

Keypad Bus Wiring Guide

Cable specifications

The following cable types can be used for wiring the Control4® keypad bus:

- Control system cable, such as Remee ZRE-6500426LTREM (available on the Dealer Portal), Belden 1502R or 1502P, or Liberty Cable LLINX-U (that utilizes one 18-gauge pair for power and one 22- or 24-gauge twisted pair for data).



Note: The use of Cat5e or Cat6 cable for bus wiring is not recommended. For installations that already have Cat5e/Cat6 cabling, see “Cat5e/Cat6 installations” later in this guide.

Bus Power Supply

The Control4 48V Bus Power Supply (C4-DIN-BPS48 48V) provides power for devices on the bus, including:

- Configurable Wired Keypads (C4-KCB and C4-SKCB)
- Dry Contact Input Modules (C4-DCIM)
- Bus Ethernet Gateway (C4-DIN-BEG-V2)
- Wireless Keypads (C4-KC120277 or KC240) in a mixed wired/wireless installation

The Bus Power Supply mounts on a standard 35 mm DIN rail, including the rail in the Control4 2-Slot or 5-Slot Panel, for a clean and simple installation. In a Control4 panel, the power supply occupies 1/2 slot space (3M) in the panel.

The C4-BPS48 power supply (discontinued) mounts in the Control4 2-Slot or 5-Slot Panel separately from the rail and does not occupy a slot space.

Maximum number of keypads per power supply

The table below shows the maximum number of keypads that can be used per power supply based on the wiring topology used. A complete description of each wiring topology can be found later in this document.

Wiring topology	Star topology		Daisy chain topology	
Wiring configuration	1 power supply	2 power supplies	1 power supply end of chain	2 power supplies middle of chain
Maximum # of wired keypads	40	80	40	80



Note: Wireless keypads count as 1.5 wired keypads. See the section “Mixing wired and wireless keypads”.

Note: Dry Contact Input Modules count as one wired keypad, but if the 12V output is being used, it counts as 1.5 wired keypads. See the section “Dry Contact Input Module.”

Wiring topologies

The Control4 bus may be wired using one of two topologies to install the wired or wireless keypads: star or daisy chain. Each of these topologies provides two to three ways to wire the keypads, and each topology limits the number of keypads allowed and the total bus cable length. The topology options are described and illustrated in the following sections.

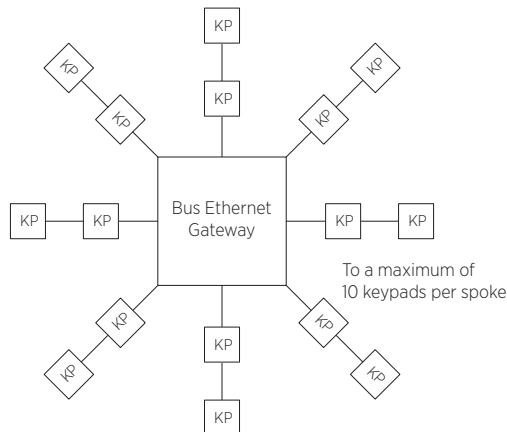
Star topology

The star topology wiring system (see Figure 1) is a cabling scheme in which all keypads connect to a central Bus Ethernet Gateway with a maximum of eight spokes of no more than 10 wired keypads per spoke.



Note: Do not home run each keypad.

Figure 1: Star topology with spokes



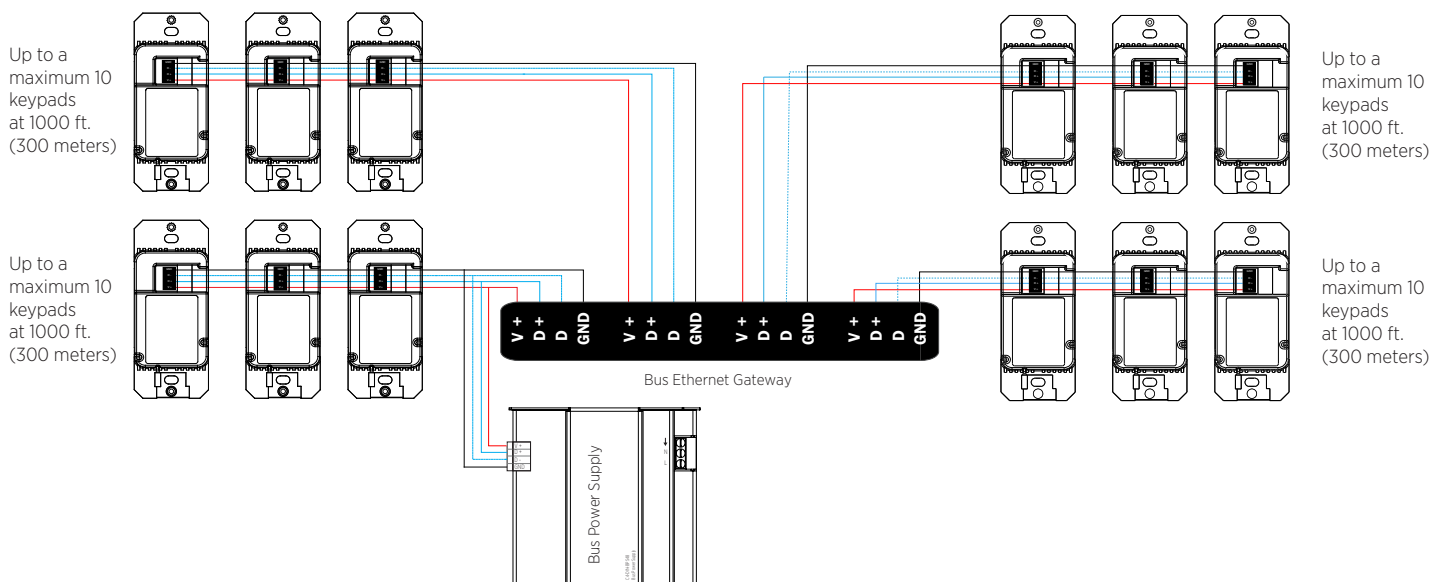
Star topology with one power supply

Figure 2 illustrates a star topology with the Bus Ethernet Gateway and a single Bus Power Supply at the center of the spoke. Wiring with this topology results in a maximum cable length of 4,000 feet (1,219 m) and a maximum of 40 wired keypads. Each spoke can be no more than 1,000 feet (304 m).



Important! Do not exceed 10 keypads per spoke or eight spokes per gateway.

Figure 2: Single power supply in a star topology



Star topology with two power supplies

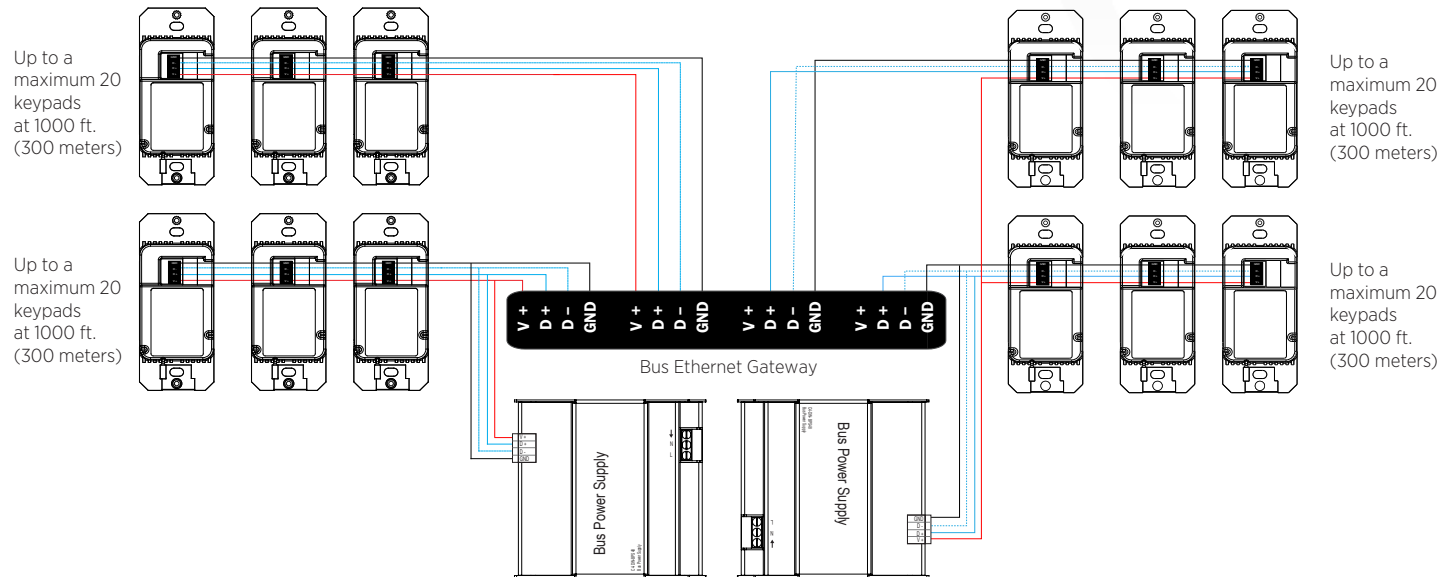
Figure 3 illustrates a star topology with the Bus Ethernet Gateway and two Bus Power Supplies at the center of each spoke. Wiring with this topology results in a maximum cable length of 4,000 feet (1,219 m) and up to 80 wired keypads. Each spoke can be no more than 1,000 feet (304 m).



Important!

- Do not exceed 10 wired keypads per spoke or eight spokes per Bus Ethernet Gateway.
- Connect only +48V from one of the two Bus Power Supplies to the Bus Ethernet Gateway.
- Make sure the GND from both Bus Power Supplies connects to the GND on the Bus Ethernet Gateway.

Figure 3: Two Power Supplies in a Star Topology



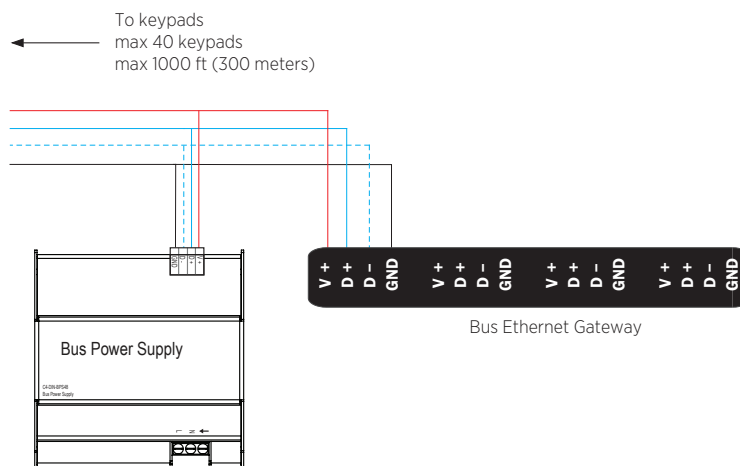
Daisy chain topology

The Control4 daisy chain topology wiring system is a cabling scheme in which the keypads and the Bus Ethernet Gateway are connected together in a single chain. The maximum number of keypads on the chain depends upon the location of the Bus Ethernet Gateway and Bus Power Supply in the chain as well as the number of Bus Power Supplies installed.

Daisy chain topology with gateway and single power supply at the beginning of the chain

Figure 4 illustrates a chain topology showing the Bus Ethernet Gateway and Bus Power Supply at the beginning of the chain. This topology allows for a maximum of 40 wired keypads and a maximum total bus length of 1,000 feet (304 m).

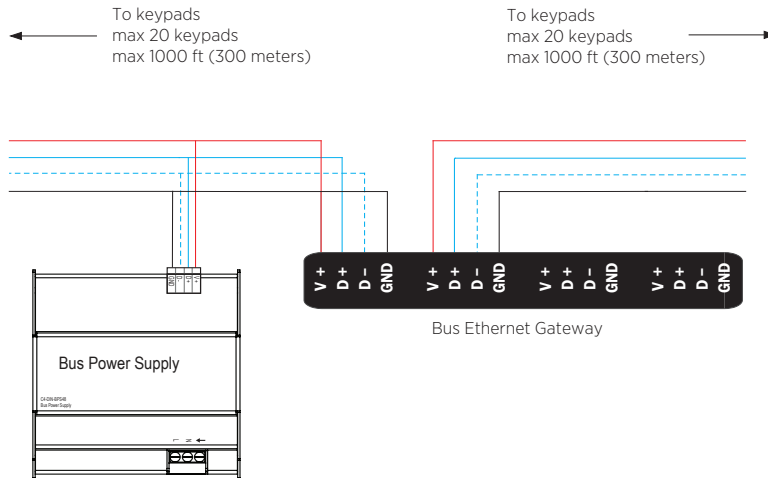
Figure 4: Chain with gateway and power supply at beginning of chain



Daisy chain topology with gateway and single power supply in the middle of the chain

Figure 5 illustrates a chain with the Bus Ethernet Gateway and Bus Power Supply centrally located between the chains. Wiring with this topology allows for a maximum of 40 keypads (20 maximum per chain) and cable length to 2,000 feet (600 m) of cable on the bus (1,000 feet/300 m maximum per chain).

Figure 5: Chain with gateway and power supply in middle of chain



Daisy chain topology with gateway and two power supplies in the middle of the chain

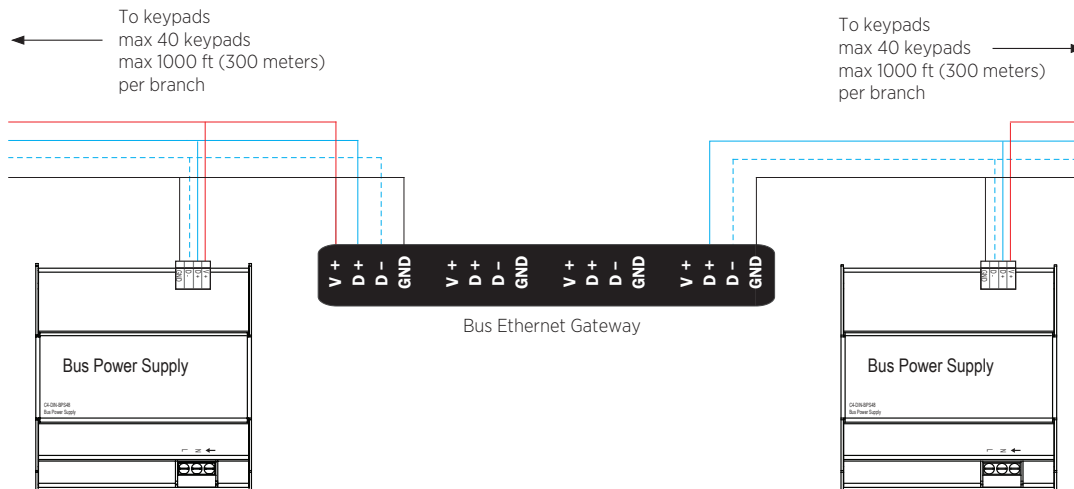
Figure 6 illustrates a chain with the Bus Ethernet Gateway and two Bus Power Supplies centrally located between the chains. Wiring in this topology results in a maximum of 80 wired keypads (40 maximum in each direction) and 2,000 feet (600 m) of cable on the bus (1,000 feet/300 m in each direction).



Important!

- Connect only +48V from one of the two Bus Power Supplies to the Bus Ethernet Gateway.
- Make sure the GND from both Bus Power Supplies connects to the GND on the Bus Ethernet Gateway.

Fig 6: Chain with gateway and two power supplies in middle of chain



Mixing wired and wireless keypads

In many instances, it may be desirable to mix both wired and wireless keypads in an installation in order to provide for a good ZigBee® mesh. We recommend using a wired keypad at the main entrance to each room in order to take advantage of the fallback capabilities. Additional keypads in the room can then be either wired or wireless as needed.

It is possible to power the wireless keypads using the same 48V Bus Power Supply that is being used to power the wired keypads. When mixing wired and wireless keypads together in any of the above topologies, count each wireless keypad as the equivalent of 1.5 wired keypads when determining the total number of keypads that can be powered by a Bus Power Supply. For example, a single power supply in the star topology can power up to 40 wired keypads or a mixture of 20 wired keypads and 13 wireless keypads.

Dry Contact Input Module

The 4-Channel Bus Dry Contact Input Module allows third-party switches to trigger events in the Control4 system.

When using Dry Contact Input Modules (DCIM) on the bus, each DCIM should be counted as the equivalent of one wired keypad. If the 12V output on a DCIM is being used, that DCIM must be counted as the equivalent of 1.5 wired keypads. For example, if a bus has 10 wired keypads, 10 DCIMs without the 12V output used, and 10 DCIMs with the 12V output used, that is the equivalent of 35 wired keypads.

Cat5e/Cat6 installations

As noted above, Cat5e and Cat6 are not recommended for new installations. For systems that were already prewired using Cat5e or Cat6, please carefully follow the wiring instructions below.

Terminal	Wire	Color
GND	3 × wire	Orange white + Green white + Brown white
D+	1 × wire	Blue
D-	1 × wire	Blue white
+48/24VDC	3 × wire	Orange + Green + Brown

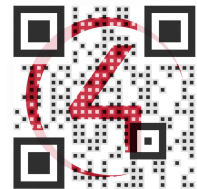
The three wires each for +48V and GND must be carefully twisted together to ensure a good connection and to prevent power issues along the bus.

- Strip each wire approximately 0.75" (1.5 cm), and then use a pair of pliers to tightly twist the wires together. Do not twist by hand.
- After the three wires have been thoroughly twisted together, cut the twisted section down slightly to fit appropriately in the connector.

More help

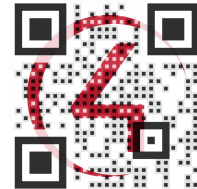
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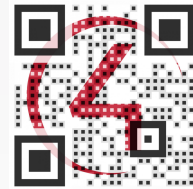
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