------------------|-------------------------|-------------------|
| 36250 | 0 | 0 | 36250 |
| CURRENT_TIME | 11/7/2022 12:31:50 | CURRENT_TEMP | 36250 |
| 36250 | 0 | 0 | 36250 |
| CURRENT_TIME | 11/7/2022 12:31:47 | CURRENT_TEMP | 36250 |
| 36187 | 0 | 0 | 36187 |
| CURRENT_TIME | 11/7/2022 12:31:45 | CURRENT_TEMP | 36187 |
| 36187 | 0 | 0 | 36187 |
| CURRENT_TIME | 11/7/2022 12:31:43 | CURRENT_TEMP | 36187 |
| 36187 | 0 | 0 | 36187 |
| CURRENT_TIME | 11/7/2022 12:31:41 | CURRENT_TEMP | 36187 |
| 36187 | 0 | 0 | 36187 |
| CURRENT_TIME | 11/7/2022 12:31:39 | CURRENT_TEMP | 36187 |
| 36187 | 0 | 0 | 36187 |
| CURRENT_TIME | 11/7/2022 12:31:37 | CURRENT_TEMP | 36187 |
| 36187 | 0 | 0 | 36187 |
| CURRENT_TIME | 11/7/2022 12:31:35 | CURRENT_TEMP | 36187 |
| 36187 | 0 | 0 | 36187 |
| CURRENT_TIME | 11/7/2022 12:31:33 | CURRENT_TEMP | 36187 |
| 36187 | 0 | 0 | 36187 |
| CURRENT_TIME | 11/7/2022 12:31:31 | CURRENT_TEMP | 36187 |
| 36125 | 0 | 0 | 36125 |
| CURRENT_TIME | 11/7/2022 12:31:29 | CURRENT_TEMP | 36125 |

Figure 42 Temperature log example

Temperature Thresholds

In addition to receiving temperature reports, this page can be used to set minimum and maximum temperature thresholds for the radio. The StreamCaster™ family of radios is equipped with on board temperature sensors which are monitored to prevent overheating. Once a radio reaches the maximum temperature threshold, the radio will begin to reduce its transmission time until the temperature falls below the minimum temperature threshold. By default, the min and max values are 75C and 85C respectively.

RSSI Reporting Configuration

This setting allows the users to report the RSSI values every few milliseconds base on users setting.

LED Configuration

This setting allows the user to disable or enable the LED on the faceplate of the radio. Also has a slide bar to control LED brightness level.

Voltage Monitor

Radios built on or after Jan 1, 2015 have the ability to monitor the input voltage, displayed here.

Broadcast Discovery

This feature is used to send radio information packets periodically to a server. Information sent will include the node ID, virtual IP address, frequency, and bandwidth of the radio.

5.2.3 Factory Reset

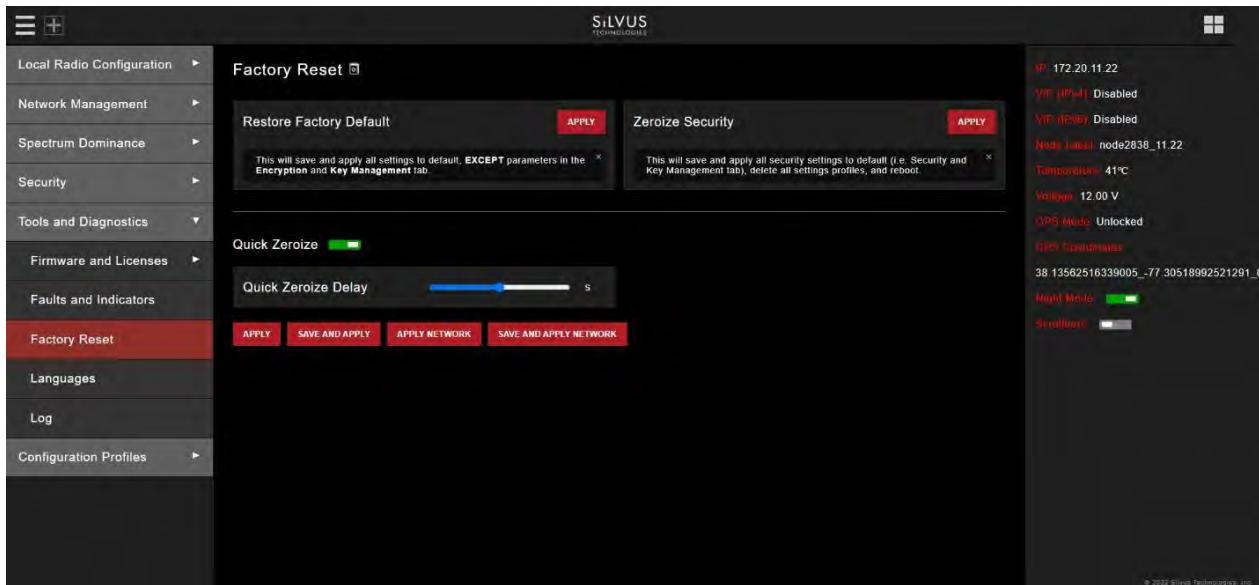


Figure 43 Tools and Diagnostics (Factory Reset)

- **Restore Factory Default:** Restores all settings to default except those related to security (such as login passwords, encryption keys, FIPS mode, etc.). This is useful if the user changed some advanced settings and now they don't know how to get to the defaults.
- **Zeroize Security:** This will set login passwords and all security keys to their defaults. This includes the Encryption Key, SSH Login Key, SSH Host Key, HTTPS Certificate, and Encryption Key Volatile. It will also erase all settings profiles. Also, if FIPS mode is off, it will turn off HTTPS and login mode. The current FIPS mode will not be changed. Zeroize will require a reboot in order to ensure all settings are zeroized. If zeroize was initiated through the GUI, the radio will automatically reboot.
- **Quick Zeroize:** When enabled, the radio zeroize process will commence after the zeroize delay when the multi-position switch is turned to the "Z" position. When disabled the radio multi-position switch must be turned from the off position to "Z" during the boot sequence to initialize zeroize. The quick zeroize delay will wait to trigger the zeroize for the specified time.

5.2.4 Languages

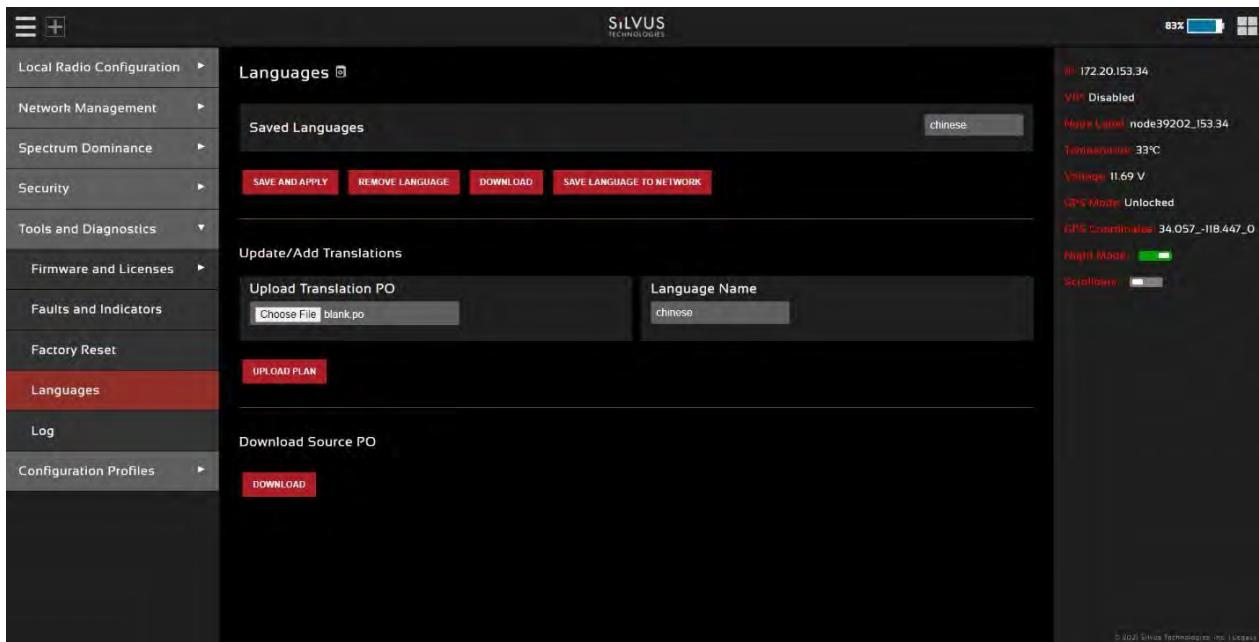
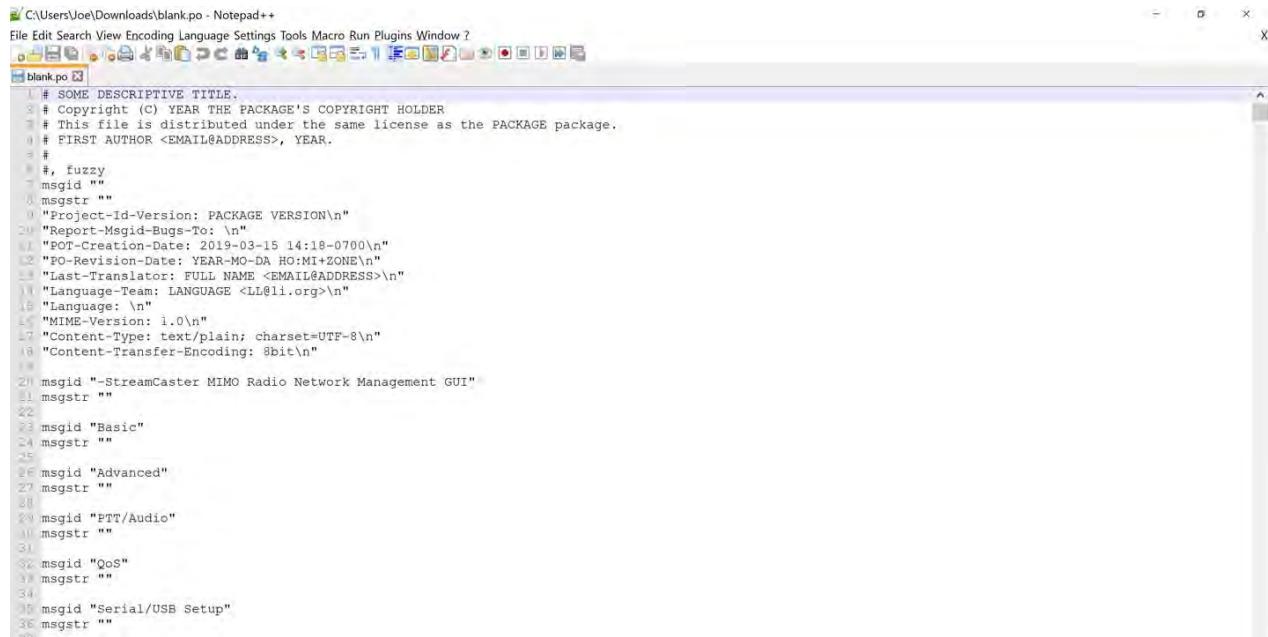


Figure 44 Tools and Diagnostics (Languages)

In this tab you will be able to edit and update the GUI into any language you choose. To do this, you would download the Source PO File as per the button on the bottom of this page. Once you have the source PO file, you can open it to edit in any plain text editor, however it may be easier to read in Notepad++.



```

C:\Users\Joe\Downloads\blank.po - Notepad+ +
File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ?
blank.po
1 # SOME DESCRIPTIVE TITLE.
2 # Copyright (C) YEAR THE PACKAGE'S COPYRIGHT HOLDER
3 # This file is distributed under the same license as the PACKAGE package.
4 # FIRST AUTHOR <EMAIL@ADDRESS>, YEAR.
5 #
6 #, fuzzy
7 msgstr ""
8 msgstr ""
9 "Project-Id-Version: PACKAGE VERSION\n"
10 "Report-Msgid-Bugs-To: \n"
11 "PO-Revision-Date: 2019-03-15 14:18-0700\n"
12 "EO-Revision-Date: YEAR-MO-DA HO:MI+ZONE\n"
13 "Last-Translator: FULL NAME <EMAIL@ADDRESS>\n"
14 "Language-Team: LANGUAGE <LL@li.org>\n"
15 "Language: \n"
16 "MIME-Version: 1.0\n"
17 "Content-Type: text/plain; charset=UTF-8\n"
18 "Content-Transfer-Encoding: 8bit\n"
19
20 msgid "-StreamCaster MIMO Radio Network Management GUI"
21 msgstr ""
22
23 msgid "Basic"
24 msgstr ""
25
26 msgid "Advanced"
27 msgstr ""
28
29 msgid "PTT/Audio"
30 msgstr ""
31
32 msgid "QoS"
33 msgstr ""
34
35 msgid "Serial/USB Setup"
36 msgstr ""

```

Figure 45 Example Source PO file for custom languages

To create a language profile in another language other than English, please follow below steps:

1. Enter the translated words from msgid into the msgstr"" after the original word or phrase.
2. Save the revised source PO file
3. Enter the language you have translated the words for into the field labeled Language Name.
4. Click on choose file and select the source PO file that you revised and saved.
5. Click on upload plan.
6. After the plan has been uploaded, you should be able to select which language plan you would like to use under the drop-down menu of saved languages.
7. Select the language you would like viewed in the GUI, click save and apply.

To remove a previously saved language, please see below steps:

1. select the language that you want to remove from the drop-down menu of saved languages.
2. Click on remove language button to remove the selected saved language. That saved language will no longer be an option for you to view.

In order to download a previously loaded language file, see below steps:

1. Select the language file from the drop-down menu of saved languages.
2. Click on the download button. You will download the source PO file that is associated with the language you selected under saved languages.

When a new firmware edition for the Silvus radio is released, there may be new texts that will require updated language translation. In order to update the po file in a new firmware edition you would need to download the old translated file, then the new blank po file from the new firmware edition. The new appended entries should be seen at the bottom of the new po file. Copy paste these new entries to your translated file (append), and translate new entries.

5.2.5 Log

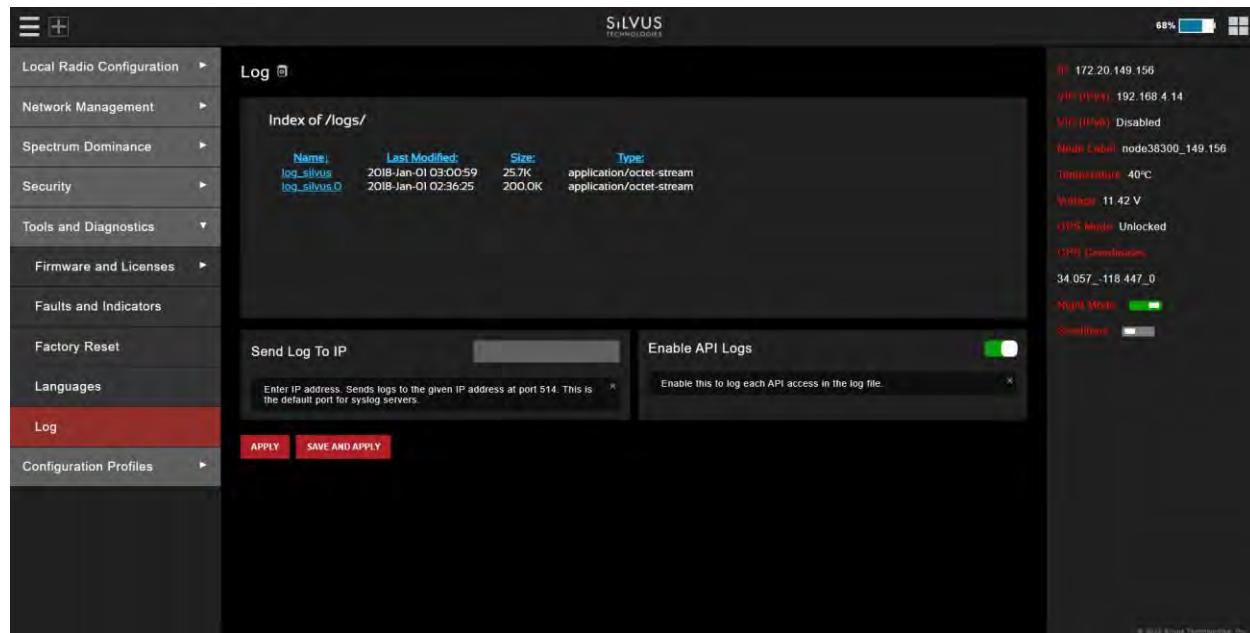


Figure 46 Security (Log)

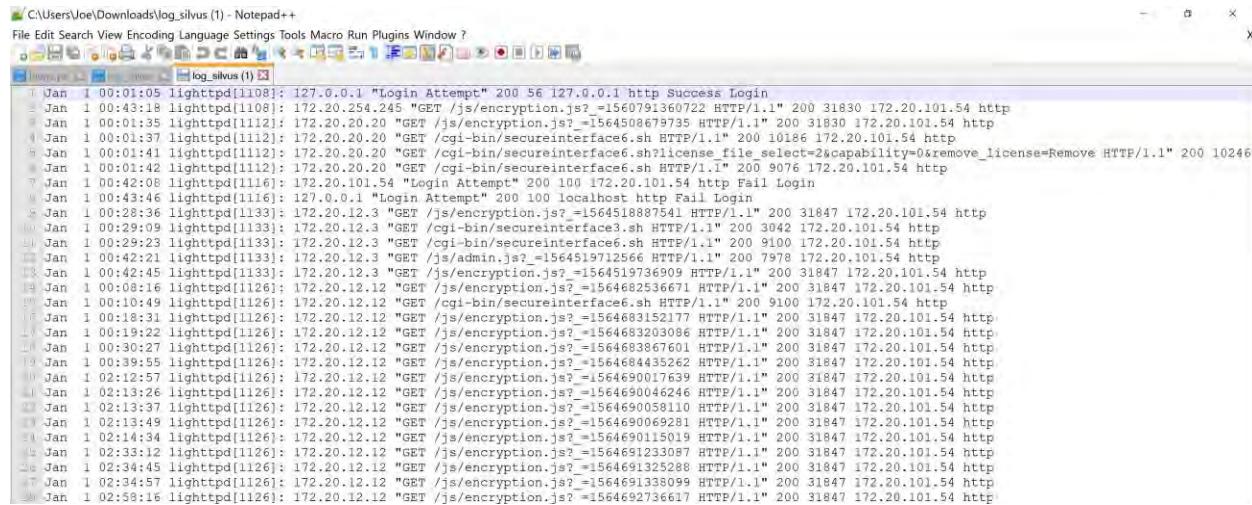
The log tab tracks some security events that happen within the radio. Below is a list of events that the log keeps track of:

- Successful/unsuccessful login attempts when login authentication is turned on.
- Visits to the license tab (shown as secureinterface6.sh), upgrade tab (secureinterface3.sh) and encryption tab.

- Enable API log to include a detailed log of API access.

You can enter an ip address in the "Send Log to" text box. This will send the logs to that ip at port 514. It is compatible with Syslog servers.

Example of the log can be seen below.



```

C:\Users\Joe\Downloads\log_silvus (1) - Notepad++
File Edit Search View Encoding Language Settings Tools Macro Run Plugins Window ?
log_silvus (1) [1]
1 Jan 1 00:01:05 lighttpd[1108]: 127.0.0.1 "Login Attempt" 200 56 127.0.0.1 http Success Login
1 Jan 1 00:43:18 lighttpd[1108]: 172.20.254.245 "GET /js/encryption.js?_=1560791360722 HTTP/1.1" 200 31830 172.20.101.54 http
1 Jan 1 00:01:35 lighttpd[1112]: 172.20.20.20 "GET /js/encryption.js?_=1564508697935 HTTP/1.1" 200 31830 172.20.101.54 http
1 Jan 1 00:01:37 lighttpd[1112]: 172.20.20.20 "GET /cgi-bin/secureinterface6.sh HTTP/1.1" 200 10186 172.20.101.54 http
1 Jan 1 00:01:41 lighttpd[1112]: 172.20.20.20 "GET /cgi-bin/secureinterface6.sh?license_file_select=2&capability=0&remove_license=Remove HTTP/1.1" 200 10246
1 Jan 1 00:01:42 lighttpd[1112]: 172.20.20.20 "GET /cgi-bin/secureinterface6.sh HTTP/1.1" 200 9076 172.20.101.54 http
1 Jan 1 00:43:08 lighttpd[1116]: 172.20.101.54 "Login Attempt" 200 100 172.20.101.54 http Fail Login
1 Jan 1 00:43:46 lighttpd[1116]: 127.0.0.1 "Login Attempt" 200 100 localhost http Fail Login
1 Jan 1 00:28:36 lighttpd[1133]: 172.20.12.3 "GET /js/encryption.js?_=1564518897541 HTTP/1.1" 200 31847 172.20.101.54 http
1 Jan 1 00:29:09 lighttpd[1133]: 172.20.12.3 "GET /cgi-bin/secureinterface3.sh HTTP/1.1" 200 3042 172.20.101.54 http
1 Jan 1 00:29:23 lighttpd[1133]: 172.20.12.3 "GET /cgi-bin/secureinterface6.sh HTTP/1.1" 200 9100 172.20.101.54 http
1 Jan 1 00:42:21 lighttpd[1133]: 172.20.12.3 "GET /js/admin.js?_=1564519712569 HTTP/1.1" 200 7978 172.20.101.54 http
1 Jan 1 00:42:45 lighttpd[1133]: 172.20.12.3 "GET /js/encryption.js?_=1564519736903 HTTP/1.1" 200 31847 172.20.101.54 http
1 Jan 1 00:08:16 lighttpd[1126]: 172.20.12.12 "GET /js/encryption.js?_=1564682536671 HTTP/1.1" 200 31847 172.20.101.54 http
1 Jan 1 00:10:49 lighttpd[1126]: 172.20.12.12 "GET /cgi-bin/secureinterface6.sh HTTP/1.1" 200 9100 172.20.101.54 http
1 Jan 1 00:18:31 lighttpd[1126]: 172.20.12.12 "GET /js/encryption.js?_=1564683152177 HTTP/1.1" 200 31847 172.20.101.54 http
1 Jan 1 00:19:22 lighttpd[1126]: 172.20.12.12 "GET /js/encryption.js?_=1564683203096 HTTP/1.1" 200 31847 172.20.101.54 http
1 Jan 1 00:30:27 lighttpd[1126]: 172.20.12.12 "GET /js/encryption.js?_=1564683867601 HTTP/1.1" 200 31847 172.20.101.54 http
1 Jan 1 00:39:55 lighttpd[1126]: 172.20.12.12 "GET /js/encryption.js?_=1564684435262 HTTP/1.1" 200 31847 172.20.101.54 http
1 Jan 1 02:12:57 lighttpd[1126]: 172.20.12.12 "GET /js/encryption.js?_=1564690017639 HTTP/1.1" 200 31847 172.20.101.54 http
1 Jan 1 02:13:26 lighttpd[1126]: 172.20.12.12 "GET /js/encryption.js?_=1564690046246 HTTP/1.1" 200 31847 172.20.101.54 http
1 Jan 1 02:13:26 lighttpd[1126]: 172.20.12.12 "GET /js/encryption.js?_=1564690058110 HTTP/1.1" 200 31847 172.20.101.54 http
1 Jan 1 02:13:44 lighttpd[1126]: 172.20.12.12 "GET /js/encryption.js?_=1564690069281 HTTP/1.1" 200 31847 172.20.101.54 http
1 Jan 1 02:14:34 lighttpd[1126]: 172.20.12.12 "GET /js/encryption.js?_=1564690115019 HTTP/1.1" 200 31847 172.20.101.54 http
1 Jan 1 02:33:12 lighttpd[1126]: 172.20.12.12 "GET /js/encryption.js?_=1564691233087 HTTP/1.1" 200 31847 172.20.101.54 http
1 Jan 1 02:34:45 lighttpd[1126]: 172.20.12.12 "GET /js/encryption.js?_=1564691325288 HTTP/1.1" 200 31847 172.20.101.54 http
1 Jan 1 02:34:57 lighttpd[1126]: 172.20.12.12 "GET /js/encryption.js?_=1564691338099 HTTP/1.1" 200 31847 172.20.101.54 http
1 Jan 1 02:58:16 lighttpd[1126]: 172.20.12.12 "GET /js/encryption.js?_=1564692736617 HTTP/1.1" 200 31847 172.20.101.54 http

```

Figure 47 Example of Security Log

The first data listed in the log is the date and time that the occurrence happened. You can manually input the date and time of the radio under the Network Manager>Map Overlay tab under CoT feature. However, upon a reboot, the time will no longer be accurate.

Please disregard the lighttpd [xxxx] as this will be likely removed in updated firmware versions. The format of the details listed in the log after lighttpd [xxxx] is as follows:

"a b c d e http/https"
 a = IP address of remote host
 b = HTTP request-line
 c = HTTP status code
 d = bytes sent for the body
 e = HTTP request host name

5.3 Configuration Profiles

Under the configuration profiles section you will be able to configure profile settings for the radio, and save them to a file to distribute to other radios. You will also be able to customize the multi-position switch in this section.

5.3.1 Settings profile

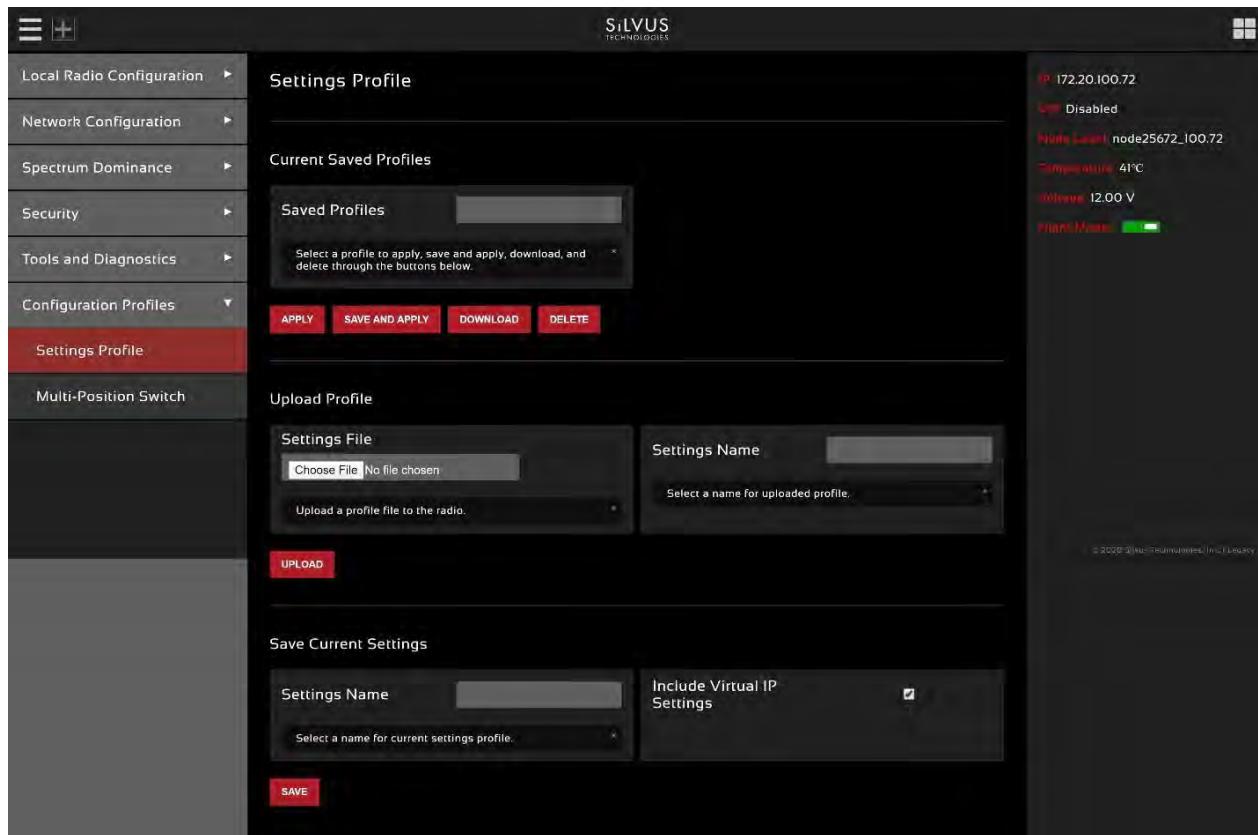


Figure 48 Configuration Profiles (Settings Profile)

Current Saved Profiles: Select a saved profile and apply the settings to use the selected profile. The profile stored can be downloaded or deleted.

- **Upload Profile:** Select a downloaded profile from the computer and upload to the radio as a saved profile.
- **Save Current Settings:** Store the current settings on to the radio for future access. Note that the FIPS mode setting is not saved in the profile. You must manually enable/disable it after applying the profile.

5.3.2 MPS (Multi-Position Switch) (not available on SL4200)

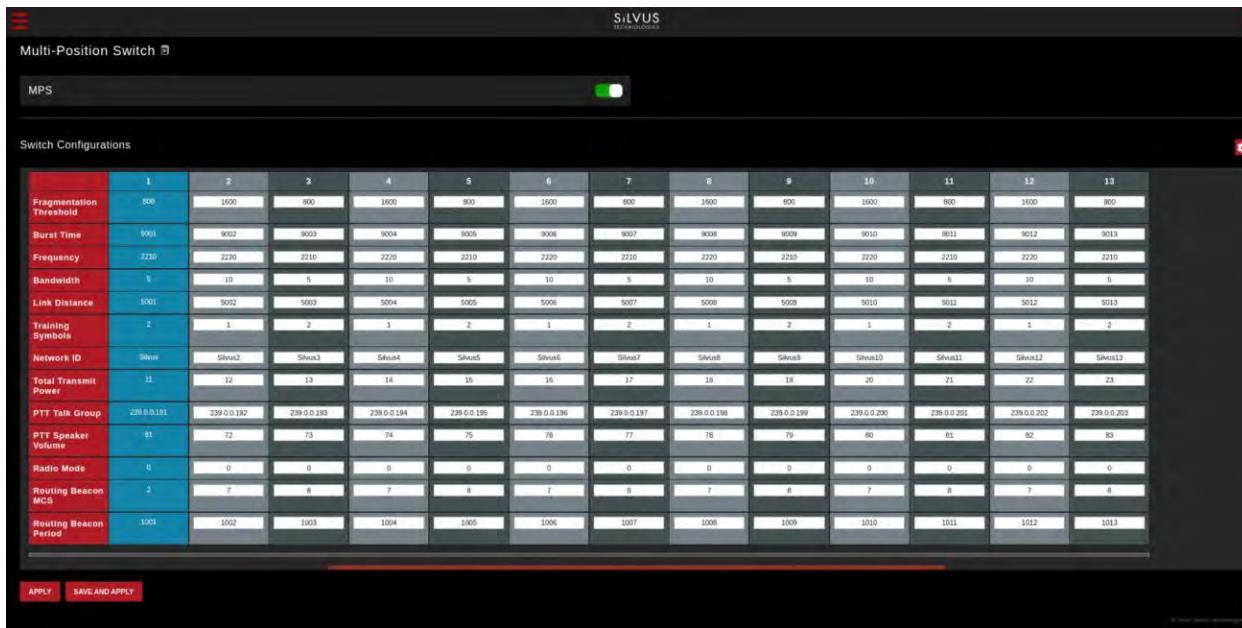


Figure 49 Multi-position Switch

The Multi-Position Switch allows you to change various settings of the radio by using the new physical switch position, no web GUI required (This is not available on all radios).

You must first configure the settings you want to correspond with each switch position. Switch positions 1 through 13 are listed in a table with parameters listed that can be configured. To show more configuration parameters click the red boxed gear icon to the top right of the table. Configuration parameters will be shown as seen in below Figure 96 additional configuration parameters for MPS.



Figure 50 Additional Configuration parameters for MPS

Available parameters that can be configured by the MPS include link distance, total transmit power, routing beacon period, fragmentation threshold, training symbols, burst time, routing beacon MCS, radio mode, frequency, bandwidth, network ID, PTT talk group, and PTT speaker volume. Position 1 will always be associated with the parameters originally saved in the radio. Once MPS parameters have been saved into the table, click save and apply to save the settings to the radio. MPS switch parameters will be checked once every second.

When the MPS switch is turned, the LED light on the radio will quickly flash green. This means the settings are being applied for this position. When the LED stops quickly flashing, the settings have been applied.

Any time settings are updated from the GUI without using the MPS page (i.e. Basic Tab, PTT/Audio Tab), position 1 will be updated with those results. The blue highlighted column shows the current position of the physical switch.

If the radio boots up in position “Z” (second to last position on the MPS), the radio will perform a physical MPS zeroize function. This action will reset all passwords, reset all settings in the Security tab to default, and will perform a factory reset on all other settings. After zeroize has been completed, a radio reboot will be required to ensure all settings are zeroized.

6. Streaming Response

Some users may be interested in streaming specific information from the radio e.g. RSSI, noise floor, temperature, etc. After enabling the response, they need using the above commands, the radio will transmit the desired information in the form of UDP packets to a specific IP address and port. The format of each report message will be in the type-length-value format as shown below:

TYPE LENGTH VALUE TYPE LENGTH VALUE ...

- TYPE and LENGTH will be 16-bit unsigned integers in network-endian format.
- TYPE indicates the kind of information being transmitted. Pre-defined types are listed later in this document.
- LENGTH indicates the length of the VALUE field in bytes, including the terminating null byte.
- VALUE will be ASCII-encoded text terminated with a null byte ('\0').
- A single report will comprise of a set of type-length-value fields beginning with a “begin” report type. It will have a type which is specific to the type of report being generated, length of 1 byte and a value of an empty string (“”). Note the empty string is still null terminated.
- Each report will end with an end of report which has type 1 (type = end of report, length = 1, value = “”).
- The empty string listed above has a NULL character and has length 1. Any length number in the streaming report includes the NULL character
- A UDP packet may contain more than one report.
- The UDP packets have a maximum size of 1400 bytes.

6.1 RSSI and Noise Floor Reporting

The type/length/value for RSSI and noise floor reporting are listed in the following table:

| Report Type | Data Type | Information |
|-------------|-----------------|---|
| 5009 | Empty string "" | Begin of RSSI report |
| 5010 | Float | Revision number for RSSI report |
| 5011 | String | 172.20.xx.xx IP of radio |
| 5012 | String | Virtual IP of radio |
| 5000 | Integer | Raw signal power of first antenna, represented in full dBm steps. |
| 5001 | Integer | Raw signal power of second antenna represented in full dBm steps. |
| 5002 | Integer | Raw signal power of third antenna represented in full dBm steps. |
| 5003 | Integer | Raw signal power of fourth antenna represented in full dBm steps. |
| 5004 | Integer | Raw noise power represented in full dBm steps. |
| 5005 | 32-bit integer | Sync signal power (from digital domain, see note below). |
| 5006 | 32-bit integer | Sync noise power (from digital domain, see note below). |
| 5007 | 16-bit integer | Node ID of the transmitter radio that triggered the receiver to send an RSSI report packet. |
| 5008 | 32-bit integer | Report sequence number, increments for every report, resets after 9999. |
| 1 | Empty string "" | End of report. |

Table 27 RSSI Reporting Format

Note:

The sync noise and power (types 5005, 5006) are special values obtained after packet processing in the digital domain. They cannot be directly compared to the raw signal and noise values. To obtain an SNR from these values the user needs to run the below formula on these values:

X = sync signal power;

Y = sync noise power;

Z = (Y-X)/51

SNR_mw = (X - 12 * Z)/(64 * Z)

SNR_db = 10 * log(SNR_mw)/log(10)

SNR_db is the SNR in dB and it is averaged across all antennae.

The SNR obtained above is more accurate when the real SNR goes below 10 dB. Above 10 dB, the SNR obtained from the raw signal and noise values are more accurate.

Below is an example of the RSSI report:

| Report Type | Length | Information |
|-------------|--------|-------------|
| 5009 | 1 | "" |
| 5010 | 4 | "1.0" |
| 5008 | 5 | "2333" |
| 5000 | 5 | "-43" |
| 5001 | 5 | "-31" |
| 5002 | 5 | "-28" |
| 5003 | 5 | "-66" |
| 5004 | 5 | "-190" |
| 5005 | 8 | "8604568" |
| 5006 | 8 | "8861322" |
| 5007 | 5 | "1025" |
| 1 | 1 | "" |

Table 28 Sample RSSI Report

The corresponding raw UDP dump in hexadecimal format is attached below. For the purpose of easier reading, each byte is separated by a space, and each item is separated by a new line. The real streaming report is continuous without any spaces or newlines and is currently 109 bytes long.

13 ffffff91 0 1 0

13 ffffff92 0 4 31 2e 30 0

13 ffffff90 0 5 32 33 33 33 0

13 ffffff88 0 5 20 2d 34 33 0
13 ffffff89 0 5 20 2d 33 31 0
13 ffffff8a 0 5 20 2d 32 38 0
13 ffffff8b 0 5 20 2d 36 36 0
13 ffffff8c 0 5 2d 31 39 30 0
13 ffffff8d 0 a 20 20 38 36 30 34 35 36 38 0
13 ffffff8e 0 a 20 20 38 38 36 31 33 32 32 0
13 ffffff8f 0 5 31 30 32 35 0
0 1 0 1 0

6.2 Temperature Reporting

The type, length and value for temperature reporting are listed in the following table:

| Report Type | Data Type | Data |
|-------------|-----------------|--|
| 8 | Empty string "" | Begin of temperature report. |
| 9 | Float | Revision number for temperature report. |
| 2 | Integer | Current Temperature on the radio. |
| 3 | Integer | Maximum Temperature reached on the radio after last booting. |
| 4 | Integer | Overheat Count: number of times the radio temperature has exceeded temp_reporting_max_threshold. |
| 1 | Empty string "" | End of report |

Table 29 Temperature Reporting Format

6.3 Voltage Reporting

The type, length and value for voltage reporting are listed in the following table:

| Report Type | Data Type | Data |
|-------------|---------------------------|---|
| 4001 | START REPORT | Indicates start of voltage monitoring report |
| 1 | END REPORT | Indicates end of report |
| 4003 | REVISION_REPORT | Indicates revision of this report, currently always "1.1" |
| 4004 | CUR_VOLTAGE_REPORT | Current voltage value as a floating point string |
| 4005 | MIN_VOLTAGE_REPORT | Minimum voltage seen so far, as a floating point string |
| 4006 | MAX_VOLTAGE_REPORT | Maximum voltage seen so far, as a floating point string |
| 4007 | UNDERVOLTAGE_COUNT_REPORT | Number of times voltage dropped below min threshold, as an integer string |
| 4008 | OVERVOLTAGE_COUNT_REPORT | Number of times voltage spiked above max threshold, as an integer string. |

Table 30 Voltage Reporting Format

7. FCC Notice

7.1 FCC Identifier: N2S-SC3500

Silvus Model #: SC3500-243541

Equipment Class: Digital Transmission System

The following parameters must be used to be compliant to the appropriate FCC requirements:

Antenna: 3dB Omni (AOV3T245515575)

Bandwidth: 20MHz

Maximum Output Power across Frequency Range #1: 495.28mW from 2427MHz to 2447MHz

Maximum Output Power across Frequency Range #2: 493.62mW from 5745MHz to 5830MHz

7.2 FCC Identifier: N2S-SC3822

Silvus model #: SC3822-245580

Equipment Class: Digital Transmission System

The following parameters must be used to be compliant to the appropriate FCC requirements:

Antenna: 3dB Omni (AOV3T245515575)

Bandwidth: 20MHz

Maximum Output Power across Frequency Range #1: 268.64mW from 2420MHz to 2450MHz

Maximum Output Power across Frequency Range #2: 329.02mW from 5760MHz to 5810MHz

7.3 FCC Identifier: N2S-SC42-245

Silvus model #: SC4210-245-BB, SC4240-245-BB

Equipment Class: Digital Transmission System

The following parameters must be used to be compliant to the appropriate FCC requirements:

Antenna: 2.1dBi Omni Antennas (AOV2S230515)

Bandwidth: 10MHz

Maximum Output Power @ Frequency #1: 810.17mW @ 2430MHz

Maximum Output Power @ Frequency #2: 795.3mW @ 2440MHz

7.4 FCC Identifier: N2S-SC44-245

Silvus model #: SC4410-235-SBST, SC4480-235-SBST

Equipment Class: Digital Transmission System

The following parameters must be used to be compliant to the appropriate FCC requirements:

Antenna: 2.1dBi Omni Antennas (AOV2S230515)

Bandwidth: 10MHz

Maximum Output Power @ Frequency #1: 582.1mW @ 2430MHz

Maximum Output Power @ Frequency #2: 523.6mW @ 2440MHz

7.5 FCC Identifier: N2S-SC42-520

Silvus model #: SC4240E-520-BB

Equipment Class: Digital Transmission System

The following parameters must be used to be compliant to the appropriate FCC requirements:

Antenna: 6dBi Omni Antennas (Peak Antennas CO520-6-LS)

Bandwidth: 20MHz

Maximum Output Power @ Frequency #1: 414.03mW @ 5220MHz

Maximum Output Power @ Frequency #2: 498.92mW @ 5240MHz

7.6 FCC Identifier: N2S-SC44-520

Silvus model #: SC4480E-520-SBST

Equipment Class: Digital Transmission System

The following parameters must be used to be compliant to the appropriate FCC requirements:

Antenna: 6dBi Omni Antennas (Peak Antennas CO520-6-LS)

Bandwidth: 20MHz

Maximum Output Power @ Frequency #1: 241.48mW @ 5220MHz

Maximum Output Power @ Frequency #2: 246.52mW @ 5240MHz

7.7 FCC Identifier: N2S-SC42E-245

Silvus model #: SC4210E-245-EB

Equipment Class: Digital Transmission System

The following parameters must be used to be compliant to the appropriate FCC requirements:

Antennas: 2.1dBi Omni Antennas (Silvus AOV2D230515) & 4dBi Omni Antennas (Silvus AOV4S235)

Bandwidth: 10MHz

Maximum 10MHz Bandwidth Output Power @ Frequency #1: 789.84mW @ 2430MHz

Maximum 10MHz Bandwidth Output Power @ Frequency #2: 790.06mW @ 2440MHz

Bandwidth: 20MHz

Maximum 20MHz Bandwidth Output Power @ Frequency #1: 123.82mW @ 2440MHz

7.8 FCC Identifier: N2S-SC42E-235470

Silvus model #: SC4240E-235470-BB

Equipment Class: Digital Transmission System

The following parameters must be used to be compliant to the appropriate FCC requirements:

Antennas: 2.5dBi Omni Antennas (Silvus part# 1001-071)

Bandwidth: 10MHz

Maximum 10MHz Bandwidth Output Power @ Frequency #1: 891.25mW @ 4945MHz, 4950MHz, 4955MHz, 4960MHz, 4965MHz, 4970MHz

Maximum 10MHz Bandwidth Output Power @ Frequency #2: 955mW @ 4975MHz, 4980MHz, 4985MHz

7.9 FCC Identifier: N2S-SC44E-235470

Silvus model #: SC4480E-235470-SBST

Equipment Class: Digital Transmission System

The following parameters must be used to be compliant to the appropriate FCC requirements:

Antennas: 2.5dBi Omni Antennas (Silvus part# 1001-071)

Bandwidth: 10MHz

Maximum 10MHz Bandwidth Output Power @ Frequency #1: 912mW @ 4945MHz, 4950MHz, 4955MHz

Maximum 10MHz Bandwidth Output Power @ Frequency #2: 933.25mW @ 4960MHz, 4965MHz, 4970MHz

Maximum 10MHz Bandwidth Output Power @ Frequency #3: 912mW @ 4975MHz, 4980MHz, 4985MHz

7.10 FCC ID: N2S-SL42-245

Silvus model #: SL4210-245-SB

Equipment Class: Digital Transmission System

Antennas: 2.1dBi Omni Antennas (Silvus part# 1001-071)

Bandwidth: 1.25, 2.5 or 5MHz

Maximum 5MHz Bandwidth Output Power @ Frequency #1: 950.6mW @ 2412MHz

Maximum 5MHz Bandwidth Output Power @ Frequency #2: 862.98mW @ 2440MHz

Maximum 5MHz Bandwidth Output Power @ Frequency #3: 968.28mW @ 2462MHz

Maximum output power for 5MHz @ operating frequency spectrum should not exceed 27dBm/antenna

7.11 FCC ID: N2S-SL4210-245-OEM (Modular Certification)

The product SL4210-245-O is approved for modular certification by FCC under the following ID:

FCC ID: N2S-SL4210-245-OEM



Figure 51 Silvus Radio Model SL4210-235-O

- Equipment Class: Digital Transmission System
- Frequency band: S-band, 2200-2500 MHz
- Maximum output power/antenna: 0.5W, 27dBm
- Bandwidth: 1.25, 2.5 or 5MHz
- Maximum 5MHz Bandwidth Output Power @ Frequency #1: 749.9mW @ 2412MHz
- Maximum 5MHz Bandwidth Output Power @ Frequency #2: 674.5mW @ 2440MHz
- Maximum 5MHz Bandwidth Output Power @ Frequency #3: 623.7mW @ 2462MHz
- Maximum output power for 5MHz @ operating frequency spectrum should not exceed 27dBm/0.5W/antenna
- Recommended Antennas: 2.1dBi Omni Antennas (Silvus part# AOV2D230515G-TM) or equivalent for FCC 2.109 & 15.247 RF Exposure compliance
- DC supply: the customer provides DC power from their own DC supply source; the supply should be fused for 5-amp circuit.

Modular approval allows installation in different end-use products by an OEM with limited or no additional testing or equipment authorization for the transmitter function provided by the SL4210-245-O:

- ❖ No additional transmitter compliance testing is required if the module is operated with an approved antenna.
- ❖ No additional transmitter compliance testing is required if the module is operated with the same general type of antenna listed as approved in the SL4210-245-O documentation.
- ❖ Acceptable antennas must be of equal or less far field gain than the antenna previously authorized under the same FCC ID and must have similar in band and out of band characteristics.

The end-product must comply with all applicable FCC equipment authorizations, regulations, requirements and equipment functions not associated with the SL4210-245-O.

Compliance must be demonstrated to regulations for other transmitter components within the host product, to requirements for unintentional radiators (Part 15B), and to additional authorization requirements for the non-transmitter functions.

The OEM applying the SL4210-245-O is required to include all FCC statements and warnings detailed in the following sections to the end-product labeling and in the finished product manual.

7.11.1. Product Label

A statement must be included on the exterior of the final OEM product which communicates that the device identified by the FCC ID number is contained within the product. Include the statement:

- Contains FCC ID: N2S-SL4210-245-OEM

Additionally, the OEM must include the following statements on the exterior of the finished product:

- 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 any interference that may cause undesired operation.

7.11.2. User Manual (Customer end-product)

Any user documentation that accompanies the end-product must include the following information in a location that is easily read:

- To comply with FCC's RF radiation exposure requirements, the antenna(s) used for this transmitter must be installed such that a minimum separation distance of 20 cm is maintained between the reader (antenna) & user's/nearby people's body at all times and must not be collocated or operating in conjunction with another antenna or transmitter.

The finished product manual must contain the following statement:

- **WARNING:** The Federal Communications Commission warns that changes or modifications of the radio module within this device not expressly approved by Silvus Technologies, Inc. could void the user's authority to operate the equipment.

In the case where an OEM seeks class B (residential) limits for the host product, the finished product manual must contain the following statement:

NOTE: 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

In the case where an OEM seeks the lesser category of a Class A digital device for their finished product, the following statement must be included in the manual of the finished product:

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

7.11.3. OEM Accessories

Accessories for the SL4200 OEM unit are detailed below:

| Silvus PN | Description |
|------------------|---|
| SC42E-OEM-2 | RF connector, right angle SMP (f) to TNC (f); 38 mm length |
| SC22-OEM-6 | RF connector right angle SMP (f) to SMA (f); 21 mm length |
| SC22-OEM-6-75mm | 75 mm length |
| SC22-OEM-6-150mm | 150 mm length |
| SC22-OEM-6-155mm | 155 mm length |
| SC22-OEM-6-240mm | 240 mm length |
| SC22-OEM-6-750mm | 750 mm length |
| SL42-OEM-CK | Mating connector kit (6 connectors, less RF, with extra crimp pins) |
| SL42-OEM-L200 | Status LED (200 mm wire leads; Red/Green color) |
| SL42-OEM-S0 | 2-pos On/Off rotary switch (no wires, contacts only) |

Table 31 SL4200 OEM Accessories

7.11.4. Interface Connections

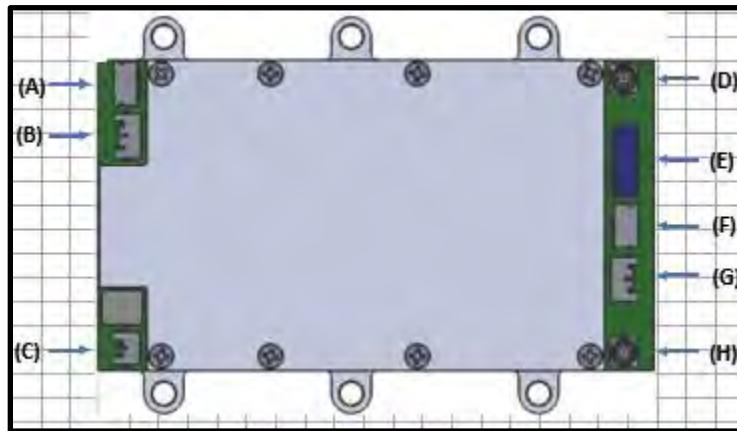


Figure 52 SL4200 OEM Connector Diagram

| Fig Ref | PCB Nom | Description | Connector Type | Vendor | MPN Mating Connector |
|---------|---------|-------------------------|--------------------------|-----------|----------------------|
| A | USB1 | USB1 | Header RA 5-POS (1mm) | JST Sales | SHLP-05V-S-B |
| B | USB PD | USB-PD (9V only) | Header RA 4-POS (1mm) | Molex | 50376404013 |
| C | VBAT | VBAT (9V - 32V) | Header RA 3-POS (1mm) | Molex | 50376403013 |
| D | 1 | RF-1 | SMP Straight Jack (Male) | Amphenol | See accessories |
| E | RS232 | Serial & Misc | Header RA 10-POS (1mm) | JST Sales | SHLP-10V-S-B |
| F | USBO | USBO | Header RA 5-POS (1mm) | JST Sales | SHLP-05V-S-B |
| G | ONOFF | Status LED/Power Switch | Header RA 4-POS (1mm) | Molex | 50376404013 |
| H | 2 | RF-2 | SMP Straight Jack (Male) | Amphenol | See accessories |

Table 32 SL4200 Interfaces

Connection pin-outs are detailed in [StreamCaster Lite SL4200 OEM Integration](#).

7.11.5. DC Power Consumption & Heat Management requirements

The SL4200 OEM radio has a maximum native RF output power of 500 mW/antenna. Power consumption varies from 4.8 Watts (not transmitting) to 17 Watts depending on the transmit duty cycle, transmit power, frequency band used and if USB devices are connected. Average power consumption will be proportional to the transmit duty cycle. Peak power is 25 Watts (2.8A @ 9VDC, 2.1A @ 12 VDC) @burst transmissions for 100 micro-seconds.

When using a USB-C PD power source, the source must be rated to supply 3.0A @ 9 VDC. The external power source must be sized to meet this peak requirement. When using VBAT input the voltage range is 9.0 to 32.0 VDC. However, the radio is most power efficient when operating at 15VDC.

The recommended heat management details are in the [StreamCaster Lite SL4200 OEM Integration](#) Manual.

7.12 FCC ID: N2S-SC421-235

Silvus model #: SC4210EP-235-BB, SC4210EP-235F-BB, SC4210EP-235-EB, SC4210EP-235F-EB

Equipment Class: Digital Transmission System

The following parameters must be used to be compliant to the appropriate FCC requirements:

Antennas: 2.1dBi Omni Antennas (Silvus part# AOV2D230515, vendor pn# 1001-071)

Band: 2.4GHz ISM

Bandwidth: 10MHz

Maximum 10MHz Bandwidth Output Power: 177.83mW @ 2440MHz

Maximum output power for 10MHz @ operating frequency spectrum should not exceed 20dBm/antenna

7.13 FCC ID: N2S-SC424-235

Silvus model #: SC4240EP-235-BB, SC4240EP-235F-BB, SC4240EP-235-EB, SC4240EP-235F-EB

Equipment Class: Digital Transmission System

The following parameters must be used to be compliant to the appropriate FCC requirements:

Antennas: 2.1dBi Omni Antennas (Silvus part# AOV2D230515, vendor pn# 1001-071)

Band: 2.4GHz ISM

Bandwidth: 10MHz

Maximum 10MHz Bandwidth Output Power: 177.83mW @ 2440MHz

Maximum output power for 10MHz @ operating frequency spectrum should not exceed 20dBm/antenna

7.14 FCC ID: N2S-SC42A-235

Silvus model #: SC42A0EP-235-BB, SC42A0EP-235F-BB, SC42A0EP-235-EB, SC42A0EP-235F-EB

Equipment Class: Digital Transmission System

The following parameters must be used to be compliant to the appropriate FCC requirements:

Antennas: 2.1dBi Omni Antennas (Silvus part# AOV2D230515, vendor pn# 1001-071)

Band: 2.4GHz ISM

Bandwidth: 10MHz

Maximum 10MHz Bandwidth Output Power: 190.55mW @ 2440MHz

Maximum output power for 10MHz @ operating frequency spectrum should not exceed 20dBm/antenna

7.15 FCC ID: N2S-SC421-235467

Silvus model #: SC4210EP-235467-BB, SC4210EP-235467F-BB, SC4210EP-235467-EB, SC4210EP-235467F-EB

Equipment Class: Digital Transmission System

The following parameters must be used to be compliant to the appropriate FCC requirements:

Antennas: 2.1dBi Omni Antennas (Silvus part# AOV2D230515, vendor pn# 1001-071)

Band: 2.4GHz ISM

Bandwidth: 10MHz

Maximum 10MHz Bandwidth Output Power: 186.21mW @ 2440MHz

Maximum output power for 10MHz @ operating frequency spectrum should not exceed 20dBm/antenna

7.16 FCC ID: N2S-SC424-235467

Silvus model #: SC4240EP-235467-BB, SC4240EP-235467F-BB, SC4240EP-235467-EB, SC4240EP-235467F-EB

Equipment Class: Digital Transmission System

The following parameters must be used to be compliant to the appropriate FCC requirements:

Antennas: 2.1dBi Omni Antennas (Silvus part# AOV2D230515, vendor pn# 1001-071)

Band: 2.4GHz ISM

Bandwidth: 10MHz

Maximum 10MHz Bandwidth Output Power: 165.96mW @ 2440MHz

Maximum output power for 10MHz @ operating frequency spectrum should not exceed 20dBm/antenna

7.17 FCC ID: N2S-SC42A8-235467

Silvus model #: SC42A8EP-235467-BB, SC42A8EP-235467F-BB, SC42A8EP-235467-EB, SC42A8EP-235467F-EB

Equipment Class: Digital Transmission System

The following parameters must be used to be compliant to the appropriate FCC requirements:

Antennas: 2.1dBi Omni Antennas (Silvus part# AOV2D230515, vendor pn# 1001-071)

Band: 2.4GHz ISM

Bandwidth: 10MHz

Maximum 10MHz Bandwidth Output Power: 173.78mW @ 2440MHz

Maximum output power for 10MHz @ operating frequency spectrum should not exceed 20dBm/antenna

7.18 FCC ID: N2S-SC441-235

Silvus model #: SC4410E-235-SBST, SC4410E-235F-SBST

Equipment Class: Digital Transmission System

The following parameters must be used to be compliant to the appropriate FCC requirements:

Antennas: 2.1dBi Omni Antennas (Silvus part# AOV2D230515, vendor pn# 1001-071)

Band: 2.4GHz ISM

Bandwidth: 10MHz

Maximum 10MHz Bandwidth Output Power: 169.82mW @ 2440MHz

Maximum output power for 10MHz @ operating frequency spectrum should not exceed 17dBm/antenna

7.19 FCC ID: N2S-SC448-235

Silvus model #: SC4480E-235-SBST, SC4480E-235F-SBST

Equipment Class: Digital Transmission System

The following parameters must be used to be compliant to the appropriate FCC requirements:

Antennas: 2.1dBi Omni Antennas (Silvus part# AOV2D230515, vendor pn# 1001-071)

Band: 2.4GHz ISM

Bandwidth: 10MHz

Maximum 10MHz Bandwidth Output Power: 190.55mW @ 2440MHz

Maximum output power for 10MHz @ operating frequency spectrum should not exceed 17dBm/antenna

7.20 FCC ID: N2S-SC44K-235

Silvus model #: SC44K0E-235-SBST, SC44K0E-235F-SBST,
SC44K0E-235-LBST, SC44K0E-235F-LBST

Equipment Class: Digital Transmission System

The following parameters must be used to be compliant to the appropriate FCC requirements:

Antennas: 2.1dBi Omni Antennas (Silvus part# AOV2D230515, vendor pn# 1001-071)

Bandwidth: 10MHz

Maximum 10MHz Bandwidth Output Power: 165.96W @ 2440MHz

Maximum output power for 10MHz @ operating frequency spectrum should not exceed 17dBm/antenna

7.21 FCC ID: N2S-SC441-235467

Silvus model #: SC4410E-235467-SBST, SC4410E-235467F-SBST

Equipment Class: Digital Transmission System

The following parameters must be used to be compliant to the appropriate FCC requirements:

Antennas: 2.1dBi Omni Antennas (Silvus part# AOV2D230515, vendor pn# 1001-071)

Bandwidth: 10MHz

Maximum 10MHz Bandwidth Output Power: 204.17mW @ 2440MHz

Maximum output power for 10MHz @ operating frequency spectrum should not exceed 17dBm/antenna

7.22 FCC ID: N2S-SC448-235467

Silvus model #: SC4480E-235467-SBST, SC4480E-235467F-SBST

Equipment Class: Digital Transmission System

The following parameters must be used to be compliant to the appropriate FCC requirements:

Antennas: 2.1dBi Omni Antennas (Silvus part# AOV2D230515, vendor pn# 1001-071)

Bandwidth: 10MHz

Maximum 10MHz Bandwidth Output Power: 186.21mW @ 2440MHz

Maximum output power for 10MHz @ operating frequency spectrum should not exceed 17dBm/antenna

7.23 FCC ID: N2S-SC44KG-235467

Silvus model #: SC44KGE-235467-SBST, SC44KGE-235467F-SBST, SC44KGE-235467-LBST, SC44KGE-235467F-LBST

Equipment Class: Digital Transmission System

The following parameters must be used to be compliant to the appropriate FCC requirements:

Antennas: 2.1dBi Omni Antennas (Silvus part# AOV2D230515, vendor pn# 1001-071)

Bandwidth: 10MHz

Maximum 10MHz Bandwidth Output Power: 194.98mW @ 2440MHz

Maximum output power for 10MHz @ operating frequency spectrum should not exceed 17dBm/antenna

7.24 FCC ID: N2S-SL52-245-OEM (Modular certification)

The following Silvus radios models are approved for modular certification by FCC under the following ID:

FCC ID: N2S-SL52-245-OEM

- ❖ SL5220-139235-O, SL5220-139235F-O
- ❖ SL5210-139235-O, SL5210-139235F-O
- ❖ LC5220-139235-O, LC5220-139235F-O
- ❖ LC5210-139235-O, LC5210-139235F-O
- ❖ LC52.50-139235-O, LC52.50-139235F-O

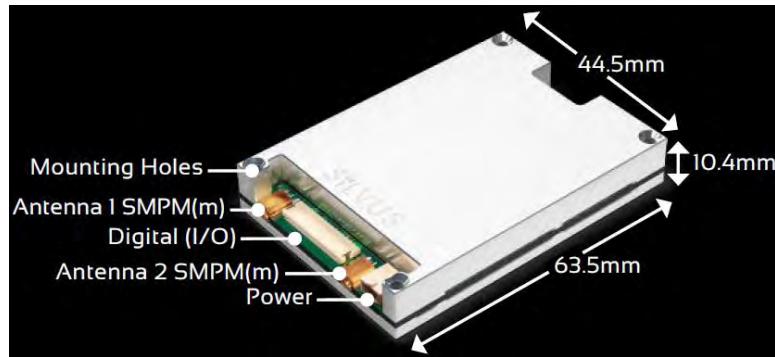


Figure 53 SL/LC5200 OEM Connector Diagram

- Equipment Class: Digital Transmission System
- Frequency band: 2.4 GHz, ISM-band
- Bandwidth: 10 & 20MHz
- Frequency range:
 - Tx BW=20MHz, F-mid=2440MHz only, no frequency range
 - Tx BW=10MHz, 2416-2457MHz
- Maximum output power:
 - Maximum 20MHz Bandwidth Output Power @ 2440MHz: 0.979W
 - Maximum output power for 20MHz @ operating frequency spectrum should not exceed 27dBm/0.5W/antenna
 - Maximum 10MHz Bandwidth Output Power @ 2416MHz: 0.241W
 - Maximum 10MHz Bandwidth Output Power @ 2440MHz: 0.247W
 - Maximum 10MHz Bandwidth Output Power @ 2457MHz: 0.25W
 - Maximum output power for 10MHz @ operating frequency spectrum should not exceed 24dBm/0.25W/antenna
- Recommended Antennas: ~ 2.5 dBi Omni Antennas (Silvus PN# AOV2S192G-TM) or equivalent for FCC 2.109 & 15.247 RF Exposure compliance
- DC supply: the customer provides DC power from their own DC supply source; the supply

should be fused for 5-amp circuit.

Modular approval allows installation in different end-use products by an OEM with limited or no additional testing or equipment authorization for the transmitter function provided by the SL/LC52xx-139235/F-O:

- ❖ No additional transmitter compliance testing is required if the module is operated with an approved antenna.

No additional transmitter compliance testing is required if the module is operated with the same general type of antenna listed as approved in the SL/LC52xx-139235/F-O documentation.

- ❖ Acceptable antennas must be of equal or less far field gain than the antenna previously authorized under the same FCC ID and must have similar in band and out of band characteristics.

The end-product must comply with all applicable FCC equipment authorizations, regulations, requirements and equipment functions not associated with the SL/LC52xx-139235/F-O.

Compliance must be demonstrated to regulations for other transmitter components within the host product, to requirements for unintentional radiators (Part 15B), and to additional authorization requirements for the non-transmitter functions.

The OEM applying the SL/LC52xx-139235/F-O are required to include all FCC statements and warnings detailed in the following sections to the end-product labeling and in the finished product manual.

7.24.1 Product Label

A statement must be included on the exterior of the final OEM product which communicates that the device identified by the FCC ID number is contained within the product. Include the statement:

- Contains FCC ID: **N2S-SL52-245-OEM**

Additionally, the OEM must include the following statements on the exterior of the finished product:

- 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 any interference that may cause undesired operation.

7.24.2 User Manual (Customer end-product)

Any user documentation that accompanies the end-product must include the following information in a location that is easily read:

- To comply with FCC's RF radiation exposure requirements, the antenna(s) used for this transmitter must be installed such that a minimum separation distance of 20 cm is maintained between the reader (antenna) & user's/nearby people's body at all times and must not be collocated or operating in conjunction with another antenna or transmitter.

The finished product manual must contain the following statement:

- **WARNING:** The Federal Communications Commission warns that changes or modifications of the radio module within this device not expressly approved by Silvus Technologies, Inc. could void the user's authority to operate the equipment.

In the case where an OEM seeks class B (residential) limits for the host product, the finished product manual must contain the following statement:

- **NOTE:** 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

In the case where an OEM seeks the lesser category of a Class A digital device for their finished product, the following statement must be included in the manual of the finished product:

- **NOTE:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

7.24.3 OEM Accessories

Accessories for the SL5200 OEM unit are detailed below:

| Silvus PN | Description |
|-------------------------|---|
| SL52-OEMCBL-PWR-12I | 12-inch SL5200 OEM 2-pin (m) Switchcraft power cable. |
| SL52-OEMCBL-IO-ESU-18I | 18-inch SL5200 OEM data cable. Provides Ethernet, Serial, and USB OTG (micro-B) connection |
| SL52-OEMCBL-IO-ESUH-18I | 18-inch SL5200 OEM data cable. Provides Ethernet, Serial, and USB Host (Type A female) connection. (Radio=Host) |
| SL52-OEMCBL-IO-ESUC-18I | 18-inch SL5200 OEM data cable. Provides Ethernet, Serial, and USB Client (Type A male) connection. (Radio=Client) |
| SL52-RF-RASM-TNC-12I | RF Cable 12-inches, RA SMPM jack, straight TNC (f) flange version |
| SL52-RF-RASM-SMA-12I | RF Cable 12-inches, RA SMPM jack, straight SMA (f) bulkhead version (IP67 rated on SMA) |

Table 33 SL/LC5200 OEM Accessories

7.24.4 Interface Connections



Figure 54 SL/LC5200 OEM Connector Diagram

| Fig 5 Ref | PCB Nom | Description | Connector Type | Vendor | MPN Mating Connector |
|-----------|---------|------------------------------------|-----------------------|-----------|---------------------------|
| A | J9001 | I/O Connector | SM14B-SHLS-TF(LF)(SN) | JST Sales | SHLP-14V-S-B ¹ |
| B | J9002 | Power Connector | SM02B-SFKH-TF | JST Sales | SFKR-02V-S ² |
| C | | Debug Connector (Factory use only) | | | |

Table 34 SL/LC5200 Interfaces and Connector Types

notes:

¹ JST crimp contact MPN is SSHL-003T-P0.2

² JST crimp contact MPN is SSFH-001T-P0.5

Connection pin-outs are detailed in StreamCaster Lite SL/LC5200 OEM Integration Guide.

7.24.5 DC Power Consumption & Heat Management requirements

1W TX power configuration

In the 1W configuration, Tx power is 0.5W/ant, the peak power draw is estimated to be 1.5A@12VDC. While the radio is actively transmitting at 1W TX power, it consumes 10W. While the radio is listening on air, it consumes 3.6W. Average power consumption could range from 3.6W to 10W, depending on the transmission duty cycle.

2W TX power configuration

In the 2W configuration, Tx power is 1W/ant, the peak power draw is estimated to be 2.3A@12VDC. While the radio is actively transmitting at 2W TX power, it consumes 15W. While the radio is listening on air, it consumes 3.6W. Average power consumption could range from 3.6W to 15W, depending on the transmission duty cycle.

The recommended heat management details are in the StreamCaster Lite SL/LC5200 OEM integration Guide.

7.25 Common Notes

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.

In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of the manufacturer could void the user's authority to operate the equipment.

To satisfy RF exposure requirements, this device and its antennas must operate with a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

8. EU-CE Markings

8.1 (-206 models)

The following Silvus Technologies models are declared to conform to CE Mark requirements:

Silvus P/N: SC4240-206-EB, SC4480-206-SBST, SC4240E-206-EB, SC4480E-206-SBST
SC4240E-206-BB

Relevant standards:

ETSI EN 302 064 V2.1.1 (2016-09), Wireless Video Links, Harmonized Standard

ETSI EN 301 489-1 V2.2.0 (2017-03), EMC, Common Technical Requirements

ETSI EN 301 489-28 V1.1.1 (2004-09), EMC, Specific conditions for wireless digital video links

EN 60950-1, Information Technology Equipment, Safety

Frequency range: 2025-2110 MHz

Maximum RF power: 500 mW per channel, up to a maximum EIRP of 1.6 watts for the SC4240-206-EB, SC4240E-206-EB, SC4240E-206-BB and 3.2 watts for the SC4480-206-SBST, SC4480E-206-SBST

Antenna: 2.15dBi Omni Antennas (AOV2D230515)

Cable: Silvus cable assembly (SC22-PRICBL02-6)

External Bandpass Filter:

Microwave Filter Co. model 3813

(a filter of equivalent performance may also be used, contact Silvus Technologies customer support for more information)

AC Adapter (if used): EDAC Power Electronics EA10523C-120 (this adapter is approved for indoor use only) (this adapter was certified by the manufacturer to IEC 60950-1)

External DC supply: If the customer provides DC power from their own source, the supply should be fused for a 5-amp circuit.

Safe Working Distance:

Maintain safe working distance of minimum 20cm. For more details, refer to TUV report no. SD72128709-0617A-0617C, "Radio Frequency Exposure Verification of the Silvus Technologies Inc. StreamCaster SC420-206 and SC4480 Tactical MIMO Radio EN 62311 January 2008" (copy of

report available upon request). The CE Mark Technical File is available upon request for inspection.

To satisfy RF exposure requirements, this device and its antennas must operate with a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter, except in accordance with RED RF Exposure requirements.

This equipment has been constructed so that the product complies with the requirement of with Article 10(2) as it can be operated in at least one Member State as examined and the product is compliant with Article 10(10) as it has no restrictions on putting into service in all EU member states.

See restrictions mentioned in ERC Recommendation 25-10, Table 7-C2, for guidance of restrictions applicable to specific countries.

Table 7-C2: additional information regarding the national conditions for the identified tuning ranges for video PMSE applications - Band C2

| Frequency Band | Country | Implementation | Conditions/remarks |
|------------------|---------|----------------|---|
| C2 2025-2110 MHz | AUT | L*† | Max. 10MHz Channels, max. 20dBW eirp, 2070-2090 MHz: Restricted to Broadcasters only 2090-2110 MHz: Restricted to fire brigades and private users |
| | AZE | Y* | On a secondary basis |
| | BIH | L | PBS old MW link systems for PMSE. Military use in 2025-2110 MHz |
| | BUL | Y | ECC Report 219. Available for Cordless Cameras, Portable video links and Mobile video links |
| | CZE | Y* | The band may be used in the coordination with the Ministry of Defence of the Czech Republic: https://www.ctu.cz/sites/default/files/obsah/o-ctu/rsup_p_06_09-2014-07_en_.pdf , new version is available only in czech https://www.ctu.cz/sites/default/files/obsah/vtu/vyava-k-uplatneni-pripominek-k-navrh-uplatneni-obecne-povahy-casti-planu-vyuuziti-radioveho-spektra-c-pv-p6/xx/2017-yy-pro-kmitotcove-pasmo-1900-2200-mhz/obrazky/pv-p6-2017.pdf |
| | D | N | Deviations from the specifications in the Frequency Plan (FreqP) could be permitted for a limited time in accordance with §58 TKG. This is provided that the frequency usages indicated in the Frequency Ordinance (Freq) and the Frequency Plan are not adversely affected (for more details see: https://www.bundesnetzagentur.de/cin_1412/DE/Sachgebiete/Telekommunikation/Unternehmen_Institutionen/Frequenzen/SpezielleAnwendungen/Kurzzeltzuteilungen/kurzzeltzuteilungen-node.html) |
| | DNK | Y* | |
| | E | N | Band not available |
| | EST | L* | 2075.25-2110 MHz SAP/SAB. See Regulation of Ministry of Communication and Economical Affairs 21.05.2013 No 35. Otherwise governmental use. |
| | F | L*† | Temporary licenses, e.i.r.p. max = 10 dBW. Use of 10 MHz bandwidth centered on 2095 MHz and 2095 MHz for ground-to-ground link and 10 MHz bandwidth centered on 2085 MHz and 2105 MHz for air-to-ground link. Coordination required between assigning authorities (la Defense and Space) regarding the use of the other available bands in order to avoid harmful interference. ARCEP Decision 2016-1130 |
| | FIN | L*† | Cordless cameras, temporary use on a case- by-case basis. Standard EN 302664. Other use includes military use and space operation |
| | G | Y*† | Technology and application neutral but typically used for wireless cameras, typically licensed at 100 mW e.r.p. |
| | GEO | L* | |
| | GRC | L*† | Cordless Cameras, Portable/Mobile video links. 2087.5- 2108.5 MHz : not available (exclusive use by security services) |
| | HNG | N | Band not available (governmental use). However, the band may be used for short-term PMSE use if the user demand makes it necessary at certain occasions like main events. In this case the authority handles the requests on a case-by-case basis and if the frequency use can be authorised the users receive an individual license |
| | HOL | L* | 2070-2110 MHz for ENG-OB only |

Possible implementation status: Y = the whole band is available for PMSE. L = Limited availability. N = the band is not available for PMSE. * - Individual licence may be required. † - restrictions apply (e.g. geographical restrictions)

Table 35 Additional Restrictions on Band C2

EU DECLARATION OF CONFORMITY

Number: *STDOC1001*

Name and address of the Manufacturer

Silvus Technologies, Inc.,
10990 Wilshire Blvd., Suite #1500
Los Angeles, CA 90024 U.S.A

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Object of the declaration

Product information StreamCaster SC4240-206-EB, SC4480-206-SBST, SC4240E-206-EB, SC4480E-206-SBST

Additional information SW version : v3.12.6.4 for SC4240-206-EB and SC4480-206-SBST
HW version : C5 for SC4240-206-EB, B1 for SC4480-206-SBST

SW version : v3.17.1.1 for SC4240E-206-EB and SC4480E-SBST
HW version : C7 for SC4240E-206-EB and B1 for SC4480E-SBST

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

- References to the relevant harmonised standards used or references to the technical specifications in relation to which conformity is declared

Radio Equipment Directive 2014/53/EU

RoHS Directive 2011/65/EU

EN 301 489-1 V2.1.1
EN 301 489-28 V1.1.1
EN 302 064 V2.1.1
EN 60950-
1:2006+A11:2009+A1:2010+A12:
2011+A2:2013
EN62311:2008

EN 50581:2012

The notified body Name: *TÜV SÜD American*
Number:1929

performed • a conformity assessment of the technical construction file

and issued the certificate CB-19-0102

Additional information

N/A

Signed for and on behalf of: *Silvus Technologies*

Authorised Representative:

Name and Surname / Function:

Weijun Zhu, Vice President of Engineering

Date of issue:

8-12-2019



1/1

EU DECLARATION OF CONFORMITY

Number: STDOC1001

Name and address of the Manufacturer

Silvus Technologies, Inc.,
10990 Wilshire Blvd., Suite #1500
Los Angeles, CA 90024 U.S.A

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Object of the declaration

Product information

StreamCaster SC4240E-206-BB

Additional information

SW version : v3.17.1.1
HW version : B7

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

- References to the relevant harmonised standards used or references to the technical specifications in relation to which conformity is declared

Radio Equipment Directive 2014/53/EU

EN 301 489-1 V2.1.1
EN 301 489-28 V1.1.1
EN 302 064 V2.1.1
EN
60950-1:2006+A11:2009+A1:2010
+A12:2011+A2:2013
EN62311:2008

RoHS Directive 2011/65/EU

EN 50581:2012

The notified body

Name: TÜV SÜD American
Number:1929

performed

• a conformity assessment of the technical construction file

and issued the certificate

CB-19-0102

Additional information

N/A

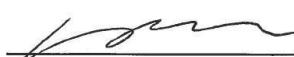
Signed for and on behalf of: Silvus Technologies

Authorised Representative:

Name and Surname / Function:

Weijun Zhu, Vice President of Engineering

Date of issue: 1-7-2020



1/1

8.2 (-139 Models)

The following Silvus Technologies models are declared to conform to CE Mark requirements:

Silvus P/N: SC4240EP-139-BB, SC4240EP-139-EB, SC4480E-139-SBST

Relevant standards:

ETSI EN 302 064 V2.1.1 (2016-09), Wireless Video Links, Harmonized Standard

ETSI EN 301 489-1 V2.2.0 (2017-03), EMC, Common Technical Requirements

ETSI EN 301 489-28 V1.1.1 (2004-09), EMC, Specific conditions for wireless digital video links

EN 62368-1, Product Safety Standard

Frequency range: 1350-1440 MHz

Maximum RF power: 2W per channel, up to a maximum EIRP of 4 watts for the SC4240EP-139-BB, SC4240EP-139-EB and 8 watts for the SC4480E-139-SBST

Antenna: 2.1dBi Omni Antennas (AOV2S192)

Cable: Silvus cable assembly (SC22-PRICBL02-6)

External Bandpass Filter:

Microwave Filter Co. model 3813

(a filter of equivalent performance may also be used, contact Silvus Technologies customer support for more information)

AC Adapter (if used): EDAC Power Electronics EA10523C-120 (this adapter is approved for indoor use only) (this adapter was certified by the manufacturer to IEC 60950-1)

External DC supply: If the customer provides DC power from their own source, the supply should be fused for a 5-amp circuit.

Safe Working Distance:

Maintain safe working distance of minimum 20cm. For more details, refer to TUV report no. 7217985B, "Radio Frequency Exposure Verification of the Silvus Technologies Inc. StreamCaster SC4240EP-139 and SC4480E-139 Tactical MIMO Radio EN 62311 January 2008" (copy of report available upon request). The CE Mark Technical File is available upon request for inspection.

To satisfy RF exposure requirements, this device and its antennas must operate with a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter, except in accordance with RED RF Exposure requirements.

This equipment has been constructed so that the product complies with the requirement of Article 10(2) as it can be operated in at least one Member State as examined and the product is compliant with Article 10(10) as it has no restrictions on putting into service in all EU member states.

See restrictions mentioned in ERC Recommendation 25-10, Table 7-C2, for guidance of restrictions applicable to specific countries.

Table 7-C2: additional information regarding the national conditions for the identified tuning ranges for video PMSE applications - Band C2

| Frequency Band | Country | Implementation | Conditions/remarks |
|------------------|---------|-----------------|---|
| C2 2025-2110 MHz | AUT | L ^{!1} | Max. 10MHz Channels; max. 20dBW eirp; 2070-2090 MHz: Restricted to Broadcasters only; 2090-2110 MHz: Restricted to fire brigades and private users |
| | AZE | Y [*] | On a secondary basis |
| | BIH | L | PBS old MW link systems for PMSE. Military use in 2025-2110 MHz |
| | BUL | Y | ECC Report 219. Available for Cordless Cameras, Portable video links and Mobile video links |
| | CZE | Y [*] | The band may be used in the coordination with the Ministry of Defence of the Czech Republic: https://www.ctu.eu/sites/default/files/obsah/o-ctu/rsup-p_06_09-2014-07_en_.pdf , new version is available only in czech https://www.ctu.cz/sites/default/files/obsah/ctu/vyza-k-uplatneni-priponiek-k-nazvuh-opatreni-obecne-povahy-casti-platu-vyuzit-radioveho-spektra-c-pv-p/6/xx.2017-yy-pro-kmitoctove-pismo-1900-2200-mhz/obrazky/pv-p6-2017.pdf |
| | D | N | Deviations from the specifications in the Frequency Plan (FreqP) could be permitted for a limited time in accordance with §58 TKG. This is provided that the frequency usages indicated in the Frequency Ordinance (FreqV) and the Frequency Plan are not adversely affected (for more details see: https://www.bundesnetzagentur.de/cln_1412/DE/Sachgebiete/Telekommunikation/Unternehmen/Frequenzen/SpezielleAnwendungen/Kurzzeitzuweisungen/kurzzeitzuweisungen-node.html) |
| | DNK | Y [*] | |
| | E | N | Band not available |
| | EST | L [*] | 2075.25-2110 MHz SAP/SAB. See Regulation of Ministry of Communication and Economical Affairs 21.05.2013 No 35. Otherwise governmental use. |
| | F | L ^{!1} | Temporary licenses, e.i.r.p. max = 10 dBW. Use of 10 MHz bandwidth centered on 2055 MHz and 2095 MHz for ground-to-ground link and 10 MHz bandwidth centered on 2085 MHz and 2105 MHz for air-to-ground link. Coordination required between assigning authorities (la Défense and Space) regarding the use of the other available bands in order to avoid harmful interference. ARCEP Decision 2016-1130 |
| | FIN | L ^{!1} | Cordless cameras, temporary use on a case- by-case basis. Standard EN 302064. Other use includes military use and space operation |
| | G | Y ^{!1} | Technology and application neutral but typically used for wireless cameras, typically licensed at 100 mW e.r.p. |
| | GEO | L [*] | |
| | GRC | L ^{!1} | Cordless Cameras. Portable/Mobile video links. 2087.5- 2108.5 MHz : not available (exclusive use by security services) |
| | HNG | N | Band not available (governmental use). However, the band may be used for short-term PMSE use if the user demand makes it necessary at certain occasions like main events. In this case the authority handles the requests on a case-by-case basis and if the frequency use can be authorised the users receive an individual license. |
| | HOL | L [*] | 2070-2110 MHz for ENG/OB only |

Possible implementation status: Y = the whole band is available for PMSE L = Limited availability N = the band is not available for PMSE * - Individual licence may be required ! - restrictions apply (e.g. geographical restrictions)

Table 36 Additional Restrictions on Band C2

EU DECLARATION OF CONFORMITY

Number: 10045C000

Name and address of the Manufacturer

Silvus Technologies, Inc.,
10990 Wilshire Blvd., Suite #1500
Los Angeles, CA 90024 U.S.A

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Object of the declaration**Product information**

StreamCaster:
SC4240EP-139-BB, SC4240EP-139-EB, SC4480E-139-SBST

Additional information SW version : v4.0.2.7 (all models)

HW version : B1: SC4480E-139-SBST
B7: SC4240EP-139-BB
C7: SC4240EP-139-EB

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

- References to the relevant harmonised standards used or references to the technical specifications in relation to which conformity is declared

Radio Equipment Directive 2014/53/EU

EN 301 489-1 V2.1.1
EN 301 489-28 V1.1.1
EN 302 084 V2.1.1
EN 62368-1
EN62311:2008

RoHS Directive 2011/65/EU

EN 50581:2012

The notified body

Name: TÜV SÜD America
Number: 1929

performed

• a conformity assessment of the technical construction file

and issued the certificate

NB06 002138 0004 Rev. 00

Additional information

N/A

Signed for and on behalf of: Silvus Technologies Inc

Authorised Representative:



Name and Surname / Function:

WeiJun Zhu, Vice President of Engineering

Date of Issue:

March 2, 2023

8.3 (-235467 Models)

The following Silvus Technologies models are declared to conform to CE Mark requirements:

Silvus P/N: SC4240EP-235467-BB, SC4240EP-235467-EB, SC4480E-235467-SBST

Relevant standards:

ETSI EN 302 064 V2.1.1 (2016-09), Wireless Video Links, Harmonized Standard

ETSI EN 301 489-1 V2.2.0 (2017-03), EMC, Common Technical Requirements

ETSI EN 301 489-28 V1.1.1 (2004-09), EMC, Specific conditions for wireless digital video links

EN 62368-1, Product Safety Standard

Frequency range: S band (2200MHz to 2500MHz)

C-1 band (4400MHz to 4940MHz)

Maximum RF power: 2W per channel, up to a maximum EIRP of 4 watts for the SC4240EP-235467-BB, SC4240EP-235467-EB and 8 Watts for the SC4480E-235467-SBST

Antenna: 1.8-1.9dBi Dual Bands Omni Antennas (AOV2D235515G)

Cable: Silvus cable assembly (SC22-PRICBL02-6)

External Bandpass Filter:

Microwave Filter Co. model 3813

(a filter of equivalent performance may also be used, contact Silvus Technologies customer support for more information)

AC Adapter (if used): EDAC Power Electronics EA10523C-120 (this adapter is approved for indoor use only) (this adapter was certified by the manufacturer to IEC 60950-1)

External DC supply: If the customer provides DC power from their own source, the supply should be fused for a 5-amp circuit.

Safe Working Distance:

Maintain safe working distance of minimum 20cm. For more details, refer to TUV report no. 72171985D, "Radio Frequency Exposure Verification of the Silvus Technologies Inc. StreamCaster SC4240EP-235467 and SC4480E-235467 Tactical MIMO Radio EN 62311 January 2008" (copy of report available upon request). The CE Mark Technical File is available upon request for inspection.

To satisfy RF exposure requirements, this device and its antennas must operate with a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter, except in accordance with RED RF Exposure requirements.

This equipment has been constructed so that the product complies with the requirement of with Article 10(2) as it can be operated in at least one Member State as examined and the product is compliant with Article 10(10) as it has no restrictions on putting into service in all EU member states.

See restrictions mentioned in ERC Recommendation 25-10, Table 7-C2, for guidance of restrictions applicable to specific countries.

Table 7-C2: additional information regarding the national conditions for the identified tuning ranges for video PMSE applications - Band C2

| Frequency Band | Country | Implementation | Conditions/remarks |
|------------------|---------|----------------|---|
| C2 2025-2110 MHz | AUT | L [†] | Max. 10MHz Channels, max 20dBW eirp, 2070-2090 MHz: Restricted to Broadcasters only. 2090-2110 MHz: Restricted to fire brigades and private users |
| | AZE | Y [*] | On a secondary basis |
| | BIH | L | PBS old MW link systems for PMSE. Military use in 2025-2110 MHz |
| | BUL | Y | ECC Report 219. Available for Cordless Cameras, Portable video links and Mobile video links |
| | CZE | Y [*] | The band may be used in the coordination with the Ministry of Defence of the Czech Republic: https://www.ctu.cz/sites/default/files/obsah/o-ctu/rsp-p_06_09_2014-07_en_.pdf , new version is available only in czech https://www.ctu.cz/sites/default/files/obsah/ctu/vyzva-k-uplatneni-pripomienek-k-nauhnu-opatreni-obecne-povahy-casti-platu-vyuuzit-radioveho-spektra-c-pv-p/61xx.2017-yy-pro-kmitoctove-pismo-1900-2200-mhz/obrazky/pv-p6-2017.pdf |
| | D | N | Deviations from the specifications in the Frequency Plan (FreqP) could be permitted for a limited time in accordance with §58 TKG. This is provided that the frequency usages indicated in the Frequency Ordinance (FreqV) and the Frequency Plan are not adversely affected (for more details see: https://www.bundesnetzagentur.de/cln_1412/DE/Sachgebiete/Telekommunikation/Unternehmen_Institutionen/Frequenzen/SpezialeAnwendungen/Kurzzeitzuweisungen/kurzzeitzuweisungen-node.html) |
| | DNK | Y [*] | |
| | E | N | Band not available |
| | EST | L [*] | 2075.25-2110 MHz SAP/SAB. See Regulation of Ministry of Communication and Economical Affairs 21.05.2013 No 35. Otherwise governmental use. |
| | F | L [†] | Temporary licenses, e.i.r.p. max = 10 dBW. Use of 10 MHz bandwidth centered on 2055 MHz and 2095 MHz for ground-to-ground link and 10 MHz bandwidth centered on 2095 MHz and 2105 MHz for air-to-ground link. Coordination required between assigning authorities (la Défense and Space) regarding the use of the other available bands in order to avoid harmful interference. ARCEP Decision 2016-1130 |
| | FIN | L [†] | Cordless cameras, temporary use on a case- by-case basis. Standard EN 302064. Other use includes military use and space operation |
| | G | Y [*] | Technology and application neutral but typically used for wireless cameras, typically licensed at 100 mW e.r.p. |
| | GEO | L [*] | |
| | GRC | L [†] | Cordless Cameras. Portable/Mobile video links. 2087.5- 2108.5 MHz : not available (exclusive use by security services) |
| | HNG | N | Band not available (governmental use). However, the band may be used for short-term PMSE use if the user demand makes it necessary at certain occasions like main events. In this case the authority handles the requests on a case-by-case basis and if the frequency use can be authorised the users receive an individual license |
| | HOL | L [*] | 2070-2110 MHz for ENG-CB only |

Possible implementation status: Y = the whole band is available for PMSE L = Limited availability N = the band is not available for PMSE * - Individual licence may be required † - restrictions apply (e.g. geographical restrictions)

Table 37 Additional Restrictions on Band C2

EU DECLARATION OF CONFORMITY

Number: 10046C000

Name and address of the Manufacturer

Silvus Technologies, Inc.,
10990 Wilshire Blvd., Suite #1500
Los Angeles, CA 90024 U.S.A

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Object of the declaration

Product information

StreamCaster:
SC4240EP-235467-BB, SC4240EP-235467-EB, SC4480E-235467-SBST

Additional information SW version : v4.0.2.7 (all models)
HW version : B1: SC4480E-235467-SBST
B7: SC4240EP-235467-BB
C7: SC4240EP-235467-EB

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

- References to the relevant harmonised standards used or references to the technical specifications in relation to which conformity is declared

Radio Equipment Directive 2014/53/EU

RoHS Directive 2011/65/EU

EN 301 489-1 V2.1.1
EN 301 489-28 V1.1.1
EN 302 064 V2.1.1
EN 62368-1
EN62311:2008

EN 50581:2012

The notified body Name: TÜV SÜD America performed a conformity assessment of the technical construction file
Number: 1929

and issued the certificate **NB06 002138 0005 Rev. 00**

Additional information

N/A

Signed for and on behalf of: Silvus Technologies Inc

Authorised Representative:

Name and Surname / Function:

WeiJun Zhu, Vice President of Engineering

Date of issue:

March 2, 2023

8.4. (-235 Models)

The following Silvus Technologies models are declared to conform to CE Mark requirements:

Silvus P/N:

- **SC4240-235-BB, SC4240-235-EB**
- **SC4240EP-235-BB, SC4240EP-235-EB**
- **SC4480-235-SBST, SC4480E-235-SBST**

Relevant standards:

- ETSI EN 302 064 V2.1.1 (2016-09), Wireless Video Links, Harmonized Standard
- ETSI EN 301 489-1 V2.2.0 (2017-03), EMC, Common Technical Requirements
- ETSI EN 301 489-28 V1.1.1 (2004-09), EMC, Specific conditions for wireless digital video links
- EN 62311, MPE (Maximum Permissible Exposures)
- EN 62368-1, Product Safety Standard
- EN 50581, RoHS (Restriction of Hazardous Substances)

Frequency range: S band (2200MHz to 2500MHz)

Maximum RF power: 2W per channel, up to a maximum EIRP of 4 watts for the SC4240xx-235-BB, SC4240xx-235-EB and 8 Watts for the SC4480x-235-SBST

Antenna: 2.4dBi Omni Antennas (AOV2192)

Cable: Silvus cable assembly (SC22-PRICBL02-6)

External Bandpass Filter:
Microwave Filter Co. model 3813
(a filter of equivalent performance may also be used, contact Silvus Technologies customer support for more information)

AC Adapter (if used): EDAC Power Electronics EA10523C-120 (this adapter is approved for indoor use only) (this adapter was certified by the manufacturer to IEC 60950-1)

External DC supply: If the customer provides DC power from their own source, the supply should be fused for a 5-amp circuit.

Safe Working Distance:

Maintain safe working distance of minimum 20cm. For more details, refer to Nemko SC4240-235-EB & SC4480-235-SBST MPE Report EN62311 "Radio Frequency Exposure Verification of the Silvus Technologies Inc. StreamCaster SC4240-235 and SC4480-235 Tactical MIMO Radio EN 62311 January 2008" (copy of report available upon request). The CE Mark Technical File is available upon request for inspection.

To satisfy RF exposure requirements, this device and its antennas must operate with a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter, except in accordance with RED RF Exposure requirements.

This equipment has been constructed so that the product complies with the requirement of with Article 10(2) as it can be operated in at least one Member State as examined and the product is compliant with Article 10(10) as it has no restrictions on putting into service in all EU member states.

See restrictions mentioned in ERC Recommendation 25-10, Table 7-C2, for guidance of restrictions applicable to specific countries.

Table 7-C2: additional information regarding the national conditions for the identified tuning ranges for video PMSE applications - Band C2

| Frequency Band | Country | Implementation | Conditions/remarks |
|------------------|---------|----------------|---|
| C2 2025-2110 MHz | AUT | L [†] | Max. 10MHz Channels; max. 20dBW eirp; 2070-2090 MHz: Restricted to Broadcasters only; 2090-2110 MHz: Restricted to fire brigades and private users |
| | AZE | Y [*] | On a secondary basis |
| | BIH | L | PBS old MW link systems for PMSE. Military use in 2025-2110 MHz |
| | BUL | Y | ECC Report 219: Available for Cordless Cameras, Portable video links and Mobile video links |
| | CZE | Y [*] | The band may be used in the coordination with the Ministry of Defence of the Czech Republic: https://www.ctu.cz/sites/default/files/obsah/o-ctu/rsup-p_06_09-2014-07_en_.pdf , new version is available only in czech https://www.ctu.cz/sites/default/files/obsah/ctu/vyza-k-uplatneni-priponiek-k-nazvahu-opatreni-obecne-povahy-casti-platu-vyuziti-radioveho-spektra-c-pv-p/6/xx.2017-yy-pro-kmitoctove-pasmo-1900-2200-mhz/obrazky/pv-p6-2017.pdf |
| | D | N | Deviations from the specifications in the Frequency Plan (FreqP) could be permitted for a limited time in accordance with §58 TKG. This is provided that the frequency usages indicated in the Frequency Ordinance (FreqV) and the Frequency Plan are not adversely affected (for more details see: https://www.bundesnetzagentur.de/cln_1412/DE/Sachgebiete/Telekommunikation/Unternehmen/Frequenzen/SpezielleAnwendungen/Kurzzeitzuordnungen/kurzzeitzuordnungen-node.html) |
| | DNK | Y [*] | |
| | E | N | Band not available |
| | EST | L [*] | 2075.25-2110 MHz SAP/SAB. See Regulation of Ministry of Communication and Economical Affairs 21.05.2013 No 35. Otherwise governmental use. |
| | F | L [†] | Temporary licenses, e.i.r.p. max = 10 dBW. Use of 10 MHz bandwidth centered on 2055 MHz and 2095 MHz for ground-to-ground link and 10 MHz bandwidth centered on 2085 MHz and 2105 MHz for air-to-ground link. Coordination required between assigning authorities (la Défense and Space) regarding the use of the other available bands in order to avoid harmful interference. ARCEP Decision 2016-1130 |
| | FIN | L [†] | Cordless cameras, temporary use on a case- by-case basis. Standard EN 302064. Other use includes military use and space operation |
| | G | Y [†] | Technology and application neutral but typically used for wireless cameras, typically licensed at 100 mW e.r.p. |
| | GEO | L [*] | |
| | GRC | L [†] | Cordless Cameras, Portable/Mobile video links. 2087.5- 2108.5 MHz : not available (exclusive use by security services) |
| | HNG | N | Band not available (governmental use). However, the band may be used for short-term PMSE use if the user demand makes it necessary at certain occasions like main events. In this case the authority handles the requests on a case-by-case basis and if the frequency use can be authorised the users receive an individual license |
| | HOL | L [*] | 2070-2110 MHz for ENG/OB only |

Possible implementation status: Y = the whole band is available for PMSE L = Limited availability N = the band is not available for PMSE * - Individual licence may be required ! - restrictions apply (e.g. geographical restrictions)

Table 38 Additional Restrictions on Band C2



Certificate No:
0470 - RED -182301
File No:
346287

Notified Body 0470 – Radio Equipment Directive 2014/53/EU

EU-Type Examination Certificate

0470 – RED - 182301

In compliance with Directive (EU) No 2014/53 of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment (RED), this certificate applies to the product(s)

STREAMCASTER MIMO radios
Model: SC4240-235
SC4480-235

Placed on the market under the name or trade mark of:

Silvus Technologies Inc,
10990 Wilshire Blvd #1500,
Los Angeles,
CA 90024

This certificate attests that all provisions concerning the assessment and verification of performance described in the standard(s)

Art 3.1a: Not Assessed

Art 3.1b: Not assessed

Art 3.2: EN 302 064 V2.1.1

as per Annex III (Module B) for the performance set out in this certificate, are applied.

Certificate issued June 12, 2018
Certificate was first issued June 12, 2018

Certificate revision: 1.0

For NEMKO (Notified Body 0470)
Authorized signatory: Roy Uggerud

This certificate has been granted by Nemko AS, Gaustadalleen 30, NO-0373 Oslo, Norway

This certificate remains valid, unless cancelled or revoked, provided the conditions indicated in the subsequent page(s) are complied with and the product remains satisfactory in service. This certificate will not be valid if the applicant makes any changes or modifications to the approved product, which have not been notified to, and agreed in writing with Nemko. Should the specified regulations or standards be amended, the products are to be re-approved prior to being placed on the market. Nemko is designated by the Norwegian Notified Authority as a Notified Body under the terms of the Norwegian regulations. This certificate is issued within the scope of the "Provisions for certification - Electrical products - Radio Equipment Directive 2014/53/EU" (Nemko C355), which is available on request.

Any person not a party to the contract pursuant to which this document is delivered may not assert a claim against Nemko for any liability arising out of errors or omissions which may be contained in said document, or for errors of judgement, fault or negligence committed by personnel in the establishment or issuance of this document, and in connection with any activities for which it may provide



Certificate No:
0470-RED-182301
File No:
346287

ANNEX 1 – PRODUCT SPECIFICATIONS

PRODUCT DESCRIPTION

Equipment type: **Base Station (High-throughput wireless MIMO OFDM transceiver) StreamCaster: SC4240-235 / SC4480-235**
Model/type: **SC4240-235 / SC4480-235**
Brand/trade name: **Silvus Technologies**
Rating: **SC4240-235 9-20V dc, 24W (6,8 Ah Battery)**
SC4480-235 9-20V dc, 43W (6,8 Ah Battery)

TECHNICAL CHARACTERISTICS

Intended purpose: **Wireless Video Link**
Frequency range: **2200 – 2300 MHz**
2300 – 2400 MHz
2400 – 2500 MHz
Transmit power: **SC4240-235 4 W**
SC4480-235 8 W
Modulation type: **OFDM**
Antenna type: **External antenna**

MANUFACTURER

Name: **Silvus Technologies Inc**
Address: **10990 Wilshire Blvd #1500,
Los Angeles,
CA 90024**

ADDITIONAL INFORMATION

None.

Nemko Norway
Nemko AS, Gaustadalléen 30, P.O. Box 73 Blindern, 0314 Oslo, Norway
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Page 2 of 3



Certificate No:
0470-RED-182301
File No:
346287

ANNEX 2 - SCHEDULE OF APPROVAL

SCOPE OF EXAMINATION

| | |
|---|--------------|
| <input type="checkbox"/> Protection of Health and Safety, according to Article 3(1)(a). | Not assessed |
| <input type="checkbox"/> Electromagnetic Compatibility (EMC), according to Article 3(1)(b). | Not assessed |
| <input checked="" type="checkbox"/> Radio Spectrum Use, according to Article 3(2). | COMPLIES |
| <input checked="" type="checkbox"/> Special Radio Features, according to Article 3(3)(a)-(f). | N/A |

APPLICATIONS/LIMITATIONS

No limitations

MARKING OF PRODUCT

The Manufacturer and Type Designation shall be applied to the product in a visible location.
The equipment shall carry the CE marking of the European Union.

TYPE EXAMINATION DOCUMENTATION

Test report(s)

| Article | Standard | Test report number | Issued by |
|---------|--|--|------------------------------------|
| 3.1a | EN 60950-1:2006* EN 62311: 2008 EN 62311: 2008 | SC4240-235-EB MPE Report EN62311 SC4480-235-SBST MPE Report EN62311 | Nemko USA Inc Nemko USA Inc |
| 3.1b | EN 301 489-1 EN 301 489-28 | SD72128709-0617B Silvus EN 301 489-28 Test Report | TÜV Süd San Diego |
| 3.2 | EN 302 064 EN 302 064 | 346287-1TRFWL SD72128709-0617A Silvus Test Report | Nemko USA Inc TÜV Süd San Diego |

*Not Assessed

Additional documentation

- RED technical file by Silvus Technologies Inc dated: 2018-05-31

ADDITIONAL INFORMATION

None.

| Revision # | Date | Description |
|------------|------------|--------------|
| 1.0 | 2018-06-12 | First issued |

<< End of certificate >>

Nemko Norway
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Page 3 of 3

EU DECLARATION OF CONFORMITY**Number:** STDOC1002**Name and address of the Manufacturer**

Silvus Technologies, Inc.,
10990 Wilshire Blvd., Suite #1500
Los Angeles, CA 90024 U.S.A

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Object of the declaration

Product information StreamCaster SC4240-235-EB, SC4480-235-SBST

Additional information SW version : v3.14.0.1 for both models
HW version : C5 for SC4240-235-EB, B1 for SC4480-235-SBST

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

- References to the relevant harmonised standards used or references to the technical specifications in relation to which conformity is declared

Radio Equipment Directive 2014/53/EU

EN 301 489-1 V2.1.1
EN 301 489-28 V1.1.1
EN 302 064 V2.1.1
EN 60950-
1:2006+A11:2009+A1:2010+A12:
2011+A2:2013
EN62311:2008

RoHS Directive 2011/65/EU

EN 50581:2012

The notified body Name: Nemko AS
Number: NB 0470

performed • a conformity assessment of the technical construction file

and issued the certificate

Additional information

N/A

Signed for and on behalf of: Silvus Technologies

Authorised Representative:

Name and Surname / Function:

Weljun Zhu, Vice President of Engineering

Date of Issue: 5-2-2018



1/1



Certificate No:
0470 - RED - 182301
File No:
346287

Notified Body 0470 – Radio Equipment Directive 2014/53/EU

EU-Type Examination Certificate

0470 – RED - 182301

In compliance with Directive (EU) No 2014/53 of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment (RED), this certificate applies to the product(s)

STREAMCASTER MIMO radios

Model: SC4240-235
SC4480-235

Variants: See Annex 1

Placed on the market under the name or trade mark of:

Silvus Technologies Inc,
10990 Wilshire Blvd #1500,
Los Angeles,
CA 90024

This certificate attests that all provisions concerning the assessment and verification of performance described in the standard(s)

Art 3.1a: Not Assessed

Art 3.1b: Not assessed

Art 3.2: EN 302 064 V2.1.1

as per Annex III (Module B) for the performance set out in this certificate, are applied.

Certificate issued April 29, 2020
Certificate was first issued June 12, 2018
Certificate is valid until June 12, 2023

Certificate revision: 2.0

For NEMKO (Notified Body 0470)
Authorized signatory: Roy Uggerud

This certificate has been granted by Nemko AS, Gaustadalleen 30, NO-0373 Oslo, Norway

This certificate remains valid, unless cancelled or revoked, provided the conditions indicated in the subsequent page(s) are complied with and the product remains satisfactory in service. This certificate will not be valid if the applicant makes any changes or modifications to the approved product, which have not been notified to, and agreed in writing with Nemko. Should the specified regulations or standards be amended, the products are to be re-approved prior to being placed on the market. Nemko is designated by the Norwegian Notified Authority as a Notified Body under the terms of the Norwegian regulations. This certificate is issued within the scope of the "Provisions for certification - Electrical products - Radio Equipment Directive 2014/53/EU" (Nemko C355), which is available on request.

Any person not a party to the contract pursuant to which this document is delivered may not assert a claim against Nemko for any liability arising out of errors or omissions which may be contained in said document, or for errors of judgement, fault or negligence committed by personnel in the establishment or issuance of this document, and in connection with any activities for which it may provide



Certificate No:
0470-RED-182301
File No:
346287

ANNEX 1 – PRODUCT SPECIFICATIONS

PRODUCT DESCRIPTION

Equipment type: **Base Station (High-throughput wireless MIMO OFDM transceiver)**
Model/type: **StreamCaster: SC-4240-235 / SC4480-235**
Brand/trade name: **Silvus Technologies**
Rating: **SC4240-235 9-20V dc, 24W (6,8 Ah Battery)**
SC4480-235 9-20V dc, 43W (6,8 Ah Battery)

TECHNICAL CHARACTERISTICS

Intended purpose: **Wireless Video Link**
Frequency range: **2200 – 2300 MHz**
2300 – 2400 MHz
2400 – 2500 MHz
Transmit power: **SC4240-235 4 W**
SC4480-235 8 W
Modulation type: **OFDM**
Antenna type: **External antenna**

MANUFACTURER

Name: **Silvus Technologies Inc**
Address: **10990 Wilshire Blvd #1500,
Los Angeles,
CA 90024**

ADDITIONAL INFORMATION

Variants: Same product as standard radio type with enhanced features

Variants **SC4240-235-EB**
SC4240E-235-EB
SC4240P-235-EB
SC4240E-235-BB
SC4240P-235-BB
SC4480-235-SBST
SC4480E-235-SBST

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ENTERPRISE NUMBER NO974404532

nemko.com

Page 2 of 3



Certificate No:
0470-RED-182301
File No:
346287

ANNEX 2 - SCHEDULE OF APPROVAL

SCOPE OF EXAMINATION

| | |
|---|--------------|
| <input type="checkbox"/> Protection of Health and Safety, according to Article 3(1)(a). | Not assessed |
| <input type="checkbox"/> Electromagnetic Compatibility (EMC), according to Article 3(1)(b). | Not assessed |
| <input checked="" type="checkbox"/> Radio Spectrum Use, according to Article 3(2). | COMPLIES |
| <input checked="" type="checkbox"/> Special Radio Features, according to Article 3(3)(a)-(f). | N/A |

APPLICATIONS/LIMITATIONS

No limitations

MARKING OF PRODUCT

The Manufacturer and Type Designation shall be applied to the product in a visible location.
The equipment shall carry the CE marking of the European Union.

TYPE EXAMINATION DOCUMENTATION

Test report(s)

| Article | Standard | Test report number | Issued by |
|---------|--|--|------------------------------------|
| 3.1a | EN 60950-1:2006* EN 62311: 2008 EN 62311: 2008 | SC4240-235-EB MPE Report EN62311 SC4480-235-SBST MPE Report EN62311 | Nemko USA Inc Nemko USA Inc |
| 3.1b | EN 301 489-1 EN 301 489-28 | SD72128709-0617B Silvus EN 301 489-28 Test Report | TÜV Süd San Diego |
| 3.2 | EN 302 064 EN 302 064 | 346287-1TRFWL SD72128709-0617A Silvus Test Report | Nemko USA Inc TÜV Süd San Diego |

Additional documentation

- RED technical file by Silvus Technologies Inc dated: 2018-05-31
- Silvus Technologies Model Difference Letter dated: March 30th 2020.

ADDITIONAL INFORMATION

None.

| Revision # | Date | Description |
|------------|------------|---------------------------------------|
| 1.0 | 2018-06-12 | First issued |
| 2.0 | 2020-04-29 | Added variants with enhanced features |

<< End of certificate >>

Nemko Norway
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Page 3 of 3

EU DECLARATION OF CONFORMITY

Number: 10068C000

Name and address of the Manufacturer

Silvus Technologies, Inc.,
10990 Wilshire Blvd., Suite #1500
Los Angeles, CA 90024 U.S.A

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Object of the declaration

Product information

StreamCaster:
SC4240-235-BB, SC4240-235-EB,
SC4240EP-235-BB, SC4240EP-235-EB
SC4480-235-SBST, SC4480E-235-SBST

Additional information

SC4240-235: 4W, 9-20V dc, 24W (6.8 Ah Battery)
SC4480-235 8W, 9-20V dc, 43W (6.8 Ah Battery)

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

- References to the relevant harmonised standards used or references to the technical specifications in relation to which conformity is declared

| | | |
|---|--|---------------------------|
| Radio Equipment Directive 2014/53/EU | | RoHS Directive 2011/65/EU |
| EN 301 489-1 V2.1.1 EN 301 489-28 V1.1.1 EN 302 064 V2.1.1 EN 62368-1 EN 62311:2008 | | EN 50581:2012 |

The notified body

Name: Nemko
Number: 0470

performed

• a conformity assessment of the technical construction file

and issued the certificate

047-RED-182301

Additional information

| |
|-----|
| N/A |
|-----|

Signed for and on behalf of: Company Name

Authorised Representative:



Name and Surname / Function:

Weijun Zhu, Vice President of Engineering

Date of issue: 2/11/2025

9. ISED Canada Notice

9.1 IC: 24980-SC42E245

Silvus model #: SC4210E-245-EB. Note that the SC4210E is a subset of the generic SC4200E, the "1" in the model # indicates it is a 1-watt maximum output power product or if lower the limits found by the ISED testing.

Equipment Class: Digital Transmission System

The following parameters must be used to be compliant to the appropriate ISED requirements:

Antennas: 2.1dBi Omni Antennas (Silvus AOV2D230515) & 4dBi Omni Antennas (Silvus AOV4S235)

Bandwidth: 10MHz

Maximum 10MHz Bandwidth Output Power @ Frequency #1: 789.84mW @ 2430MHz

Maximum 10MHz Bandwidth Output Power @ Frequency #2: 790.06mW @ 2440MHz

Bandwidth: 20MHz

Maximum 20MHz Bandwidth Output Power @ Frequency #1: 123.82mW @ 2440MHz

Modulation and Coding Schemes tested: MCS0 to MCS15

9.2 Software License

A Software License is used to ensure only parameters and limits that are allowed by the ISED certificate shown in section 15.1 can be selected. These parameters include Frequency, Output Power, Modulation and Bandwidth.

9.3 Firmware Encryption

The details of our Firmware Encryption are considered proprietary and are discussed in depth in the submitted document SC4210E-245 Circuit Description v1.2 section 1.5. Also described is the method to ensure only Silvus released firmware and Software License can be loaded on the product. This will ensure only the parameters and limits that are allowed by the Industry Canada certificate shown in section 15.1 can be selected.

9.4 IC Statement: English

This radio transmitter SC24980-SC4210E245 has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

1. Omnidirectional antenna, Silvus P/N A0VD230515, maximum antenna gain 2.1 dBi, 50 ohm
2. Omnidirectional antenna, Silvus P/N A0V4S235, maximum antenna gain 4dBi, 50 ohm

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- (1) *This device may not cause interference.*
- (2) *This device must accept any interference, including interference that may cause undesired operation of the device.*

9.5 IC Statement: French

Le présent émetteur radio [identifier le dispositif par son numéro de certification d'ISED] a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué, pour tout type figurant sur la liste, sont strictement interdits pour l'exploitation de l'émetteur.

1. Omnidirectional d'onde, Silvus P/N A0VD230515, le gain max 2.1 dBi, 50 ohm
2. Omnidirectional d'onde, Silvus P/N A0V4S235, le gain max 4 dBi, 50 ohm

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR Innovation, Sciences et Développement économique 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;*
- (2) *L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.*

9.6 Radiation Exposure Statement: English

Radiation Exposure Statement:

This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 32 cm between the radiator and your body.

9.7 Radiation Exposure Statement: French

Déclaration d'exposition aux radiations

Cet équipement est conforme aux limites d'exposition aux rayonnements ISED établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 32 cm de distance entre la source de rayonnement et votre corps.

10. MIC Japan Notice

10.1 ID: 211-210701

Silvus model #: SC4210P-245-O. Note that the SC4210P is a subset of the generic SC4200P, the "1" in the model # indicates it is a 1-watt maximum output power product or if lower the limits found by the MIC testing.

Equipment Class: 2.4GHz Band for Unmanned Mobile Image Transfer System

The following parameters must be used to be compliant to the appropriate MIC requirements:

Antennas:

3dBi Omni Antennas (Silvus ABV3S235)

2.15dBi Omni Antennas (C-Astral OMNI2G4)

3dBi Omni Antennas (Silvus AO2D3S235F-SF)

3dBi Omni Antennas (Silvus AOM3S240F-SF)

1dBi Omni Antennas (Silvus AOV2D235515S-TM)

Bandwidth: 4.5MHz

Maximum 4.5MHz Bandwidth Output Power @ Frequency #1: 910mW @ 2486MHz

Maximum 4.5MHz Bandwidth Output Power @ Frequency #2: 870mW @ 2491MHz

Bandwidth: 9MHz

Maximum 9MHz Bandwidth Output Power @ Frequency #1: 880mW @ 2489MHz

Modulation and Coding Schemes tested: MCS0 to MCS15

10.2 ID: 011-210045

Silvus model #: SC4210P-576-O. Note that the SC4210P is a subset of the generic SC4200P, the "1" in the model # indicates it is a 1-watt maximum output power product or if lower the limits found by the MIC testing.

Equipment Class: 5.7GHz Band for Unmanned Mobile Image Transmission System

The following parameters must be used to be compliant to the appropriate MIC requirements:

Antennas:

2.3dBi Omni Antennas (Silvus AOV2D235515S-TM, also Southwest Antenna 1001-253)

2.15dBi Omni Antennas (Silvus AOV2S520G-TM, also Southwest Antenna 1001-128)

2.15dBi Omni Antennas (C-Astral OMNI5G7)

3dBi Omni Antennas (Silvus AO2D3S)

3dBi Omni Antennas (Silvus AOV3T245515575-TM, also L-Com HG2458RD-TM)

Bandwidth: 4.5MHz

Maximum 4.5MHz Bandwidth Output Power @ Frequency Low: 29.78dBm @ 5625.5MHz

Maximum 4.5MHz Bandwidth Output Power @ Frequency Mid: 29.8dBm @ 5702.5MHz

Maximum 4.5MHz Bandwidth Output Power @ Frequency High: 29.76dBm @ 5752.5MHz

Bandwidth: 9MHz

Maximum 9MHz Bandwidth Output Power @ Frequency Low: 29.72dBm @ 5655MHz

Maximum 9MHz Bandwidth Output Power @ Frequency Mid: 29.82dBm @ 5695MHz

Maximum 9MHz Bandwidth Output Power @ Frequency Low: 29.82dBm @ 5750MHz

Bandwidth: 19.7MHz

Maximum 19.7MHz Bandwidth Output Power @ Frequency Low: 29.6dBm @ 5660MHz

Maximum 19.7MHz Bandwidth Output Power @ Frequency Mid: 29.74dBm @ 5700MHz

Maximum 19.7MHz Bandwidth Output Power @ Frequency High: 29.66dBm @ 5745MHz

Modulation and Coding Schemes tested: MCS0 to MCS15

10.3 Software License

A Software License is used to ensure only parameters and limits that are allowed by the MIC certificates shown in sections 16.1 & 16.2 can be selected. These parameters include Frequency, Output Power, Modulation and Bandwidth.

10.4 Firmware Encryption

The details of our Firmware Encryption are considered proprietary and are discussed in depth in the submitted document SC4210P-576-O Circuit Description v1.3 section 1.5. Also described is the method to ensure only Silvus released firmware and Software License can be loaded on the product. This will ensure only the parameters and limits that are allowed by the MIC certificate shown in section 16.1 & 16.2 can be selected.

11. UKCA Markings

11.1 (-139 Models)



The following Silvus Technologies models are declared to conform to UKCA Mark requirements:

Silvus P/N: SC4240EP-139-BB, SC4240EP-139-EB, SC4480E-139-SBST

Relevant standards:

- EN 302 064 V2.1.1, Wireless Video Links, Harmonized Standard
- EN 301 489-1 V2.2.0, EMC, Common Technical Requirements
- EN 301 489-28 V1.1.1, EMC, Specific conditions for wireless digital video links
- EN 62368-1, Product Safety Standard

Frequency range: 1350-1440 MHz

Maximum RF power: 2W per channel, up to a maximum EIRP of 4 watts for the SC4240EP-139-BB, SC4240EP-139-EB and 8 watts for the SC4480E-139-SBST

Antenna: 2.1dBi Omni Antennas (AOV2S192)

Cable: Silvus cable assembly (SC22-PRICBL02-6)

External Bandpass Filter: Microwave Filter Co. model 3813 (a filter of equivalent performance may also be used, contact Silvus Technologies customer support for more information)

AC Adapter (if used): EDAC Power Electronics EA10523C-120 (this adapter is approved for indoor use only) (this adapter was certified by the manufacturer to IEC 60950-1)

External DC supply: If the customer provides DC power from their own source, the supply should be fused for a 5-amp circuit.

Safe Working Distance:

Maintain safe working distance of minimum 20cm. For more details, refer to TUV report no.

7217985B, "Radio Frequency Exposure Verification of the Silvus Technologies Inc. StreamCaster

SC4240EP-139 and SC4480E-139 Tactical MIMO Radio EN 62311 January 2008" (copy of report available upon request). The UKCA Mark Technical File is available upon request for inspection.

To satisfy RF exposure requirements, this device and its antennas must operate with a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter, except in accordance with RF Exposure requirements.

See restrictions mentioned in ERC Recommendation 25-10, Table 7-C2, for guidance of restrictions applicable to specific countries.

Table 7-C2: additional information regarding the national conditions for the identified tuning ranges for video PMSE applications - Band C2

| Frequency Band | Country | Implementation | Conditions/remarks |
|------------------|---------|----------------|---|
| C2 2025-2110 MHz | AUT | L [†] | Max. 10MHz Channels, max. 20dBW eirp; 2070-2090 MHz: Restricted to Broadcasters only; 2090-2110 MHz: Restricted to fire brigades and private users |
| | AZE | Y* | On a secondary basis |
| | BIH | L | PBS old MW link systems for PMSE. Military use in 2025-2110 MHz |
| | BUL | Y | ECC Report 219. Available for Cordless Cameras, Portable video links and Mobile video links |
| | CZE | Y* | The band may be used in the coordination with the Ministry of Defence of the Czech Republic. https://www.ctu.cz/sites/default/files/obsah/o_ctu/rsup-p_06_09-2014-07_en_.pdf , new version is available only in czech https://www.ctu.cz/sites/default/files/obsah/ctu/vyza-k-uplatneni-pripominek-k-navrh-uopatrene-obecne-povahy-casti-plunu-vyuze-radioveho-spektra-c-pv-p/6/xx.2017-yy-pro-kmitoctove-pasme-1900-2200-mhz/obrazky/pv-p6-2017.pdf |
| | D | N | Deviations from the specifications in the Frequency Plan (FreqP) could be permitted for a limited time in accordance with §58 TKG. This is provided that the frequency usages indicated in the Frequency Ordinance (FreqV) and the Frequency Plan are not adversely affected (for more details see: https://www.bundesnetzagentur.de/cn_1412/DE/Sachgebiete/Telekommunikation/Unternehmen/Frequenzen/SpezielleAnwendungen/Kurzzeitzuweisungen/kurzzeitzuweisungen-node.html) |
| | DNK | Y* | |
| | E | N | Band not available |
| | EST | L* | 2075.25-2110 MHz SAP/SAB. See Regulation of Ministry of Communication and Economical Affairs 21.05.2013 No 35. Otherwise governmental use. |
| | F | L [†] | Temporary licenses, e.i.r.p. max = 10 dBW. Use of 10 MHz bandwidth centered on 2055 MHz and 2095 MHz for ground-to-ground link and 10 MHz bandwidth centered on 2085 MHz and 2105 MHz for air-to-ground link. Coordination required between assigning authorities (la Défense and Space) regarding the use of the other available bands in order to avoid harmful interference. ARCEP Decision 2016-1130 |
| | FIN | L [†] | Cordless cameras, temporary use on a case- by-case basis. Standard EN 302064. Other use includes military use and space operation |
| | G | Y [†] | Technology and application neutral but typically used for wireless cameras, typically licensed at 100 mW e.r.p. |
| | GEO | L* | |
| | GRC | L [†] | Cordless Cameras. Portable/Mobile video links. 2087.5- 2108.5 MHz : not available (exclusive use by security services) |
| | HNG | N | Band not available (governmental use). However, the band may be used for short-term PMSE use if the user demand makes it necessary at certain occasions like main events. In this case the authority handles the requests on a case-by-case basis and if the frequency use can be authorised the users receive an individual license |
| | HOL | L* | 2070-2110 MHz for ENG OB only |

Possible implementation status: Y = the whole band is available for PMSE L = Limited availability N = the band is not available for PMSE * - Individual licence may be required † - restrictions apply (e.g. geographical restrictions)

Table 39 Additional Restrictions on Band C2

Annex A UK DECLARATION OF CONFORMITY

NOTE – THIS IS NOT A TEMPLATE. It is the responsibility of the manufacturer and / or the authorised representative to produce the Declaration of Conformity with suitable content. This is purely for consideration of what should be included and should not be used as a template. Other UK regulations if applicable may be additionally required on the Declaration of Conformity or Declaration of Conformity dossier.

We, **Silvus Technologies Inc.**

(Manufacturer's name)

Of

10990 Wilshire Blvd, Los Angeles, CA 90024

(Address)

Declare under our sole responsibility that the product:

**StreamCaster:
SC4240EP-139-BB, SC4240EP-139-EB, SC4480E-139-SBST**

(Detailed description of product including batch or serial number, name, type, model, and, where necessary, a colour image; where applicable a description of accessories and components, and software, which allow the radio equipment to operate as intended and covered by the declaration of conformity)

to which this declaration relates, is in conformity with the following designated standards and/or technical specifications

(References to standards/specifications must be listed with their identification number and version and, where applicable, date of issue)

Regulation 6(1)(a) [Health & Safety]: EN 62368-1:2014, EN 62311:2008

Regulation 6(1)(b) [EMC]: EN 301 489-1 V2.2.0 , EN 301 489 -28 V1.1.1

Regulation 6(2) [Spectrum Usage]: EN 302 064 V2.1.1

Regulation 6A [Additional essential requirements]:

We hereby declare that the above-named product is in conformity to the requirements of the Radio Equipment Regulations 2017 with the involvement of the following UK Market Conformity Assessment Body under Schedule 3 Module B of the Regulation.*(Where the Certification Body Type Examination Certificate / involvement is only for limited Regulations, i.e. Regulation 6(2) only this should be explicitly stated here)*:

TUV SUD America Inc, 401 Edgewater Place #500, Wakefield, MA, 01880, USA

Approved Body:

1929

Type Examination
Certificate No:

**UKCB2 002138
0006 Rev. 00**

The technical documentation relevant to the above equipment will be held at:
Silvus Technologies Inc. 10990 Wilshire Blvd, Los Angeles, CA 90024

(Name and address of the UK Authorised Representative, if applicable and formally appointed by the manufacturer)

11/17/2023

(Signature of authorised person)
Grant Denoon

(Date)
San Diego, CA, USA

(Name of authorised person)
Director of RF Engineering

(Place of issue; e.g. City/town, and Country)

(Job title)

11.2 (-235467 Models)



The following Silvus Technologies models are declared to conform to UKCA Mark requirements:

Silvus P/N: SC4240EP-235467-BB, SC4240EP-235467-EB, SC4480E-235467-SBST

Relevant standards:

- EN 302 064 V2.1.1, Wireless Video Links, Harmonized Standard
- EN 301 489-1 V2.2.0, EMC, Common Technical Requirements
- EN 301 489-28 V1.1.1, EMC, Specific conditions for wireless digital video links
- EN 62368-1, Product Safety Standard

Frequency range: S band (2200MHz to 2500MHz)
C-1 band (4400MHz to 4940MHz)

Maximum RF power: 2W per channel, up to a maximum EIRP of 4 watts for the SC4240EP-235467-BB, SC4240EP-235467-EB and 8 Watts for the SC4480E-235467-SBST

Antenna: 1.8-1.9dBi Dual Bands Omni Antennas (AOV2D235515G) Cable: Silvus cable assembly (SC22-PRICBL02-6)

External Bandpass Filter: Microwave Filter Co. model 3813 (a filter of equivalent performance may also be used, contact Silvus Technologies customer support for more information)

AC Adapter (if used): EDAC Power Electronics EA10523C-120 (this adapter is approved for indoor use only) (this adapter was certified by the manufacturer to IEC 60950-1)

External DC supply: If the customer provides DC power from their own source, the supply should be fused for a 5-amp circuit.

Safe Working Distance:

Maintain safe working distance of minimum 20cm. For more details, refer to TUV report no. 72171985D, "Radio Frequency Exposure Verification of the Silvus Technologies Inc. StreamCaster SC4240EP-235467 and SC4480E-235467 Tactical MIMO Radio EN 62311 January 2008" (copy of report available upon request). The UKCA Mark Technical File is available upon request for inspection.

To satisfy RF exposure requirements, this device and its antennas must operate with a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter, except in accordance with RF Exposure requirements.

See restrictions mentioned in ERC Recommendation 25-10, Table 7-C2, for guidance of restrictions applicable to specific countries.

Table 7-C2: additional information regarding the national conditions for the identified tuning ranges for video PMSE applications - Band C2

| Frequency Band | Country | Implementation | Conditions/remarks |
|------------------|---------|----------------|--|
| C2 2025-2110 MHz | AUT | L ¹ | Max. 10MHz Channels, max. 20dBW e.r.p; 2070-2090 MHz: Restricted to Broadcasters only. 2090-2110 MHz: Restricted to fire brigades and private users |
| | AZE | Y [*] | On a secondary basis |
| | BIH | L | PBS old MW link systems for PMSE. Military use in 2025-2110 MHz |
| | BUL | Y | ECC Report 219. Available for Cordless Cameras, Portable video links and Mobile video links |
| | CZE | Y [*] | The band may be used in the coordination with the Ministry of Defence of the Czech Republic: https://www.ctu.cz/sites/default/files/obsah/o-ctu/rup_p_06_09-2014_07_en_.pdf , new version is available only in czech: https://www.ctu.cz/sites/default/files/obsah/ctu/vyza-k-uplatneni-priponiek-k-nazvahu-opatreni-obecne-povahy-casti-planu-vyuze-radioveho-spektra-c-pv-pi/xx.2017-yy-pro-kmitoctove-pasmo-1900-2200-mhz/obrazky/pv-p6-2017.pdf |
| | D | N | Deviations from the specifications in the Frequency Plan (FreqP) could be permitted for a limited time in accordance with §58 TKG. This is provided that the frequency usages indicated in the Frequency Ordinance (FreqV) and the Frequency Plan are not adversely affected (for more details see: https://www.bundesnetzagentur.de/nn_1412/DE/Sachgebiete/Telekommunikation/Unternehmen_Institutionen/Frequenzen/SpezielleAnwendungen/Kurzzeitzuweisungen/kurzzeitzuweisungen-node.html .) |
| | DNK | Y [*] | |
| | E | N | Band not available |
| | EST | L [*] | 2075.25-2110 MHz SAP/SAB. See Regulation of Ministry of Communication and Economical Affairs 21.05.2013 No 35. Otherwise governmental use. |
| | F | L ¹ | Temporary licenses, e.i.r.p. max = 10 dBW. Use of 10 MHz bandwidth centered on 2055 MHz and 2095 MHz for ground-to-ground link and 10 MHz bandwidth centered on 2065 MHz and 2105 MHz for air-to-ground link. Coordination required between assigning authorities (la Défense and Space) regarding the use of the other available bands in order to avoid harmful interference. ARCEP Decision 2016-1130 |
| | FIN | L ¹ | Cordless cameras, temporary use on a case- by-case basis. Standard EN 302054. Other use includes military use and space operation |
| | G | Y ¹ | Technology and application neutral but typically used for wireless cameras. typically licensed at 100 mW e.r.p. |
| | GEO | L [*] | |
| | GRC | L ¹ | Cordless Cameras. Portable/Mobile video links. 2087.5- 2109.5 MHz : not available (exclusive use by security services) |
| | HNG | N | Band not available (governmental use). However, the band may be used for short-term PMSE use if the user demand makes it necessary at certain occasions like main events. In this case the authority handles the requests on a case-by-case basis and if the frequency use can be authorised the users receive an individual license |
| | HOL | L [*] | 2070-2110 MHz for ENG-OB only |

Possible implementation status: Y = the whole band is available for PMSE L = Limited availability N = the band is not available for PMSE * - Individual licence may be required 1 – restrictions apply (e.g. geographical restrictions)

Table 40 Additional Restrictions on Band C2

Annex A UK DECLARATION OF CONFORMITY

NOTE – THIS IS NOT A TEMPLATE. It is the responsibility of the manufacturer and / or the authorised representative to produce the Declaration of Conformity with suitable content. This is purely for consideration of what should be included and should not be used as a template. Other UK regulations if applicable may be additionally required on the Declaration of Conformity or Declaration of Conformity dossier.

We, **Silvus Technologies Inc.**

(Manufacturer's name)

Of

10990 Wilshire Blvd, Los Angeles, CA 90024

(Address)

Declare under our sole responsibility that the product:

StreamCaster:

SC4240EP-235467-BB, SC4240EP-235467-EB, SC4480E-235467-SBST

(Detailed description of product including batch or serial number, name, type, model, and, where necessary, a colour image; where applicable a description of accessories and components, and software, which allow the radio equipment to operate as intended and covered by the declaration of conformity)

to which this declaration relates, is in conformity with the following designated standards and/or technical specifications

(References to standards/specifications must be listed with their identification number and version and, where applicable, date of issue)

Regulation 6(1)(a) [Health & Safety]: EN 62368-1:2014, EN 62311:2008

Regulation 6(1)(b) [EMC]: EN 301 489-1 V2.2.0, EN 301 489 -28 V1.1.1

Regulation 6(2) [Spectrum Usage]: EN 302 064 V2.1.1

Regulation 6A [Additional essential requirements]:

We hereby declare that the above-named product is in conformity to the requirements of the Radio Equipment Regulations 2017 with the involvement of the following UK Market Conformity Assessment Body under Schedule 3 Module B of the Regulation. *(Where the Certification Body Type Examination Certificate / involvement is only for limited Regulations, i.e. Regulation 6(2) only this should be explicitly stated here)*

TUV SUD America Inc, 401 Edgewater Place #500, Wakefield, MA, 01880, USA

Approved Body:

1929

Type Examination
Certificate No:

**UKCB2 002138
0007 Rev. 00**

The technical documentation relevant to the above equipment will be held at:
Silvus Technologies Inc. 10990 Wilshire Blvd, Los Angeles, CA 90024

(Name and address of the UK Authorised Representative, if applicable and formally appointed by the manufacturer)

11/17/2023

(Signature of authorised person)
Grant Denoon

(Date)
San Diego, CA, USA

(Name of authorised person)
Director of RF Engineering

(Place of issue; e.g. City/town, and Country)

(Job title)