

# USB 2.0 RG2304-LAN

4-Port USB 2.0 Ethernet LAN Extender System

## User Guide



←EXTREME→  
USB®

Thank you for purchasing the USB 2.0 RG2304-LAN.

Please read this guide thoroughly.

This document applies to Part Numbers: 01-00397, 01-00398, 01-00399, 01-00400, 02-00006, and 02-00007.

### **FCC Radio Frequency Interference Statement Warning**

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received including interference that may cause undesired operation.

### **CE Statement**

We declare under our sole responsibility that the RG2304-LAN, to which this declaration relates, is in conformity with European Standard EN 55022, EN 55024, EN 61000-3-2, and EN 61000-3-3.

### **IC Statement**

This Class B digital apparatus complies with Canadian ICES-003.

©2013 All rights reserved.  
Document #90-01056-A04

# Contents

<b>Introduction .....</b>	<b>3</b>
RG2304-LAN Product Contents .....	3
Features .....	3
The Local Extender .....	4
The Remote Extender .....	5
<b>Installation Guide .....</b>	<b>6</b>
Installing the RG2304-LAN System on a Local Area Network .....	6
Requirements .....	6
Preparing your Network .....	6
Preparing Your Site .....	7
Installing the Local Extender .....	7
Installing the Remote Extender .....	7
Installing the RG2304-LAN System as Direct Connect.....	8
Requirements .....	8
Preparing Your Site .....	8
Installing the Local Extender .....	9
Connecting the Local Extender to the Remote Extender .....	9
Installing the Remote Extender .....	9
Checking the Installation .....	10
Connecting a USB Device.....	11
Pairing the Local and Remote Extender.....	11
Unpairing an Extender .....	11
Compatibility .....	11
<b>Troubleshooting .....</b>	<b>12</b>
<b>Technical Glossary .....</b>	<b>14</b>
<b>Specifications.....</b>	<b>15</b>

## Introduction

This guide provides product information for the RG2304-LAN, installation instructions, troubleshooting guidelines, and instructions for contacting Icron regarding technical support and warranty information.

The instructions in this guide assume a general knowledge of computer installation procedures, familiarity with cabling requirements, and some understanding of USB devices.

 **NOTE:** Notes provide additional information that could be useful.

 **CAUTION:** Cautions provide important information about an operational requirement.

## RG2304-LAN Product Contents

Your RG2304-LAN is packaged with:


- Local Extender
- Remote Extender
- USB 2.0 Cable
- Remote Extender AC International Power Adapter
- Country Specific Power Cable
- Quick Start Guide

## Features


The RG2304-LAN incorporates ExtremeUSB® technology, enabling users to extend USB beyond the standard 5m cable limit for USB 2.0 peripheral devices. The RG2304-LAN has the following key features:

- 100m of extension when directly connected over Cat 5e
- USB extension over a Local Area Network (LAN)
- Support for new USB 3.0 host controllers and devices
- Support for bulk and HID type devices (storage and mouse/keyboard types)

 USB 3.0 devices will perform at USB 2.0 speeds if extended through the RG2304-LAN.

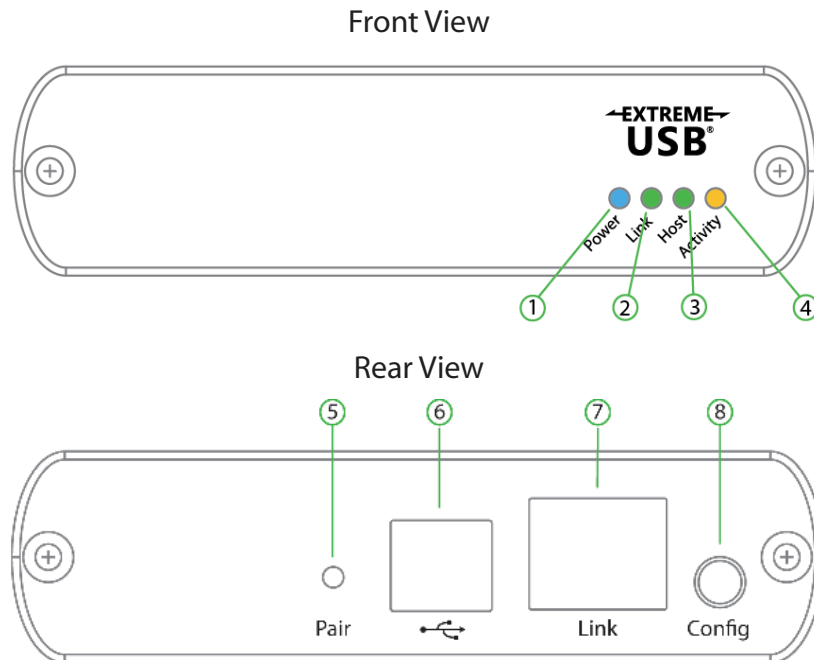
 The RG2304-LAN does not support isochronous devices. Examples of isochronous devices are most webcams, audio devices, and some “composite” devices that combine functionality, such as enhanced keyboards that handle audio.

The RG2304-LAN extender system is composed of two individual units: the Local Extender and the Remote Extender.

 All references to Cat 5e cable in this document represent the minimum requirement. Category 6 or better and/or STP cable may be substituted.

## The Local Extender

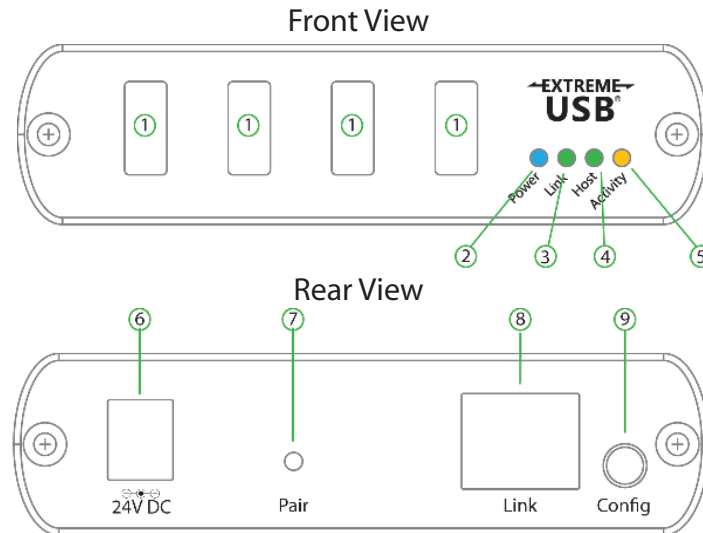
The Local Extender connects to the computer using a standard USB 2.0 cable. Power for this extender is provided by the the host computer.



ITEM	TYPE	DESCRIPTION
1	Power LED (Blue)	LED turns on when power is supplied, off when no power is supplied by the Host computer.
2	Link LED (Green)	Indicates a valid ExtremeUSB link is established between the Local and Remote Extenders. The LED turns on when link between Local and Remote Extender is established and off when there is no link between Local and Remote Extenders. Fast blinking indicates the extender is in Pairing mode, slow blinking indicates the unit is attempting to establish a link.
3	Host LED (Green)	Indicates that the RG2304-LAN system is properly enumerated on the host computer. The LED blinks when the RG2304-LAN is in a suspended state.
4	Activity LED (Amber)	Indicates data transmission is occurring between Local and Remote Extender. LED blinks intermittently with or without a USB device connected. When the Local and Remote Extenders are in suspend mode, the LED is off.
5	Pair	Used to establish a paired connection between Local and Remote Extenders.
6	USB Host Port	Used to connect the Local Extender unit to the host computer. Accepts Type B connector into the Local Extender unit.
7	Link Port (RJ45)	Accepts RJ45 connector for Cat 5e cabling (or better) to connect the Local Extender unit to the Remote Extender unit.
8	Config	Reserved for manufacturer use.

## The Remote Extender

The Remote Extender provides USB Type A ports for standard USB devices. The Remote Extender allows you to connect up to four USB devices directly. Additional devices may be connected by attaching USB hubs to the Remote Extender. The Remote Extender is powered by an external AC adapter and can supply up to 500mA to each USB port.



ITEM	TYPE	DESCRIPTION
1	USB Device Ports	Accepts USB device(s) using Type A connectors.
2	Power LED (Blue)	LED turns on when power is supplied, off when no power is supplied.
3	Link LED (Green)	Indicates a valid ExtremeUSB link is established between the Local and Remote Extenders. The LED turns on when link between Local and Remote Extenders is established and off when there is no link between Local and Remote Extenders. Fast blinking indicates the unit is in Pairing mode, slow blinking indicates the extender is attempting to establish a link.
4	Host LED (Green)	Indicates that the RG2304-LAN system is properly enumerated on the host computer. The LED blinks when the RG2304-LAN is in a suspended state.
5	Activity LED (Amber)	Indicates data transmission is occurring between Local and Remote Extenders. LED blinks intermittently with or without a USB device connected. When the Local and Remote Extenders are in suspend mode, the LED is off.
6	Power Port	Connects to the AC power supply. Required at the Remote Extender for proper operation.
7	Pair	Used to establish a paired connection between Local and Remote Extenders.
8	Link Port (RJ45)	Accepts RJ45 connector for Cat 5e cabling (or better) to connect the Local Extender to the Remote Extender.
9	Config	Reserved for manufacturer use.

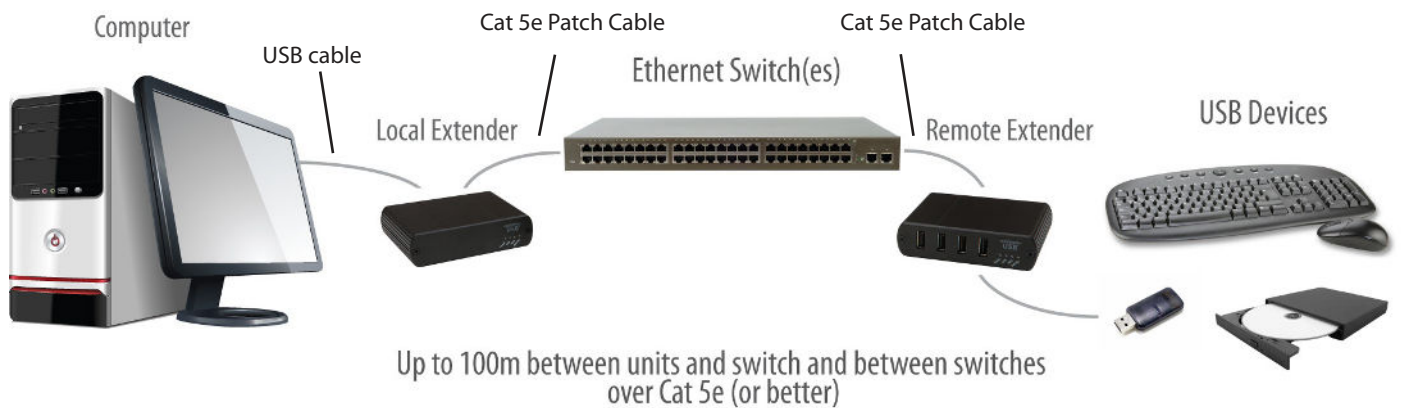
# Installation Guide

## Installing the RG2304-LAN System on a Local Area Network

### Requirements

To complete the installation, you will also require the following items that are not included with the product:

- USB compatible computer (host computer) with a USB compliant operating system
- USB compatible device(s)
- Two Cat 5e patch cables
- Preconfigured Local Area Network



### Preparing your Network

Your network must be properly configured in order for full USB 2.0 throughput to be realized and for maximum stability and reliability of your devices. Consult with your network administrator prior to installation. Using the RG2304-LAN over a network requires:

- Local Extender and Remote Extender units to be on the same subnet
- RJ45 information outlets to be near the computer and USB devices to be connected to the network switch(es)
- Pre-installed and configured Local Area Network

! USB 2.0 is capable of consuming up to 480Mbps. So for that reason, it is highly recommended to use the RG2304-LAN on Gigabit networks (1000Base-T) instead of 100 Megabit (100Base-T) networks. The performance of the USB network extension will be limited to the slowest link between the Local and the Remote Extenders.

! Some networks may be configured to block devices with unfamiliar MAC addresses. If this is the case, you will need to provide your network administrator the MAC addresses of the Local and Remote Extender units. These can be found on the label on the bottom of each unit.

! Some networks may be configured to block devices that consume a consistently high level of bandwidth. The RG2304-LAN may exhibit this behaviour when high bandwidth devices are connected. Consult with your network administrator to resolve this.

**note** Units will be prepared with each other if they were sold together in the same box. If they are not paired, follow the instructions provided in the section for pairing a Local and Remote Extenders.

**note** Increasing the number of switches between the Local and Remote Extenders may reduce the available bandwidth and as a result prevent some devices from functioning properly.

## Preparing Your Site

Before you can install the RG2304-LAN, you need to prepare your site:

1. Place the computer where desired and set it up.
2. Ensure that where you want to locate the USB device(s) is within 100m of Cat 5e cabling of the switch.
3. Ensure that where you want to locate the computer is within 100m of Cat 5e cabling of the switch.



The cable distance between switches must be no greater than 100m if Cat 5e is used as the connection media.

## Installing the Local Extender

1. Place the Local Extender near the computer.
2. Connect the supplied USB cable between the Local Extender host port and a USB port on the host computer.
3. Connect a Cat 5e patch cable (not provided) into the information outlet near the host computer.
4. Connect the patch cable into the Link port of the Local Extender.

## Installing the Remote Extender

1. Connect a Cat 5e patch cable (not provided) into the information outlet near the USB devices.
2. Connect the patch cable into the Link port of the Remote Extender.
3. Place the Remote Extender near the USB device(s).
4. Assemble the power adapter and country specific power cord together and connect them into a suitable AC outlet.
5. Connect the power adapter to the Remote Extender.

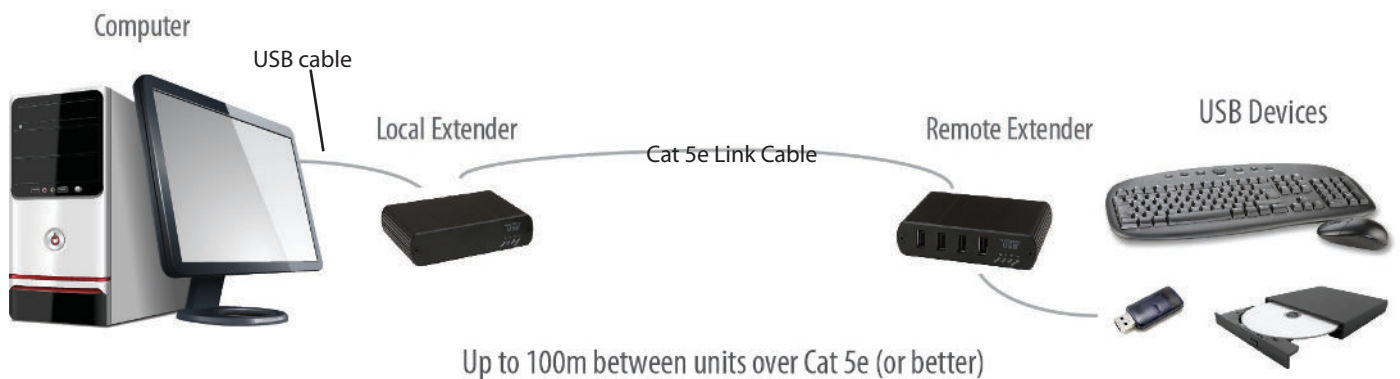


## Installing the RG2304-LAN System as Direct Connect

### Requirements

To complete the installation, you will also require the following items that are not included with the product:

- USB compatible computer (host computer) with a USB compliant operating system
- USB compatible device(s)
- Cat 5e Unshielded Twisted Pair (UTP) cable with two RJ45 connectors (if using surface cabling), OR, Cat 5e cabling with two information outlets and two Cat 5e patch cords with RJ45 connectors (if using premise cabling)



### Preparing Your Site

Before you can install the RG2304-LAN, you need to prepare your site:

1. Place the computer where desired and set it up.
2. Ensure that where you want to locate the USB device(s) is within 100m (cable-length) of the computer. If not, adjust the location of the devices and/or computer accordingly.
3. If you are using surface cabling, install the Cat 5e cabling as desired and terminate it with the appropriate RJ45 ends.

If you are using premise cabling, ensure Cat 5e cabling is installed between the two locations and if necessary patched together. Cat 5e information outlets should be located near the computer and the USB device(s), and the total length, including patch cords must be less than 100m.

- ! Cable installation is important, particularly if high throughput applications are used. When installing, ensure the cable is installed away from or isolated from potential sources of interference such as electrical wiring, fluorescent lighting, etc.



When terminating cables, ensure the matching RJ45 connector is used for the cable type. For example, if Cat 6 cable is used, then Cat 6 compatible RJ45 connectors must be used. If this care is not taken, the benefits of higher grade cabling may not be realized.

## **Installing the Local Extender**

1. Place the Local Extender near the computer.
2. Connect the supplied USB cable between the Local Extender host port and a USB port on the host computer.

## **Connecting the Local Extender to the Remote Extender**

### With Surface Cabling

1. Connect the Cat 5e cable into the Link port of the Local Extender.
2. Connect the Cat 5e cable into the Link port of the Remote Extender.

### With Premise Cabling

1. Connect a Cat 5e patch cable (not provided) into the information outlet near the host computer.
2. Connect the patch cable into the Link port of the Local Extender.
3. Connect a Cat 5e patch cable (not provided) into the information outlet near the USB devices.
4. Connect the patch cable into the Link port of the Remote Extender.

## **Installing the Remote Extender**

1. Place the Remote Extender near the USB device(s).
2. Assemble the power adapter and country specific power cord together and connect them into a suitable AC outlet.
3. Connect the power adapter to the Remote Extender.

## Checking the Installation

1. On the Local and Remote Extender, check that the Power, Status, Link and Host LEDs are on.
  - For direct connect, if the Host or Link LEDs are permanently off, then the cabling between the Local and Remote Extenders may not be installed properly or is defective.
  - For network connect, if the Link LED is blinking, then the network connection between the Local and Remote Extenders is not complete and there may be faulty cabling, network components, misconfigured network components, or the Local and Remote Extenders may need to be repaired together (see the section on pairing the Local and Remote Extender).
2. For Windows users (XP, 7, 8), open Device Manager to confirm that the RG2304-LAN has installed correctly. Expand the entry for Universal Serial Bus controllers by clicking the “+” sign. If the RG2304-LAN has been installed correctly, you should find it listed as a “Generic USB Hub”.



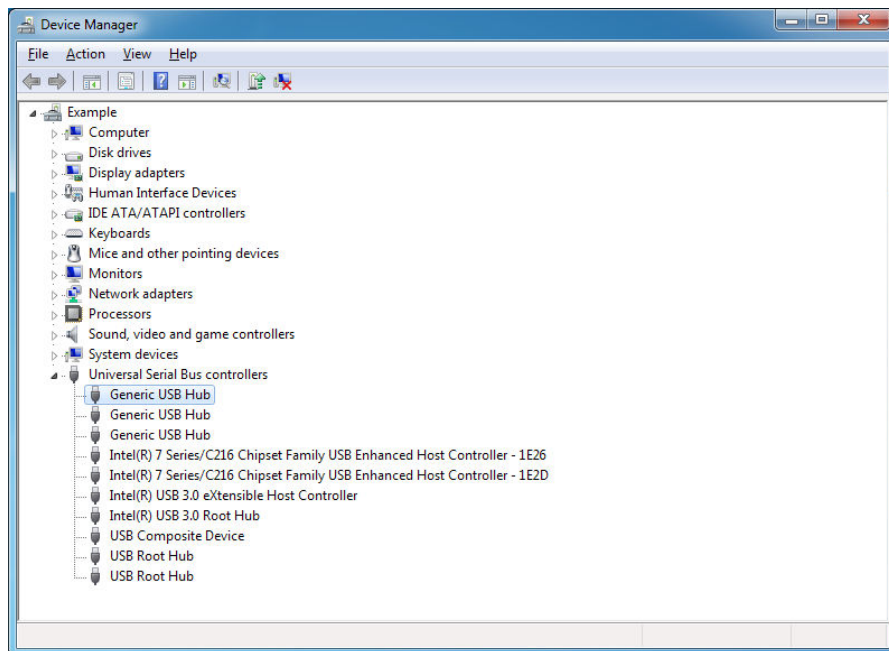
To open Device Manager in Windows XP:

Right click “My Computer” then select: Properties >> Hardware tab >> Device Manager



To open Device Manager in Windows 7 or 8

Open the Start menu, right click on “Computer” then select: Manage >> Device Manager



3. For Mac OS X users, open the System Profiler to confirm that the RG2304-LAN has installed correctly. In the left hand column under Hardware, select “USB” and inspect the right hand panel. If the RG2304-LAN has been installed correctly, you should find it listed as a “Hub” under the USB High-Speed Bus/USB Bus.



To open System Profiler in OS X: Open the Finder, select Applications, then open the Utilities folder and double click on the System Profiler icon.


4. If the RG2304-LAN is not detected correctly or fails to detect, please consult the Troubleshooting Section in this guide.

## Connecting a USB Device


1. Install any software required to operate the USB device(s). Refer to the documentation for the USB device(s), as required.
2. Connect the USB device to the device port on the Remote Extender.
3. Check that the device is detected and installed properly in the operating system.

## Pairing the Local and Remote Extender

When bought as a complete system, that consists of both a Local Extender and a Remote Extender, the extenders will be paired with each other out of the box, so no pairing action is required. However, if extenders are bought individually, individual extenders have been installed, or you simply wish to change the Local and Remote Extender pairings across a network, then the following steps must be taken:

 The following steps apply to both direct connect and network connect configurations for the RG2304-LAN.

1. Ensure the Local and Remote Extenders are either directly connected to each other, or are connected to the same subnet on your network.
2. Press and hold the Pairing button on the back of the Local Extender. Release the button within 10 seconds. The Link LED will start flashing.
3. Within 10 minutes of activating the pairing mode on the Local Extender, press and hold the Pairing button on the back of the Remote Extender. Release the button within 10 seconds. The Link LED will start flashing.
4. The Link LED on both units may start flashing more slowly before finally turning on. Once the Link LEDs are solid, the link is established between both extenders.

 If more than 10 minutes passes before the units are paired, then the extenders will switch back to regular mode and reestablish the previous links they had, if any.


 To cancel pairing mode, press and hold the Pairing button a second time. Release it within 10 seconds.

## Unpairing an Extender

If for any reason an extender needs to have its pairing removed, this can be done by pressing and holding the Pair button for longer than 10 seconds. Once this is completed the extender will not be paired to any other extender.

## Compatibility

The USB 2.0 RG2304-LAN complies with USB 1.1 and USB 2.0 specifications governing the design of USB devices. However, there is no guarantee that all USB devices or hosts will be compatible with the RG2304-LAN, as there are a number of different characteristics that may impact the operation of USB devices over extended distances.

 The USB 2.0 RG2304-LAN does not support isochronous devices. These are typically audio or video based devices. It is strongly recommended NOT to plug these devices into the extender system.

## Troubleshooting

The following table provides troubleshooting tips. The topics are arranged in the order in which they should be executed in most situations.

PROBLEM	CAUSE	SOLUTION
All LEDs on the Local Extender are off.	<ul style="list-style-type: none"> <li>The Local Extender is not receiving power from the USB port.</li> </ul>	<ol style="list-style-type: none"> <li>Ensure that the host computer is connected to the Local Extender.</li> <li>Move the USB connector to another USB port on the host computer.</li> </ol>
All LEDs on the Remote Extender are off.	<ul style="list-style-type: none"> <li>The Remote Extender is not receiving power from the AC adapter.</li> </ul>	<ol style="list-style-type: none"> <li>Ensure that the AC power adapter is properly connected to the Remote Extender.</li> <li>Check that the AC adapter is connected to a live source of electrical power. Check that the Remote power LED is illuminated.</li> </ol>
Link LEDs on the Local and the Remote Extenders are off.	<ul style="list-style-type: none"> <li>There is no connection between the Local and Remote Extenders.</li> </ul>	<ol style="list-style-type: none"> <li>Ensure Cat 5e cable is connected between the Local and Remote Extenders. Cat 5e or better cable, UTP with a straight through connector and no crossovers, and 8 conductor RJ45 connectors are used at both ends.</li> <li>Connect a short Cat 5e patch cord between the Local and Remote Extenders to determine if the original Cat 5e cable is defective.</li> </ol>
Link LEDs are blinking.	<ul style="list-style-type: none"> <li>There is no connection between the Local and Remote Extenders.</li> <li>Units may not be paired to each other.</li> <li>Network switches exist on different subnets.</li> <li>Network switch(es) are blocking traffic from the extenders.</li> </ul>	<ol style="list-style-type: none"> <li>Ensure both the Local and Remote Extenders are connected together directly or are connected to active network switches.</li> <li>Re-pair the extenders together.</li> <li>Ensure the network switches can communicate with each other and are on the same subnet.</li> <li>Ensure the network switches are not blocking traffic from the extenders either based on MAC address or due to traffic patterns.</li> <li>Consult with your network administrator.</li> </ol>

<b>PROBLEM</b>	<b>CAUSE</b>	<b>SOLUTION</b>
Link LED on the Local and Remote Extenders are blinking slowly.	<ul style="list-style-type: none"> <li>• The extenders are paired with each other but have not yet established a link.</li> </ul>	<ol style="list-style-type: none"> <li>1. Wait for a few minutes for the LEDs to go solid.</li> <li>2. If LEDs do not go solid, contact your network administrator to determine if any traffic is being blocked between the units.</li> </ol>
Link LED on the Local Extender is on, Host LED on the Local Extender is off.	<ul style="list-style-type: none"> <li>• The host computer is not powered on.</li> <li>• The Local Extender is not connected to the computer.</li> <li>• The host computer is not recognizing the Local Extender.</li> <li>• The computer does not support USB hubs.</li> <li>• The RG2304-LAN is malfunctioning.</li> </ul>	<ol style="list-style-type: none"> <li>1. Disconnect all USB devices from the Remote Extender.</li> <li>2. Disconnect the Local Extender from the computer.</li> <li>3. Disconnect the Remote Extender from the AC power adapter.</li> <li>4. Reconnect the Local Extender to the computer.</li> <li>5. Reconnect the Remote Extender to the AC power adapter.</li> <li>6. In the Universal Serial Bus controllers section of Device Manager, check that the RG2304-LAN is recognized as a "Generic USB Hub".</li> </ol>
My USB device does not work properly.	<ul style="list-style-type: none"> <li>• Insufficient bandwidth is available on the network to support the device.</li> <li>• The device is an isochronous type device (webcam, audio device, etc).</li> </ul>	<ol style="list-style-type: none"> <li>1. Connect the Local and Remote Extenders directly to each other and try the USB device again.</li> <li>2. Isochronous devices are not supported by the RG2304-LAN.</li> </ol>
My USB device does not work at all.	<ul style="list-style-type: none"> <li>• Insufficient bandwidth is available on the network to support the device.</li> <li>• The Local Extender is paired to the wrong Remote Extender.</li> <li>• The device is an isochronous type device (webcam, audio device, etc).</li> </ul>	<ol style="list-style-type: none"> <li>1. Connect the Local and Remote Extenders directly to each other and try the USB device again.</li> <li>2. Follow the instructions on page 11 and pair the Local to the Remote that is connected to the device you wish to use.</li> <li>3. Isochronous devices are not supported by the RG2304-LAN.</li> </ol>

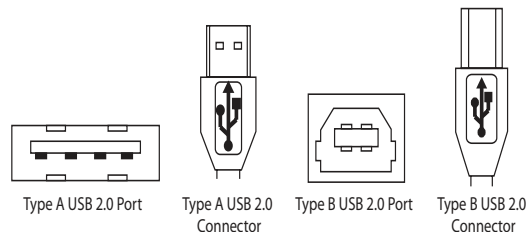
# Technical Glossary

## Category 5e (Cat 5e) Network Cabling

Category 5e cable is commonly also referred to as Cat 5e. This cabling is available in either solid or stranded twisted pair copper wire variants and as UTP (Unshielded Twisted Pair) or STP (Shielded Twisted Pair). UTP cables are not surrounded by any shielding making them more susceptible to electromagnetic interference (EMI). STP cables include shielding the copper wires and provides better protection against ElectroMagnetic Interference (EMI).

## USB 2.0 Cables

USB 2.0 cables have two distinct full-sized connectors. The Type A connector is used to connect the cable from a USB device to the Type A port on a computer or hub. The Type B connector is used to attach the USB cable to a USB device.



## RJ45

The Registered Jack (RJ) physical interface is what connects the network cabling (Cat 5e) to the Local Extender unit and Remote Extender unit. You may use either the T568A scheme (Table 1) or the T568B scheme (Table 2) for cable termination as the USB 2.0 RG2304-LAN requires all four pairs of the cable. RJ45 connectors are sometimes also referred to as 8P8C connectors. Note that any given cable must be terminated using the same T568 scheme on both ends to operate correctly.

## RJ45 Pin Positioning

Table 1 - T568A Wiring

PIN	PAIR	WIRE	CABLE COLOR
1	3	1	WHITE/GREEN
2	3	2	GREEN
3	2	1	WHITE/ORANGE
4	1	2	BLUE
5	1	1	WHITE/BLUE
6	2	2	ORANGE
7	4	1	WHITE/BROWN
8	4	2	BROWN

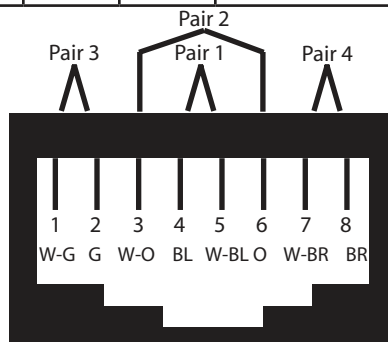
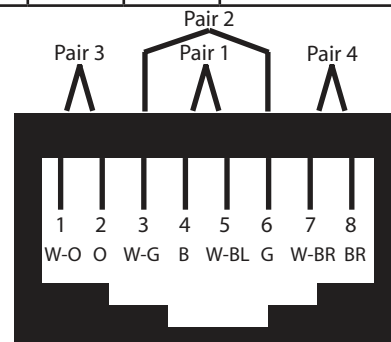


Table 2 - T568B Wiring

PIN	PAIR	WIRE	CABLE COLOR
1	2	1	WHITE/ORANGE
2	2	2	ORANGE
3	3	1	WHITE/GREEN
4	1	2	BLUE
5	1	1	WHITE/BLUE
6	3	2	GREEN
7	4	1	WHITE/BROWN
8	4	2	BROWN



# Specifications

<b>RANGE</b>	
Direct Connect	Up to 100m (330 ft) over solid core Cat 5e or better
Network Connect	Up to 100m (330 ft) between switches over solid core Cat 5e
<b>USB DEVICE SUPPORT</b>	
Maximum Throughput	Up to 480Mbps*
Traffic Types	Interrupt and Bulk**
Device Types	HID (Mouse and Keyboard), Hubs, Storage Devices**
Number of Devices and/or Hubs	17
<b>NETWORKING</b>	
Standards	100BASE-T and 1000BASE-T*
Data Traffic	Layer 2
<b>LOCAL EXTENDER</b>	
USB Connector	1 x USB 2.0 Type B Receptacle
Link Connector	1 x RJ45
Dimensions	100mm x 76mm x 26mm (3.9" x 3.0" x 1.0")
Enclosure Material	Black Anodized Aluminum
<b>REMOTE EXTENDER</b>	
USB Connectors	4 x USB 2.0 Type A Receptacles
Link Connector	1 x RJ45
Dimensions	100mm x 76mm x 26mm (3.9" x 3.0" x 1.0")
Enclosure Material	Black Anodized Aluminum
Available Current	600mA at each USB port concurrently
Power Supply	100-240V AC Input, 24V 1A DC Output
<b>ENVIRONMENTAL</b>	
Operating Temperature Range	0°C to 50°C (32°F to 122°F)
Storage Temperature Range	-10°C to 60°C (14°F to 140°F)
Operating Humidity	20% to 80% relative humidity, non-condensing
Storage Humidity	10% to 90% relative humidity, non-condensing
<b>COMPLIANCE</b>	
EMC	FCC (Class B), CE (Class B)
Environmental	RoHS2 (CE)
<b>SUPPORT</b>	
Warranty	2 years

\* Maximum speed is heavily dependant on network configuration, bandwidth and performance.  
1000Base-T is highly recommended for best performance.

\*\* Isochronous devices such as webcams and audio devices are not supported.