Reelceiver User Guide

Overview

A reelceiver is a compact, cost-effective, plug-and-play active RFID transceiver. Reelceivers are connected in a daisy-chain configuration using ubiquitous Cat5e cables with RJ-45 plugs[1] to form a "reel". Both power and communications are carried via this single cable. This user guide explains the procedure for creating a "reel" of reelceivers to establish a sensor network. The data collected and distributed by this sensor network is handled in software which is described in a separate document[2].

Disclaimer

Reelceivers are electrically powered network devices. Despite built-in protections, improper handling, installation and operation of reelceivers may result in an electrical fault, such as a short, which could lead to fire. Only qualified persons may install reelceivers and connect them in their "reel" configuration. Furthermore, all handling and operating precautions should be observed at all times.

> **!** *Only qualified persons, such as professional network installers, may install reelceivers and connect them in a "reel" configuration.*

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[1] **These are commonly known as Ethernet cables, however we avoid this misnomer as reelceivers employ a proprietary protocol.**

[2] **See the barnowl middleware package for Node.js:**
`https://www.npmjs.org/package/barnowl`

Creating a "Reel"

A "reel" is a daisy chain of reelceivers. It allows multiple reelceivers to share power and data connectivity over a single, ubiquitous cable. To create a reel, simply connect reelceivers via standard Cat5e cables with RJ-45 plugs as in the image below. The correct orientation of each reelceiver must be observed to ensure data connectivity throughout the reel: the arrow pointing "Towards Hub" must point toward the cable which leads towards the hub (source of power and network connectivity).

Cable Length

There is no specific limitation on the length of cable between two reelceivers so long as the power voltage at the reelceiver furthest from the hub is at least 5VDC. See the "Connecting to Power and Data" section for details.

Number of Reelceivers

A single "reel" can theoretically support over 250 reelceivers, however, the practical limit is significantly reduced due to the requirement that the power voltage at the reelceiver furthest from the hub is at least 5VDC. See the "Connecting to Power and Data" section for details.

Types of Reelceivers

A "reel" can support a heterogeneous mix of reelceiver types. In other words, different reelceiver models may coexist on a "reel" without limitation on their order.

Reelceiver Orientation

The correct orientation of each reelceiver must be observed, as described above. Reelceivers are nonetheless designed to fail safe if operated in the reverse orientation: only the data connection is interrupted under this condition.

Connecting to Power & Data

A "reel" connects to power and a data sink/source via the Cat5e cable of the reelceiver closest to the hub. The Cat5e cable consists of four twisted pairs of cable, coloured blue, brown, orange and green, as illustrated below.

The following table indicates the assignment for each colour pair:

Colour	Assignment
Blue	Positive voltage
Brown	Ground
Orange	Balanced data from reel to hub
Green	Balanced data from hub to reel

The pin assignments for each wire respect the **EIA 568B** standard which is provided in the following table for reference. These assignments must be respected for correct and safe operation of the "reel".

Pin	Wire Colour		Pin	Wire Colour
1	White/Orange		5	White/Blue
2	Orange		6	Green
3	White/Green		7	White/Brown
4	Blue		8	Brown

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Power

Both wires of the blue pair must be connected to a positive voltage source with an output between 5VDC and 45VDC with respect to ground (as provided on the brown pair).

Both wires of the brown pair must be connected to ground.

> **!** *It is the user's responsibility to ensure that the maximum current limit of the cables is respected for the given combination of "reel" and power supply.*

Local laws may prescribe additional restrictions on power transmission over cables. These may include voltage, current and cable length, among other limitations. It is the user's responsibility to ensure that all local laws are respected in the installation and operation of "reels".

Data

The data pairs are carriers for balanced serial communication respecting the RS-422 protocol. In the case of each data pair (orange and green), the <u>solid</u> coloured wire represents the *negative* data signal polarity and the <u>white-dashed</u> wire represents the *positive* signal polarity.

The following table specifies the serial communication parameters:

Parameter	Value
Data rate	230400bps
Data bits	8
Parity	None (N)
Stop bits	1

The data interface with a "reel" is provided by a reelyActive middleware package named barnowl. Consult the barnowl documentation and download a free copy via the following link:

https://www.npmjs.org/package/barnowl

Precautions

Operation

!	*DO NOT operate reelceivers with their enclosures removed or modified. This may result in malfunction or short leading to fire.*

!	*DO NOT operate reelceivers in damp environments susceptible to water exposure. This may result in malfunction or short leading to fire.*

Handling

!	*DO NOT insert body parts inside the reelceiver connectors as these may contain sharp edges.*

Disposal

!	*Observe all local laws regarding the disposal of electronic components. Note that reelceivers may also be returned to reelyActive for recycling.*

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