
 Cambium Networks™ 450m (Medusa) 3 GHz and DC-LPU power wiring	Document Number	cam-10189
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1 Introduction

This document is a brief introductory guide to the cable connections and polarities for the DC power cable to 450m (Medusa) 3 GHz.

The user guides describe in detail cable preparation and the use of EMC cable glands: to avoid repetition this is not included herein.

The 450m 3 GHz product user guide will contain a fuller description and takes precedence in the case of any discrepancy.

1.1 Background note

Many radios in Cambium Network's portfolio use power-over-Ethernet (PoE), supplied by a PoE injector (sometimes known as a midspan) over CAT5e cabling. This system cannot provide the higher power needed for the 450m 3 GHz radio. To support this increased power need, a higher power mains adapter plus a 4-wire (2-pair) cable of heavier gauge is used, together with appropriate connectors.

2 Components


Parts for the power wiring are listed below. Note that additional parts and equipment will be required for LPU (lightning protection unit) surge protection.

Cambium part no.	Description	Manufacturer	Notes
N000000L115A	Cable, 4-conductor 0.75 mm ² 100m	Lapp 1032126	
N000000L117A	Cable, 4-conductor 0.75 mm ² 300m	Lapp 1032126	
N000000L116A	Cable, 4-conductor 1.0 mm ² 100m	Lapp 1032131	Use thicker cable for long cable runs. See section 2.1.
N000000L118A	Cable, 4-conductor 1.0 mm ² 300m	Lapp 1032131	
N000000L123A	DC power connector kit, 18 AWG, 10 pcs (4-pin plugs plus crimp terminals)	Molex 39-03-9042 Molex 39-00-0428	Spares kit. Sufficient parts are included in the radio and LPU kits. For 0.75mm ² cables.
N000000L124A	DC power connector kit, 16 AWG, 10 pcs (4-pin plugs plus crimp terminals)	Molex 39-03-9042 Molex 39-00-0089	Spares kit. Sufficient parts are included in the radio and LPU kits. For 1.0 mm ² cables.
N000000T001A	Crimp tool	Molex 63819-0900	
N000000T002A	Crimp removal tool	Molex 11-03-0044	To rework connector errors
n/a	Terminal block, crimp connectors or similar	Installer choice	To connect the 4-wire cable to the DC power supply (section 3.2).
N000000L054B	mains power supply, 54 V, 240 W	Meanwell HLG-240H-54A	

Note: the recommended connector kits contain gold-plated contacts for best reliability. Tin-plated contacts are commonly available *but should not be used*.

2.1 Cable choice

Installers are recommended to use the cables listed above. Other cables may be used, but installers should note particular features offered by the listed cables:

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Feature	Advantage
4 wires arranged as two twisted pairs	Optimum signal propagation that may be required by future feature enhancements. Non-twisted pair cables are suitable for power-only applications.
Wires have individual colours	Easy wire identification. Cables with wires of the same colour will increase the likelihood of wiring errors.
Braided shield	Enhanced protection from lightning-induced surges. Cables with only a foil shield are not recommended.
Wide temperature range, -40°C/-50°C to +90°C	Resists cracking at low temperatures.
UV resistant outer sheath	Resists degradation in sunlight.

Two cable types are recommended, 0.75 mm² and 1.0 mm² cross-sectional area. The following table gives guidance on which to choose. *It assumes that the recommended power supply is used, trimmed up to 57 V as described in section 3.3.*


Auxiliary port PoE load (note 1)	Maximum cable length 0.75 mm ² cable	Maximum cable length 1.0 mm ² cable
No Auxiliary port PoE load	130 m	180 m
With Auxiliary port PoE load	110 m	150 m

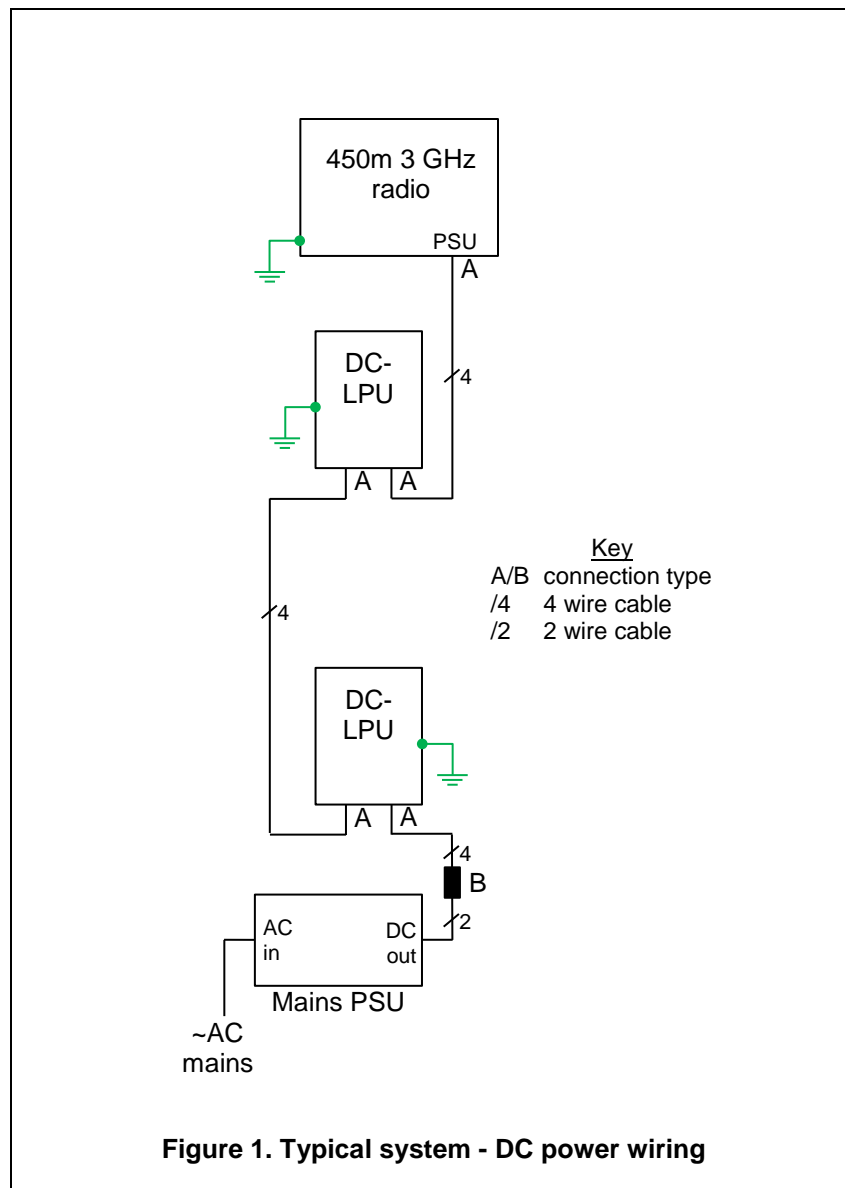
Note 1: this refers to a device wired to the 450m Auxiliary port that uses Power-over-Ethernet (PoE), such as a camera or WiFi access point.

Note 2: installers wishing to calculate the maximum cable length for other cables or cases may use the guidance in appendix 4.1.

3 Connections

A typical installation will include a mains power supply, DC-LPUs (lightning protection units) and the radio. This is shown for illustration in Figure 1 below. *Note that data cables are not shown. This document is not a substitute for the LPU installation guide; significant installation and grounding details are omitted for clarity.*

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In Figure 1 there are two types of connection:

- Type A – At the 450m 3 GHz radio and at the DC-LPUs: 4-wire cable to 4-pin plug.
- Type B – At the PSU: 4-wire cable to 2-wire cable.

These two types are described and illustrated in the following sections.

3.1 450m radio and DC-LPU connections (type A)

The recommended cable is connected as shown in Figure 2, using the parts in the 4-pin connector kits N000000L123A and N000000L124A. The plug body shown is for illustration, and may be either black or white in practice.

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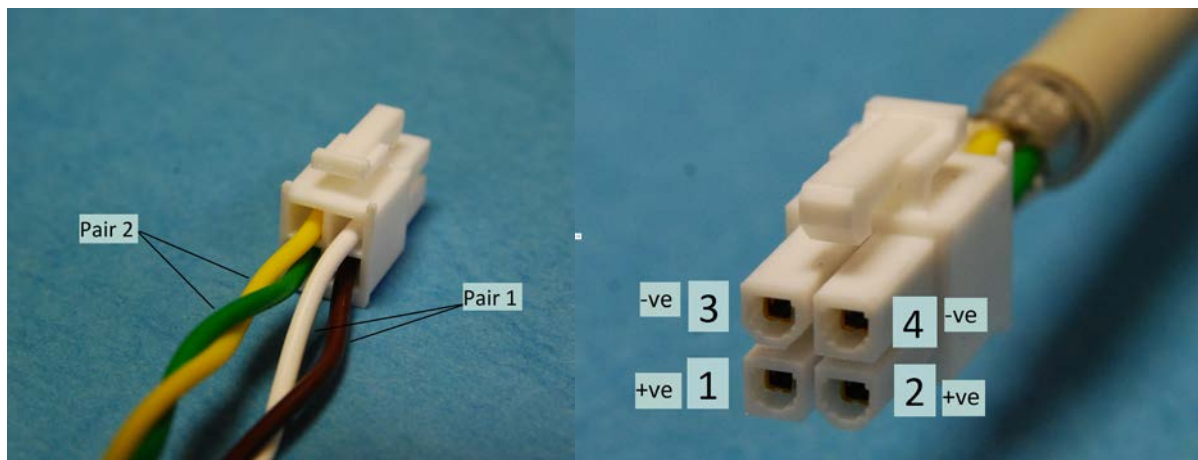


Figure 2. Cable to 450m/LPU wiring

Note the pin numbers, wire colours (when using the recommended cable) and power supply polarities that these represent:

Pin no.	Wire colour	DC polarity	Notes
1	Brown	Positive (+ve)	Negative pins are closest to the plug latch.
2	Green	Positive (+ve)	
3	White	Negative (-ve)	
4	Yellow	Negative (-ve)	

3.2 Power supply connection (type B)

Please review section 3.4 regarding cable testing before making the connections to the power supply.

The connection between the 4 wires of the drop cable and the 2 wires of the power supply are made as shown in Figure 3. Two examples are shown, using a terminal block and using crimps. Cambium Networks do not supply this connector, the installer should use any similar suitable means that fits the site installation practice.

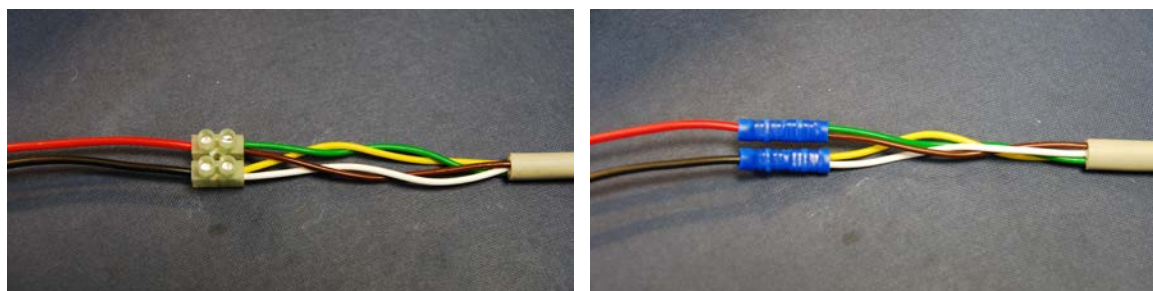



Figure 3. Cable to PSU wiring, terminal block (left), crimps (right)

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The wire colours (when using the recommended cable) and power supply polarities that these represent are:

450m wire colour	PSU wire colour	DC polarity	Notes
Brown	Red	Positive (+ve)	
Green		Positive (+ve)	
White	Black	Negative (-ve)	Negative wires are closest to the 450m plug latch.
Yellow		Negative (-ve)	

Important notes:

1. If the power supply wire strands have been consolidated with solder, then snip the soldered part off. Soldered strands *must not* be used in screwed or crimped connections.
2. When using a screw-terminal connector such as that shown on the left of Figure 3, make sure that the wire strands are protected from the terminal screw. Use a terminal block with wire protectors such as leaf springs, or a “rising cage” type, or fit crimp sleeves to the conductor strands.

3.3 Power supply

The recommended power supply from Meanwell has a default output voltage of about 54 V. It can be adjusted over a limited range using the trimmer under the black sealing bung labelled “Vo ADJ” on the top face. It is recommended, particularly for longer cable runs, or for installations with an Auxiliary port PoE load, to trim the output voltage up to between 57 V and 58 V. Gently prise the bung out, use a small screwdriver with a DMM (meter) to set the voltage, and replace the bung before use.


If a different power supply is used, it must be fitted with fold-back current limiting means such as a “hiccup” mode or fuse.

3.4 Testing

It is recommended that the wiring to the LPUs and radio is tested before making the connections to the power supply. Use a meter, ideally a DMM (digital multi-multimeter) with a diode test range, to check the following measurements. The LPUs and the radio must be connected, the power supply *must not* be connected.

Test no.	Meter positive	Meter negative	Reading	Notes
1	Pin 1 (brown)	Pin 2 (green)	8 ohms maximum	Proportionate to cable length
2	Pin 3 (white)	Pin 4 (yellow)		
3	Pins 1+2 (brown-green)	Pins 3+4 (white-yellow)	10 K (kohms) minimum or 2 V minimum	Ohms test range or Diode test range
4	Pin 3 (white)	Pin 1 (brown)	0.7 V typical	Diode test range (note)
5	Pin 4 (yellow)	Pin 2 (green)		
6	Pins 3+4 (white-yellow)	Pins 1+2 (brown-green)		

Note: the 450m 3 GHz radio includes a reverse-polarity protection diode wired across the supply. Tests 4, 5 & 6 sense this diode and help to confirm the correct wiring.

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4 Appendices

4.1 Cable calculations

Installers wishing to calculate cable lengths for other cables and situations may use the following guidance.

Minimum voltage at DC PSU	56 V
Minimum voltage at 450m radio	40 V
Peak current draw of 450m radio	4.0 A
Additional current required by Auxiliary PoE load	0.6 A
Maximum cable resistance, no PoE	$(56\text{ V} - 40\text{ V})/4.0\text{ A} = 4.0\text{ ohms}$
Maximum cable resistance, with PoE	$(56\text{ V} - 40\text{ V})/4.6\text{ A} = 3.5\text{ ohms}$

Allow for up to 16% increase in resistance at higher temperatures (0.4% per °C). The cable lengths in section 2.1 include this allowance, plus a margin for cable and radio variations to ensure reliable operation.

Document Revision History

Revision	Author	Change
000v001	Alex Kidger	First draft