

COMMUNICATIONS SETUP GUIDE



®

CR6-RF451

11/16



Copyright © 2016
Campbell Scientific, Inc.

Limited Warranty

“Products manufactured by CSI are warranted by CSI to be free from defects in materials and workmanship under normal use and service for twelve months from the date of shipment unless otherwise specified in the corresponding product manual. (Product manuals are available for review online at www.campbellsci.com.) Products not manufactured by CSI, but that are resold by CSI, are warranted only to the limits extended by the original manufacturer. Batteries, fine-wire thermocouples, desiccant, and other consumables have no warranty. CSI’s obligation under this warranty is limited to repairing or replacing (at CSI’s option) defective Products, which shall be the sole and exclusive remedy under this warranty. The Customer assumes all costs of removing, reinstalling, and shipping defective Products to CSI. CSI will return such Products by surface carrier prepaid within the continental United States of America. To all other locations, CSI will return such Products best way CIP (port of entry) per Incoterms ® 2010. This warranty shall not apply to any Products which have been subjected to modification, misuse, neglect, improper service, accidents of nature, or shipping damage. This warranty is in lieu of all other warranties, expressed or implied. The warranty for installation services performed by CSI such as programming to customer specifications, electrical connections to Products manufactured by CSI, and Product specific training, is part of CSI’s product warranty. **CSI EXPRESSLY DISCLAIMS AND EXCLUDES ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. CSI hereby disclaims, to the fullest extent allowed by applicable law, any and all warranties and conditions with respect to the Products, whether express, implied or statutory, other than those expressly provided herein.”**

Assistance

Products may not be returned without prior authorization. The following contact information is for US and international customers residing in countries served by Campbell Scientific, Inc. directly. Affiliate companies handle repairs for customers within their territories. Please visit www.campbellsci.com to determine which Campbell Scientific company serves your country.

To obtain a Returned Materials Authorization (RMA), contact CAMPBELL SCIENTIFIC, INC., phone (435) 227-9000. After an application engineer determines the nature of the problem, an RMA number will be issued. Please write this number clearly on the outside of the shipping container. Campbell Scientific's shipping address is:

CAMPBELL SCIENTIFIC, INC.

RMA# _____
815 West 1800 North
Logan, Utah 84321-1784

For all returns, the customer must fill out a "Statement of Product Cleanliness and Decontamination" form and comply with the requirements specified in it. The form is available from our website at www.campbellsci.com/repair. A completed form must be either emailed to repair@campbellsci.com or faxed to (435) 227-9106. Campbell Scientific is unable to process any returns until we receive this form. If the form is not received within three days of product receipt or is incomplete, the product will be returned to the customer at the customer's expense. Campbell Scientific reserves the right to refuse service on products that were exposed to contaminants that may cause health or safety concerns for our employees.

Safety

DANGER — MANY HAZARDS ARE ASSOCIATED WITH INSTALLING, USING, MAINTAINING, AND WORKING ON OR AROUND TRIPODS, TOWERS, AND ANY ATTACHMENTS TO TRIPODS AND TOWERS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC. FAILURE TO PROPERLY AND COMPLETELY ASSEMBLE, INSTALL, OPERATE, USE, AND MAINTAIN TRIPODS, TOWERS, AND ATTACHMENTS, AND FAILURE TO HEED WARNINGS, INCREASES THE RISK OF DEATH, ACCIDENT, SERIOUS INJURY, PROPERTY DAMAGE, AND PRODUCT FAILURE. TAKE ALL REASONABLE PRECAUTIONS TO AVOID THESE HAZARDS. CHECK WITH YOUR ORGANIZATION'S SAFETY COORDINATOR (OR POLICY) FOR PROCEDURES AND REQUIRED PROTECTIVE EQUIPMENT PRIOR TO PERFORMING ANY WORK.

Use tripods, towers, and attachments to tripods and towers only for purposes for which they are designed. Do not exceed design limits. Be familiar and comply with all instructions provided in product manuals. Manuals are available at www.campbellsci.com or by telephoning (435) 227-9000 (USA). You are responsible for conformance with governing codes and regulations, including safety regulations, and the integrity and location of structures or land to which towers, tripods, and any attachments are attached. Installation sites should be evaluated and approved by a qualified engineer. If questions or concerns arise regarding installation, use, or maintenance of tripods, towers, attachments, or electrical connections, consult with a licensed and qualified engineer or electrician.

General

- Prior to performing site or installation work, obtain required approvals and permits. Comply with all governing structure-height regulations, such as those of the FAA in the USA.
- Use only qualified personnel for installation, use, and maintenance of tripods and towers, and any attachments to tripods and towers. The use of licensed and qualified contractors is highly recommended.
- Read all applicable instructions carefully and understand procedures thoroughly before beginning work.
- Wear a **hardhat** and **eye protection**, and take **other appropriate safety precautions** while working on or around tripods and towers.
- **Do not climb** tripods or towers at any time, and prohibit climbing by other persons. Take reasonable precautions to secure tripod and tower sites from trespassers.
- Use only manufacturer recommended parts, materials, and tools.

Utility and Electrical

- **You can be killed** or sustain serious bodily injury if the tripod, tower, or attachments you are installing, constructing, using, or maintaining, or a tool, stake, or anchor, come in **contact with overhead or underground utility lines**.
- Maintain a distance of at least one-and-one-half times structure height, 20 feet, or the distance required by applicable law, **whichever is greater**, between overhead utility lines and the structure (tripod, tower, attachments, or tools).
- Prior to performing site or installation work, inform all utility companies and have all underground utilities marked.
- Comply with all electrical codes. Electrical equipment and related grounding devices should be installed by a licensed and qualified electrician.

Elevated Work and Weather

- Exercise extreme caution when performing elevated work.
- Use appropriate equipment and safety practices.
- During installation and maintenance, keep tower and tripod sites clear of un-trained or non-essential personnel. Take precautions to prevent elevated tools and objects from dropping.
- Do not perform any work in inclement weather, including wind, rain, snow, lightning, etc.

Maintenance

- Periodically (at least yearly) check for wear and damage, including corrosion, stress cracks, frayed cables, loose cable clamps, cable tightness, etc. and take necessary corrective actions.
- Periodically (at least yearly) check electrical ground connections.

WHILE EVERY ATTEMPT IS MADE TO EMBODY THE HIGHEST DEGREE OF SAFETY IN ALL CAMPBELL SCIENTIFIC PRODUCTS, THE CUSTOMER ASSUMES ALL RISK FROM ANY INJURY RESULTING FROM IMPROPER INSTALLATION, USE, OR MAINTENANCE OF TRIPODS, TOWERS, OR ATTACHMENTS TO TRIPODS AND TOWERS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC.

Table of Contents

PDF viewers: These page numbers refer to the printed version of this document. Use the PDF reader bookmarks tab for links to specific sections.

1. Introduction	1
2. Communication Setup	2
2.1 Basic Procedure: PC with RF451 to CR6-RF451	2
2.2 PC with RF451 to Multiple CR6-RF451s	13
2.3 CR6-RF451 as a Repeater	15
2.4 Communication Combinations	16
2.5 Network Planner	18
3. Troubleshooting	19

CR6-RF451

1. Introduction

The CR6-RF451 contains a 900 MHz license-free radio specifically designed to work with Campbell Scientific equipment. It can be used with an RF451 at a base computer to establish communication between *LoggerNet* and the CR6-RF451. A CR6-RF451 can also be part of a new or existing RF450/RF451 network. (Note that the CR6-RF451 cannot be added to an RF401A-series or RF407-series network.)

This document describes how to set up a simple base RF451 to remote CR6-RF451 network. It also describes how to extend that system to include more slave CR6-RF451s and / or a slave/repeater CR6-RF451, and how the CR6-RF451 can be used in combination with other communication methods.

The CR6-RF451 contains the same radio as the standalone RF451. Most of the RF hardware settings are the same for the CR6-RF451 and the RF451. See the [RF451 manual](#) for more information on RF communication using the CR6-RF451.

2. Communication Setup

2.1 Basic Procedure: PC with RF451 to CR6-RF451

NOTE This procedure assumes the RF451 and the CR6-RF451 are in their Factory Default settings.

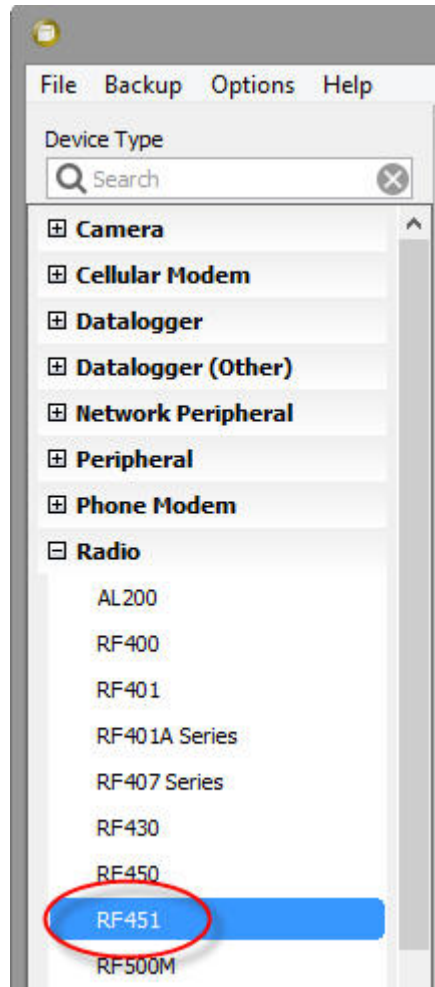
Click the *Device Configuration Utility* icon on the PC.



Device Configuration Utility (*DevConfig*) opens.

In *DevConfig*, select **Device Type** | **Radio** | **RF451**.

DevConfig displays **RF451** information in the right pane.



On the right pane, click the **Install the USB device driver** link.

The *Device Driver Installation Wizard* opens.

RF451
Send OS

RF451

The RF451 is a high performance frequency hopping spread spectrum communication. It may be connected to a datalogger, computer, or any purpose of computer-to-datalogger and datalogger-to-datalogger comm



Connect Instructions


Note: [Install the USB device driver](#) before connecting this product t

1. Connect the device **USB port** to your computer using the supplie
2. Select the correct **Communication Port** in the left panel. Not Communication Port to become available for use after physically
3. Select the **Connect** button.

Click **Next**.

The device drivers are installed and the Wizard advances to the next screen.

Device Driver Installation Wizard



Welcome to the Device Driver Installation Wizard!

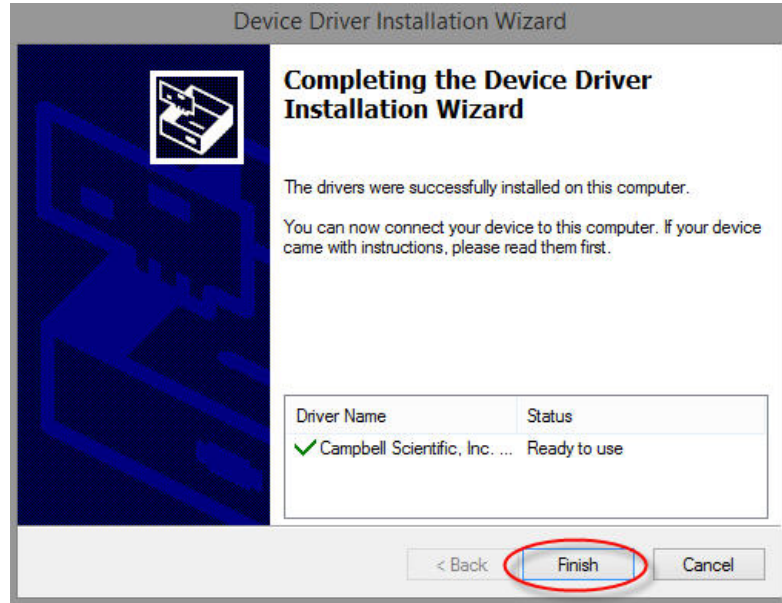
This wizard helps you install the software drivers that some computers devices need in order to work.

To continue, click Next.

< Back
Next >
Cancel

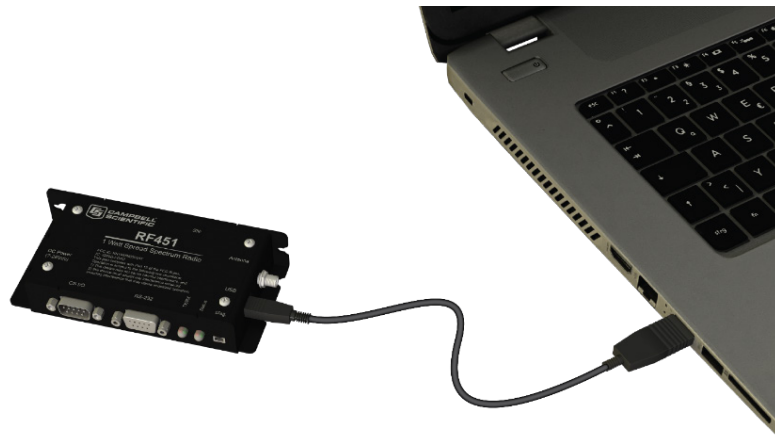
Click **Finish**.

The *Device Driver Installation Wizard* closes.



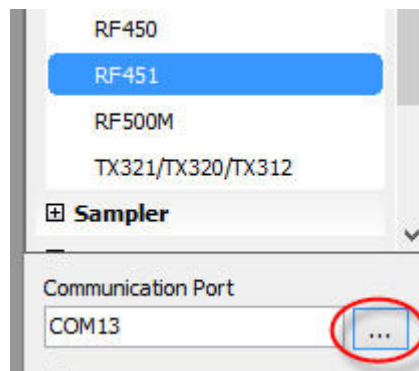
Connect the **USB** port on your RF451 to a USB port on your computer.

The RF451 **Status** LED blinks orange.



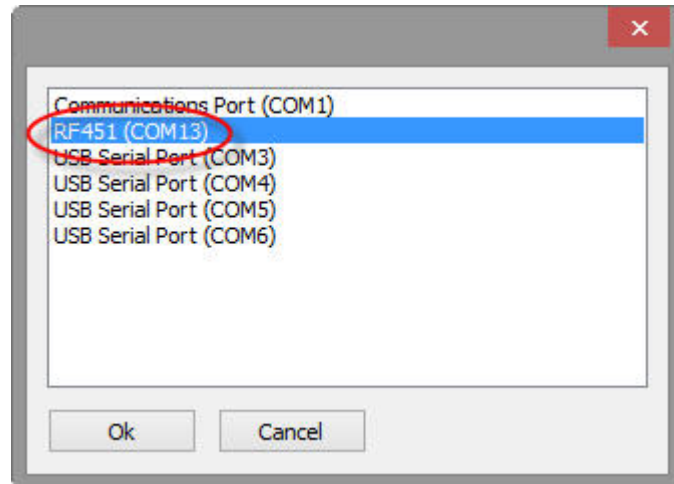
In the lower left of the *DevConfig* screen, click the **Communication Port** list button.

A list of available communication ports appears.



In the list of available communication ports, click **RF451 (COMnn)**, where **nn** is the COM port number assigned by your PC, then click **OK**.

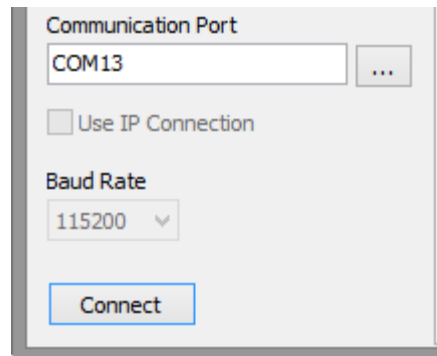
The COM port number assigned to the RF451 populates the **Communication Port** box.



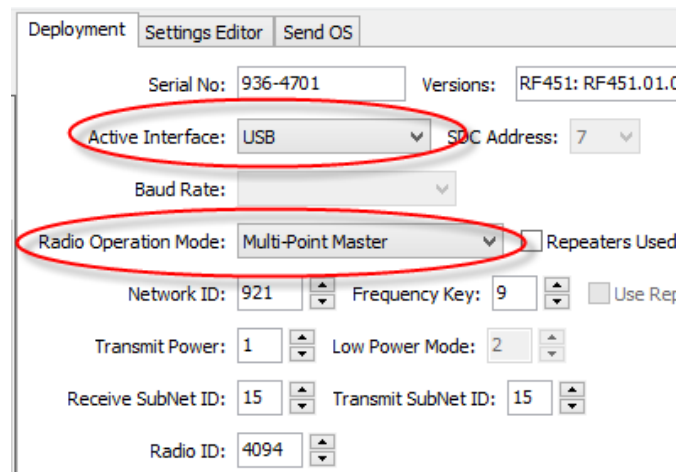
In the lower left of the *DevConfig* screen, click **Connect**. Click the extra **OK** if it appears.

DevConfig displays the **Deployment** tab in the right pane.

The RF451 **Status** LED goes to solid orange.



In the **Deployment** tab, set the **Active Interface** to **USB** or **RS-232** depending on how your computer will be connected to the RF451. Also, set the **Radio Operation Mode** to **Multi-Point Master**.



Click **Apply**.

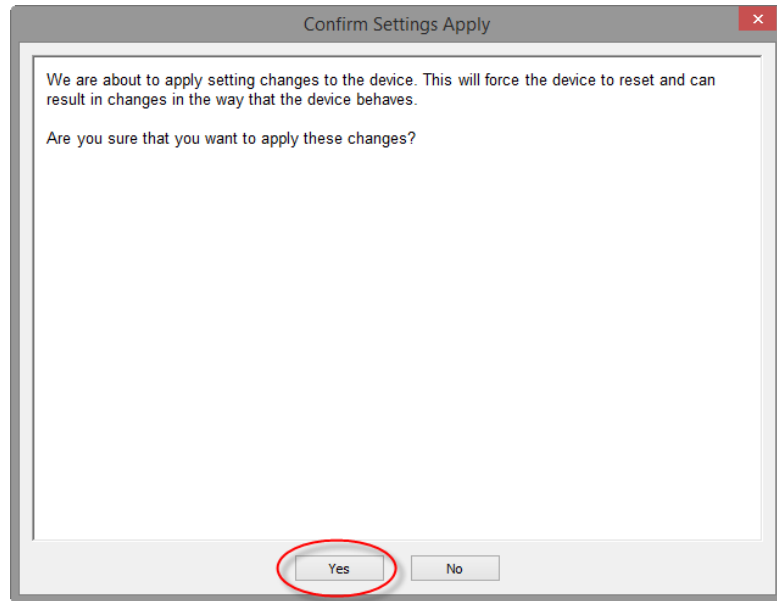
The **Confirm Settings Apply** dialog box appears.



In the **Confirm Settings Apply** dialog box, click **Yes**.

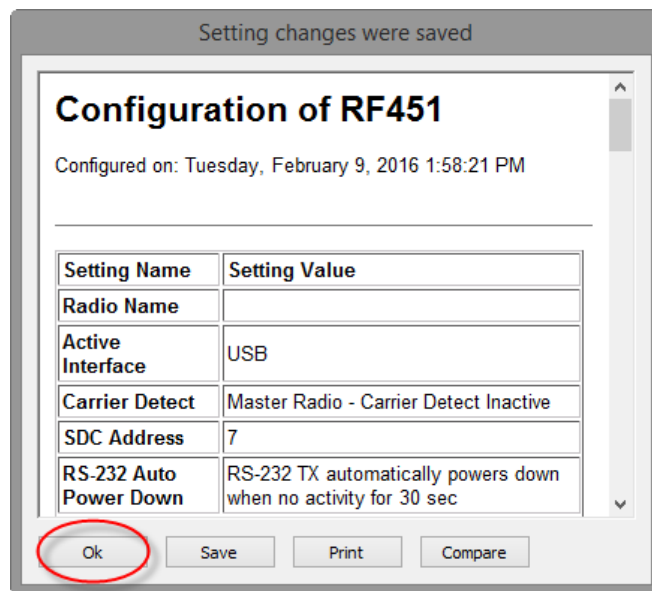
The **Settings changes were saved** dialog box appears.

The RF451 **Status** LED returns to blinking orange.



In the **Settings changes were saved** dialog box, click **OK**.

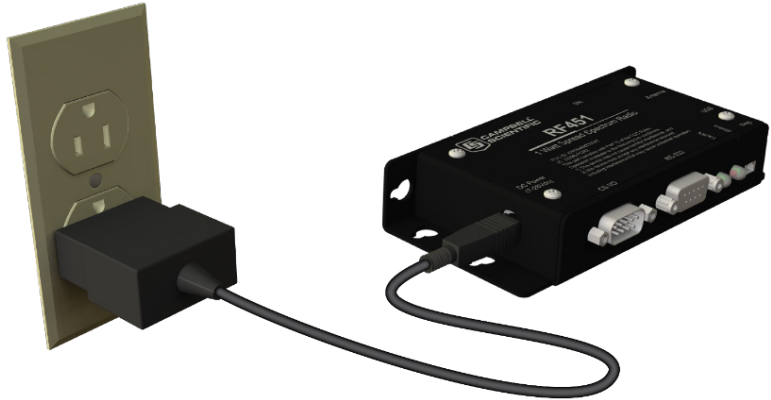
DevConfig disconnects from the RF451 and returns to the main RF451 screen.



Attach antenna to the RF451.



Provide power to the RF451. (The USB port can only supply power for configuration.)

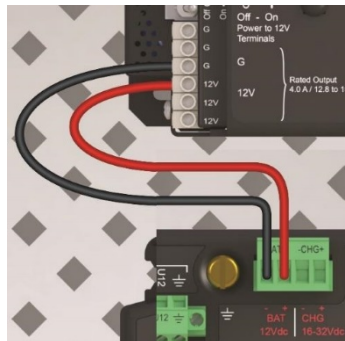


Attach antenna to the CR6-RF451.



Provide power to the CR6-RF451:

- connect 12 Vdc at the green **-BAT+** terminals,
- or connect 16 to 32 Vdc at the **-CHG+** terminals.



Click the *LoggerNet* icon on the PC.

LoggerNet opens.



From the *LoggerNet* toolbar, select **Setup** from the **Main** category.

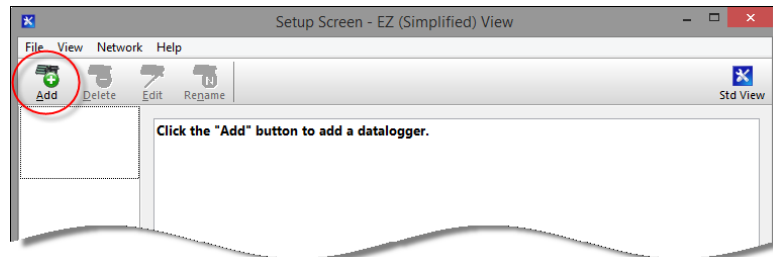
LoggerNet Setup screen opens.

If the *Setup* screen does not say **EZ (Simplified) View** at the top, click **EZ View** in the top-right corner, to switch to the EZ View.

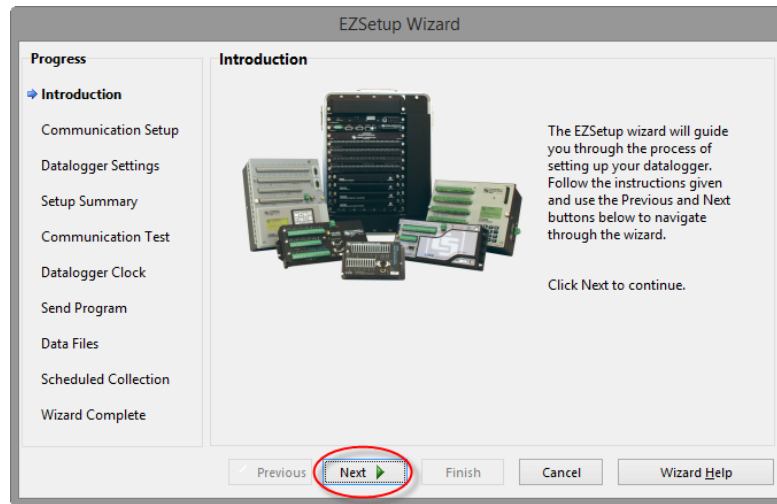


Click **Add**.

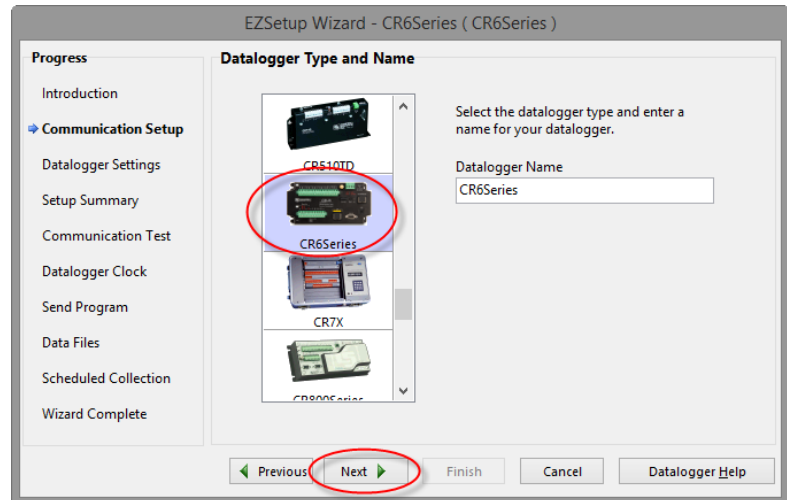
The *EZSetup Wizard* opens.



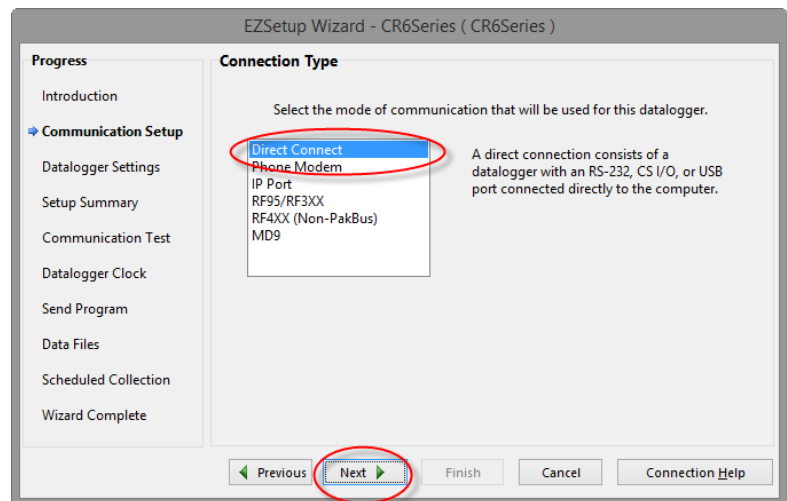
Click **Next**.



Select **CR6Series**. Click **Next**.

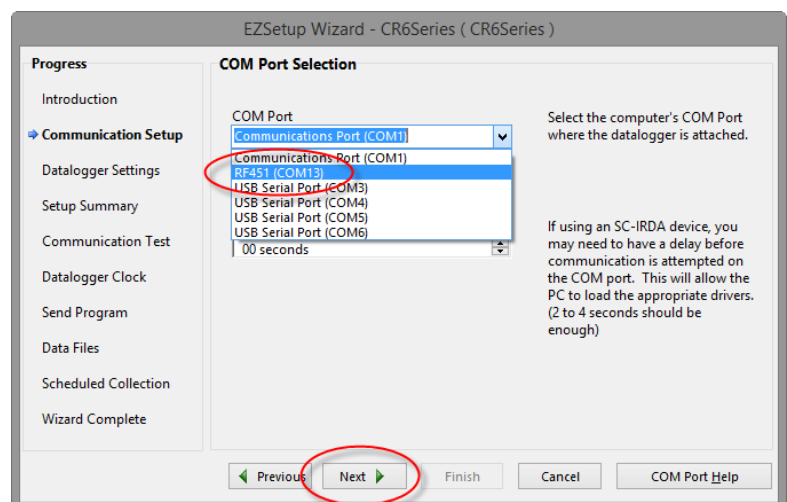


Select **Direct Connect**. Click **Next**.

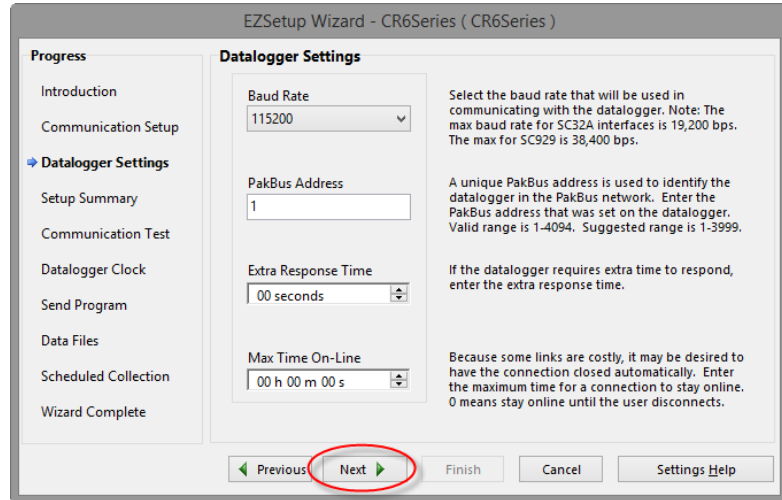


In the list of available communication ports, click **RF451 (COMnn)**, where **nn** is the COM port number assigned by your PC, then click **Next**.

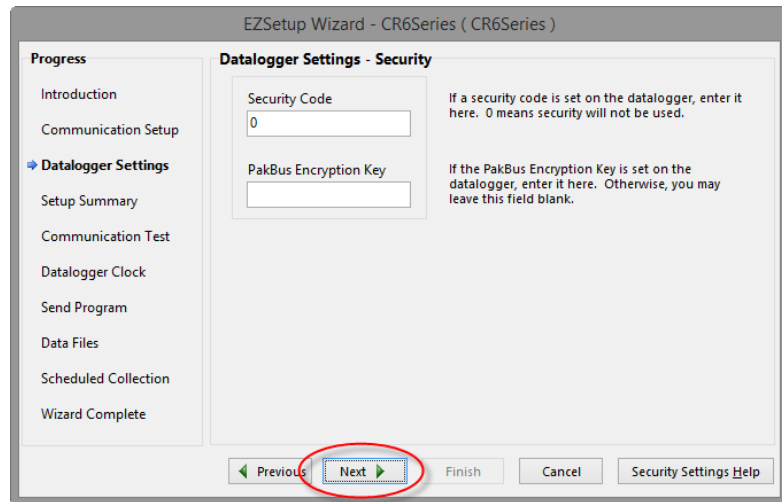
(Note that you choose **RF451 (COMnn)** to select the USB port to which the RF451 is attached. *LoggerNet* sees the CR6-RF451 as directly connected to this port. The RF451 to CR6-RF451 link does not need to be indicated in *LoggerNet*.)



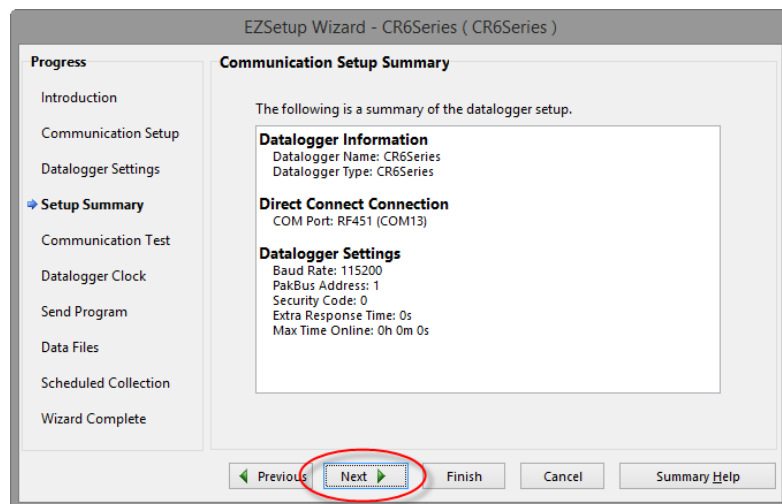
Enter the PakBus address of your datalogger. The default address is 1. Keep all other defaults. Click **Next**.



Leave these settings at their default values. Click **Next**.

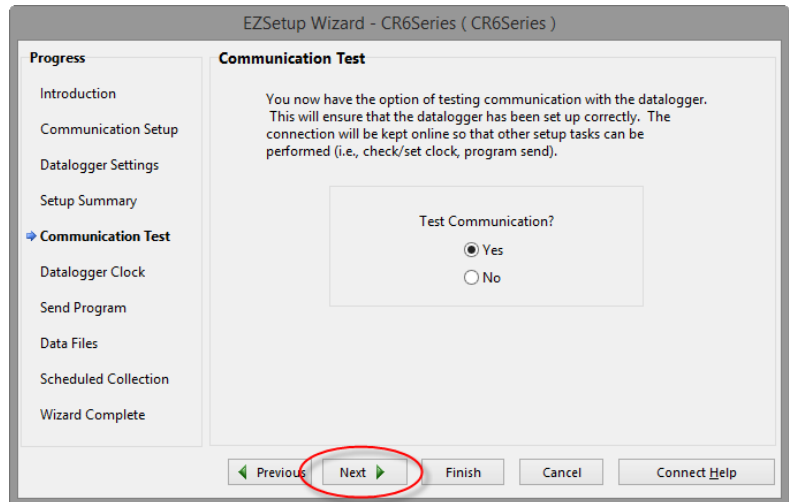


This screen shows a summary of the settings that you entered. Click **Next**.

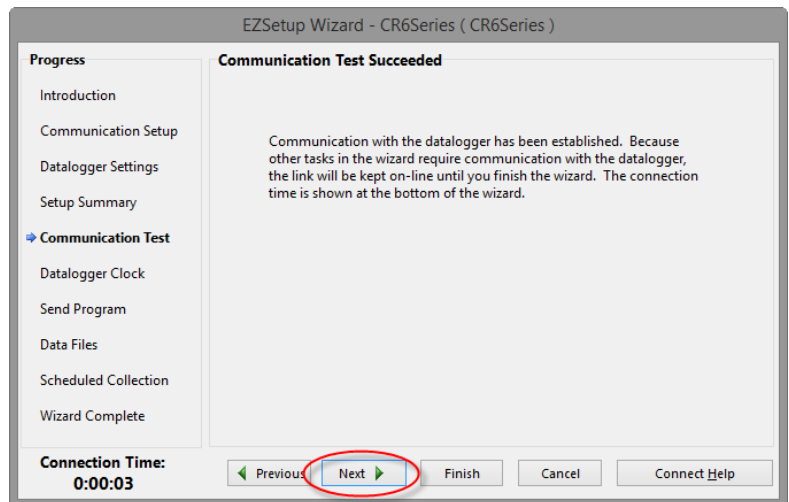


Click **Next**.

LoggerNet attempts to communicate with the CR6 and, if successful, the *EZSetup Wizard* advances to the **Communication Test Succeeded** screen. (If communication is unsuccessful, click **Previous** and verify all of the settings are correct.)

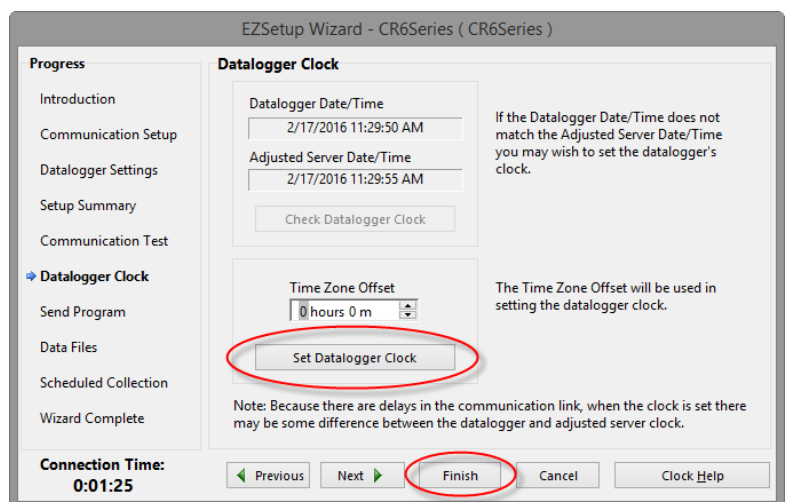


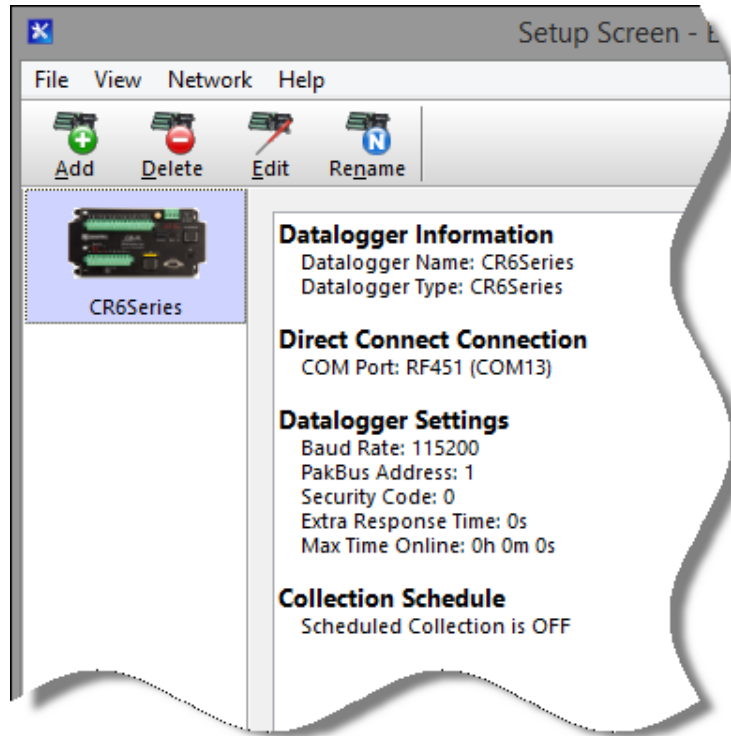
Click **Next**.



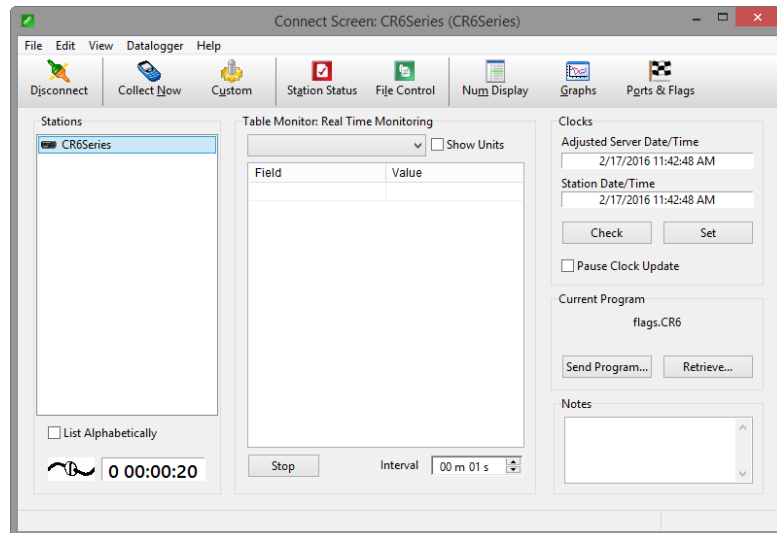
Click **Set Datalogger Clock**, and then click **Finish**.

The datalogger clock is then set to the PC clock, the *EZSetup Wizard* closes, and the CR6 is added to the *Setup* screen.



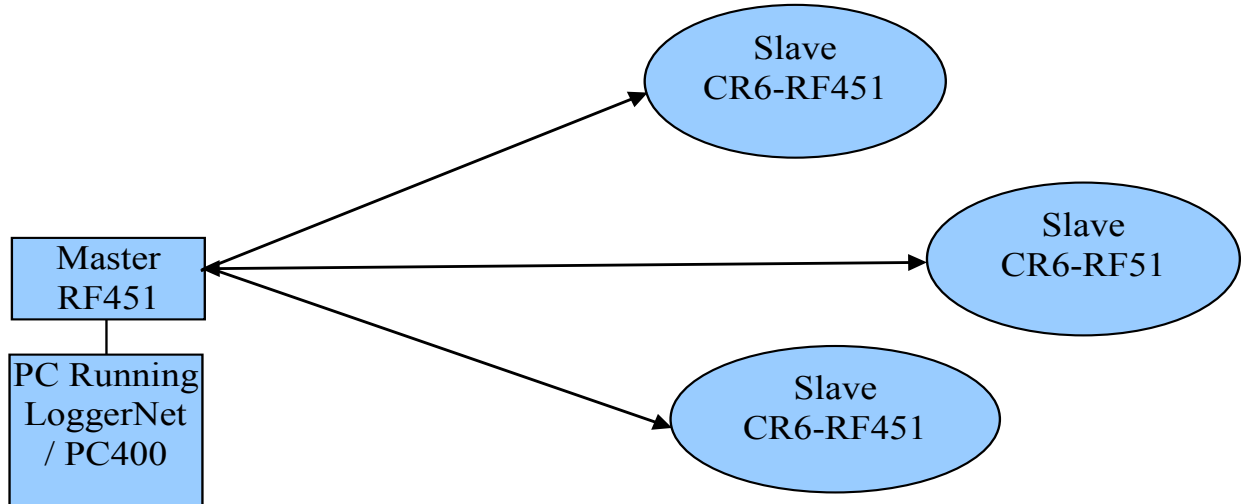


Use *LoggerNet Connect* to connect to the datalogger, send programs, and view and collect data.

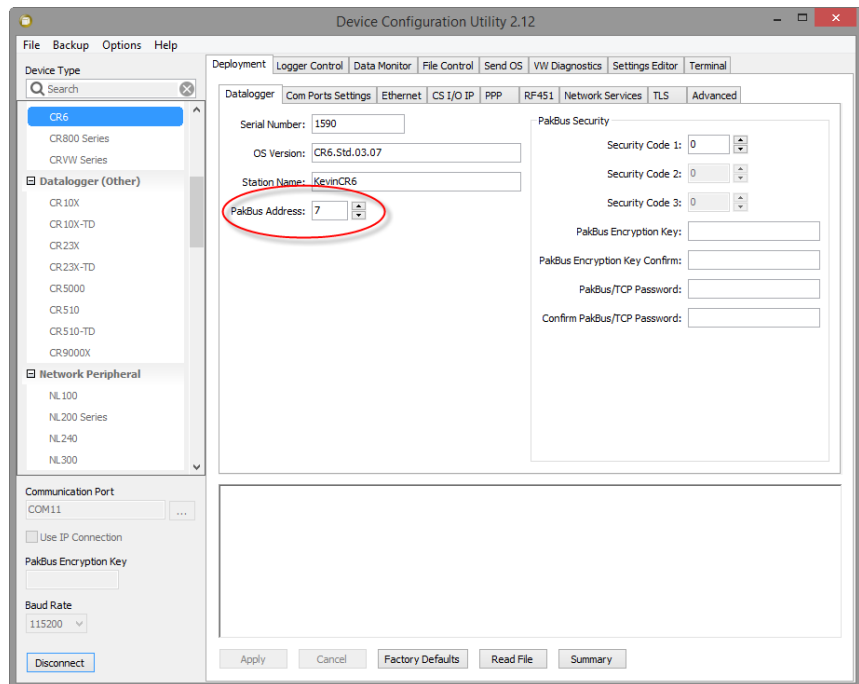


2.2 PC with RF451 to Multiple CR6-RF451s

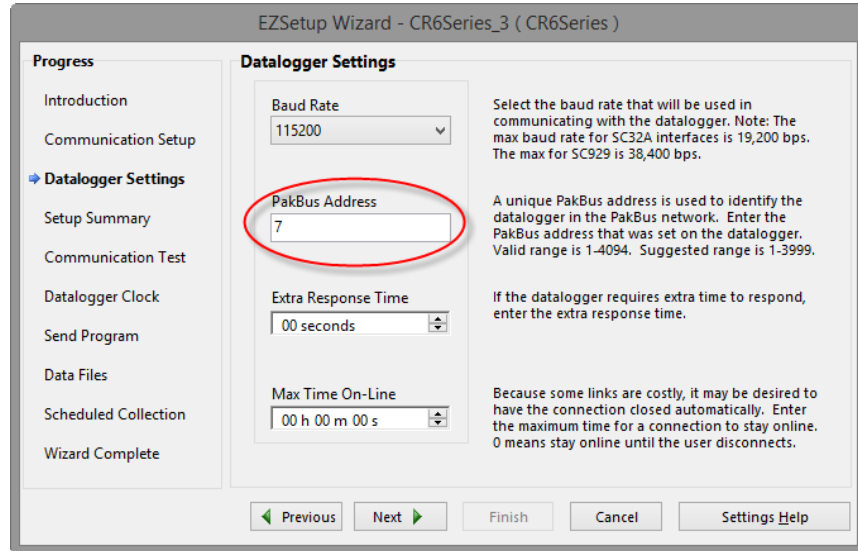
The Basic Procedure can be extended to include multiple slave CR6-RF451s in the system.



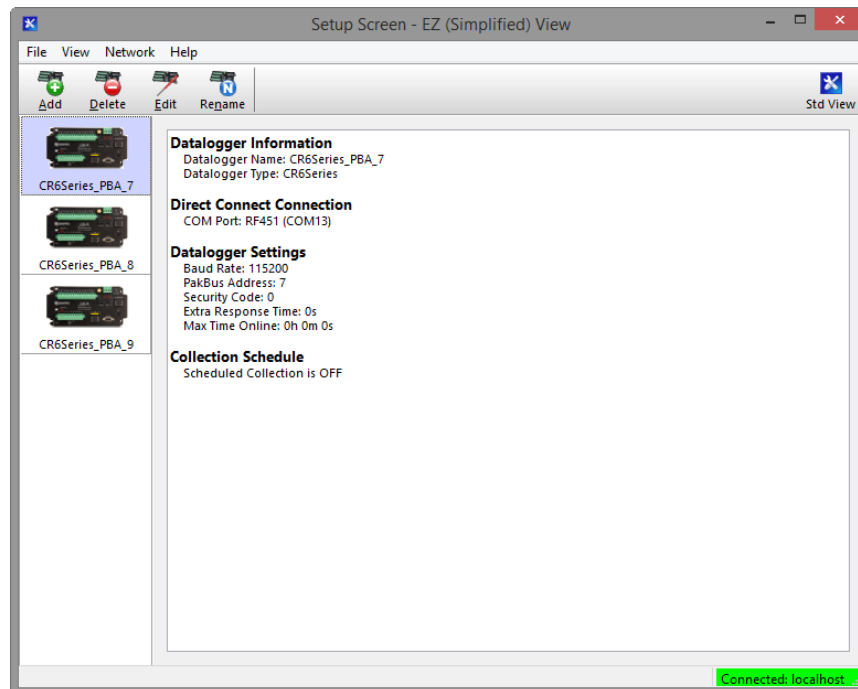
With multiple CR6-RF451s, *DevConfig* must be used to give each **CR6-RF451** a unique **PakBus Address**. This changes the hardware setting in the CR6-RF451.



These unique PakBus® addresses must be entered on the **Datalogger Settings** tab of the *EZSetup Wizard*. This change is to make the software settings (*LoggerNet*) match the change we made in the hardware settings using *DevConfig*.

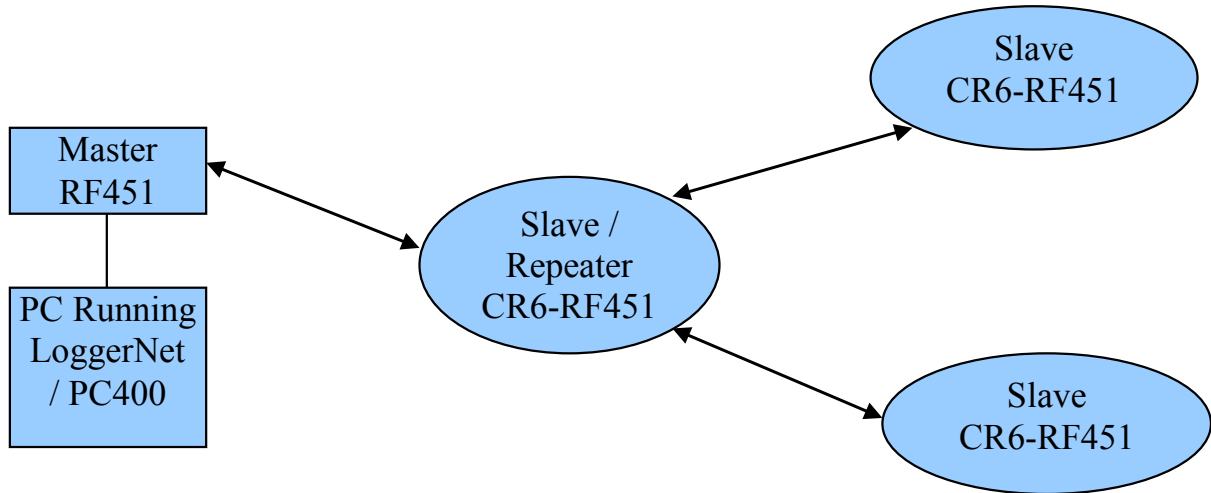


Once you have used the *EZSetup Wizard* to add all of the dataloggers in your network, they will all appear on the *Setup* screen.



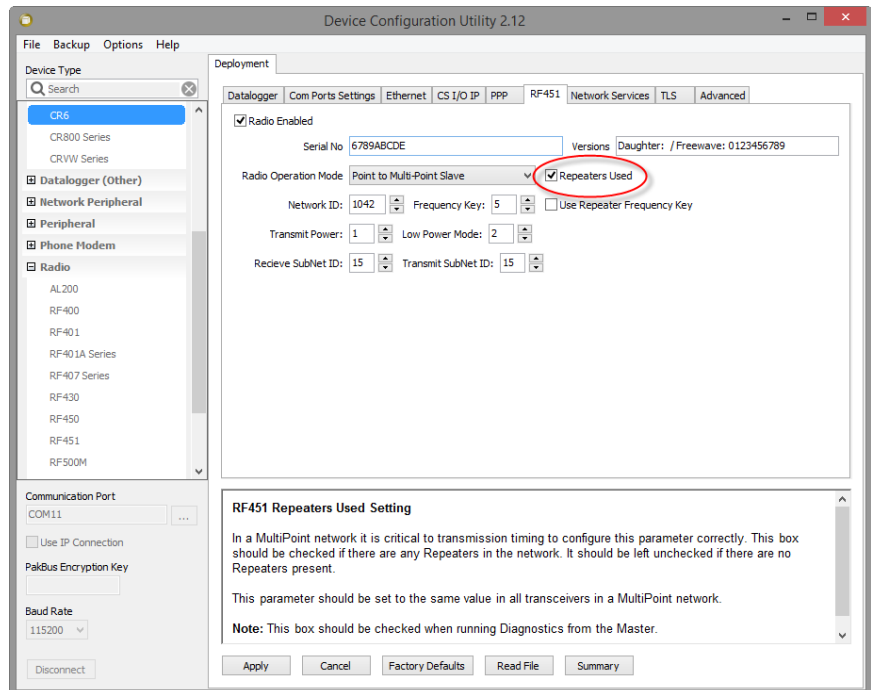
2.3 CR6-RF451 as a Repeater

The previous procedure can be extended to use one CR6-RF451 as a repeater in the network to go around an obstacle such as a hill.

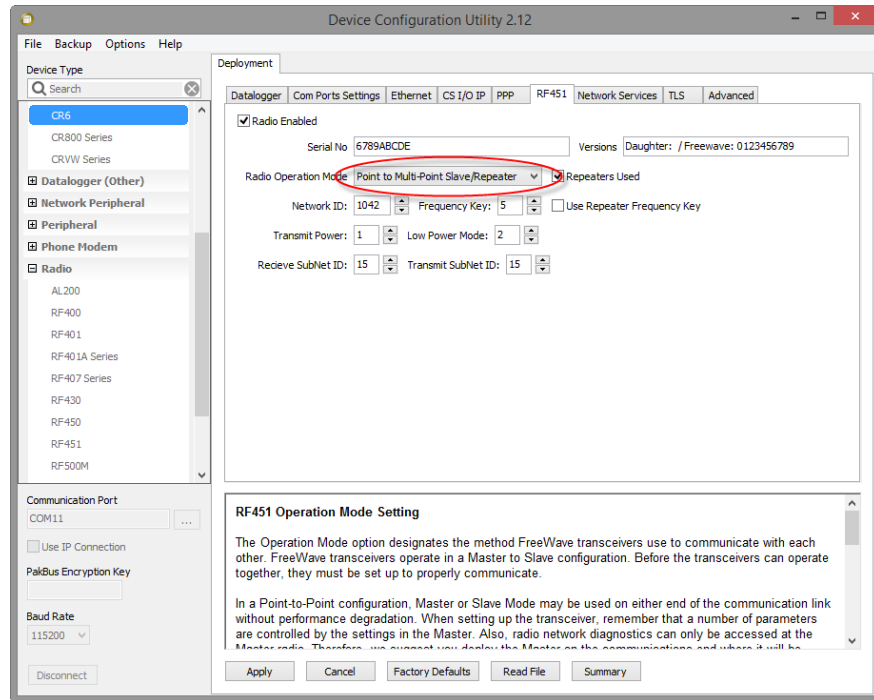


This requires only two changes to the previous procedure.

First, use *DevConfig* to enable the **Repeaters Used** checkbox in the RF451 and each CR6-RF451. (To see these settings when connected to a CR6-RF451, you must select the **RF451** tab at the top of the screen.)

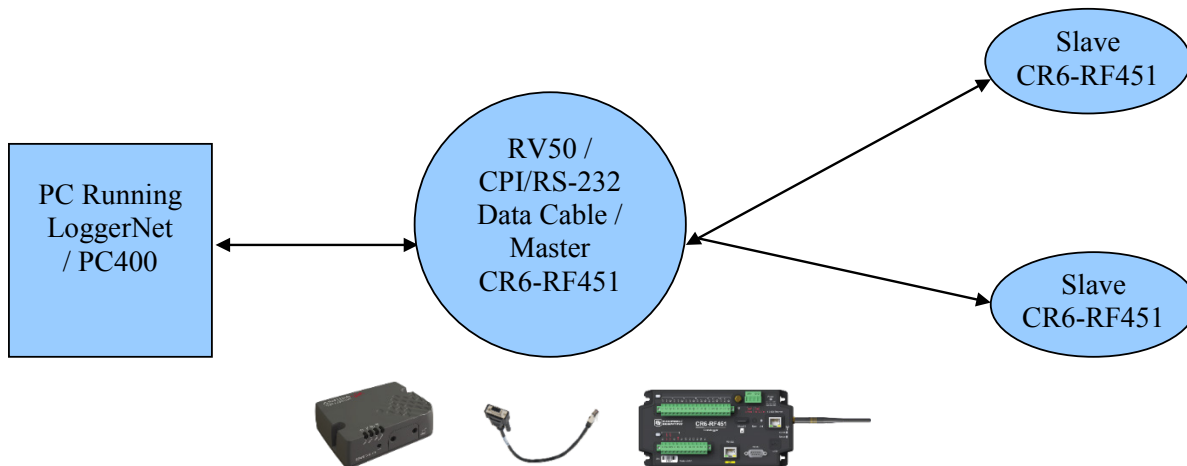


Second, set the **Radio Operation Mode** to **Point to Multi-Point Slave/Repeater** in the CR6-RF451 that will act as a repeater.

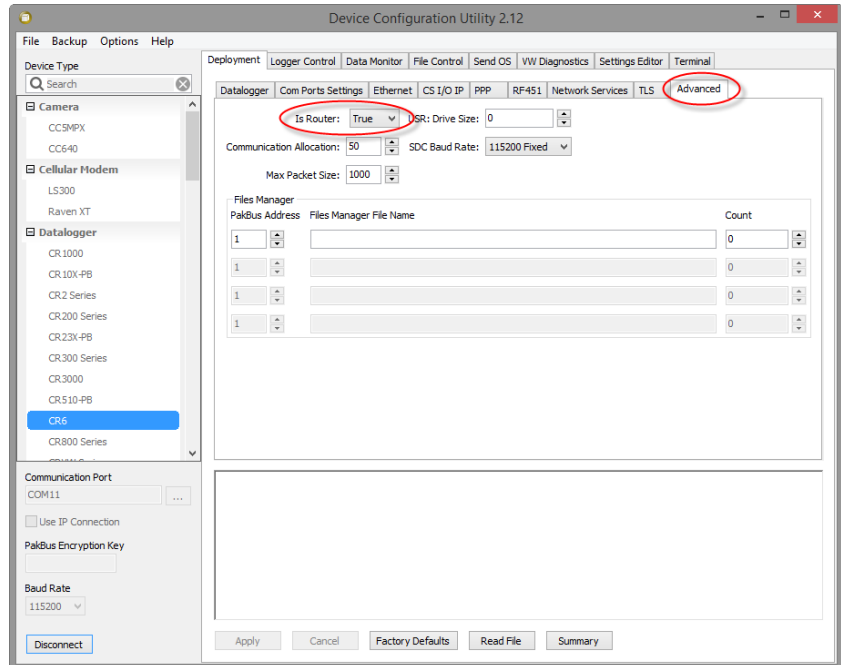


2.4 Communication Combinations

The CR6-RF451 can be used in a system with multiple communication methods. For example, in the figure below, the master CR6-RF451 communicates with *LoggerNet* through an RV50 cellular modem connected to the CR6-RF451 using a CPI/RS-232 Data Cable. (An Ethernet connection could also be used between the RV50 and the CR6-RF451. See the RV50 manual for more information.) The master CR6-RF451 communicates with the slave CR6-RF451s through RF.



This network only requires a few changes to the hardware settings described in the Basic Procedure (Section 2.1, *Basic Procedure: PC with RF451 to CR6-RF451* (p. 2)). The master RF451 has been replaced by a CR6-RF451, but *DevConfig* should still be used to set its **Radio Operation Mode** to **Multi-Point Master** as described in the procedure. In addition, the master CR6-RF451 must be made into a router. This is done from the **Advanced** tab in *DevConfig*. Set the **Is Router** setting to **True**.

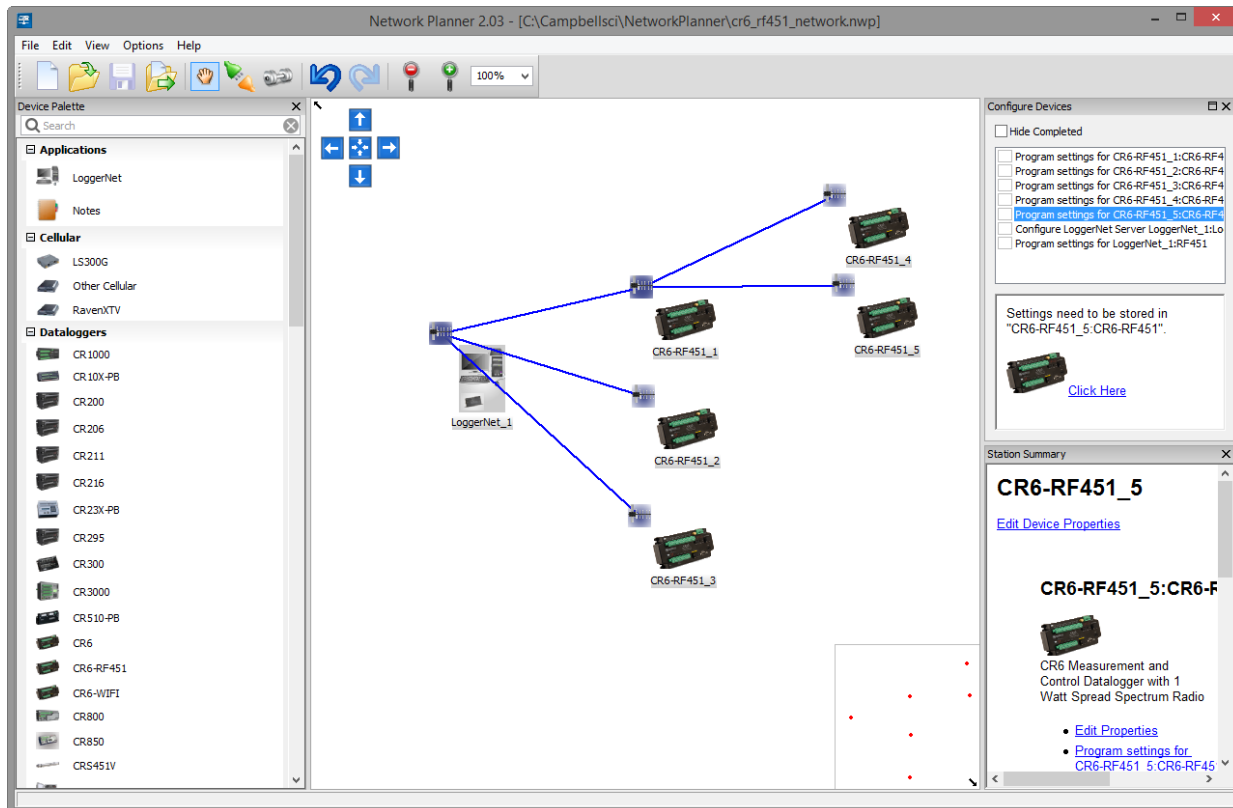


See the manual for the communication product being used in combination with the CR6-RF451 (in this example, the RV50) for information on setting up *LoggerNet* to communicate with the master CR6-RF451.

2.5 Network Planner



For more complicated networks, the *LoggerNet Network Planner* is recommended for the network setup. Select devices from the **Device Palette** and place them on the drawing canvas. Use the link tool to draw lines indicating the communication links between devices. Use the activity tool to indicate activities that will take place between devices.

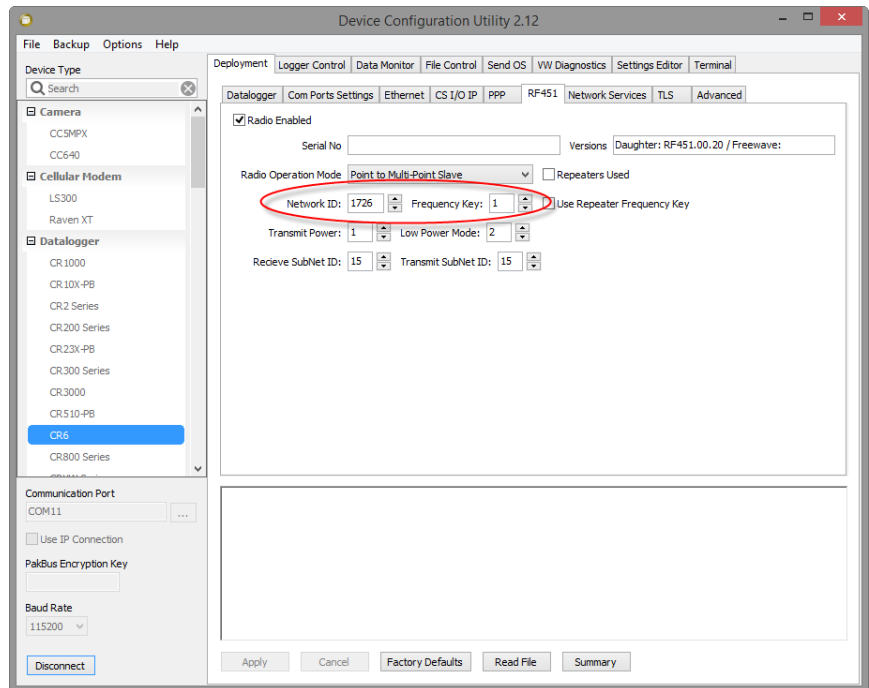


Network Planner calculates the optimum settings for each device in the network and allows you to send these settings to the device. If any change is made to a device in the network, that change is propagated to every affected device setting. *Network Planner* can then use the information entered to configure *LoggerNet Setup*.

Refer to the *Network Planner* help for more information.

3. Troubleshooting

If there are intermittent communication problems with the above setups, there may be another FreeWave® network in the area causing interference. To remove the interference, use *DevConfig* to change the **Network ID** and **Frequency Key** in all RF451s and CR6-RF451s to a different value. Each of these settings must have the same value in all RF451s and CR6-RF451s. For example, the **Network ID** in all devices could be set to **1726**, and the **Frequency Key** in all devices could be set to **1**. This is just an example. The **Network ID** can be any number between 0 and 4095, excluding 255. The **Frequency Key** can be any number between 0 and 14.



Campbell Scientific Companies

Campbell Scientific, Inc.

815 West 1800 North
Logan, Utah 84321
UNITED STATES

www.campbellsci.com • info@campbellsci.com

Campbell Scientific Canada Corp.

14532 – 131 Avenue NW
Edmonton AB T5L 4X4
CANADA

www.campbellsci.ca • dataloggers@campbellsci.ca

Campbell Scientific Africa Pty. Ltd.

PO Box 2450
Somerset West 7129
SOUTH AFRICA

www.campbellsci.co.za • cleroux@csafrica.co.za

Campbell Scientific Centro Caribe S.A.

300 N Cementerio, Edificio Breller
Santo Domingo, Heredia 40305
COSTA RICA

www.campbellsci.cc • info@campbellsci.cc

Campbell Scientific Southeast Asia Co., Ltd.

877/22 Nirvana@Work, Rama 9 Road
Suan Luang Subdistrict, Suan Luang District
Bangkok 10250
THAILAND

www.campbellsci.asia • info@campbellsci.asia

Campbell Scientific Ltd.

Campbell Park
80 Hathern Road
Shepshed, Loughborough LE12 9GX
UNITED KINGDOM

www.campbellsci.co.uk • sales@campbellsci.co.uk

Campbell Scientific Australia Pty. Ltd.

PO Box 8108
Garbutt Post Shop QLD 4814
AUSTRALIA

www.campbellsci.com.au • info@campbellsci.com.au

Campbell Scientific Ltd.

3 Avenue de la Division Leclerc
92160 ANTONY
FRANCE

www.campbellsci.fr • info@campbellsci.fr

Campbell Scientific (Beijing) Co., Ltd.

8B16, Floor 8 Tower B, Hanwei Plaza
7 Guanghua Road
Chaoyang, Beijing 100004
P.R. CHINA

www.campbellsci.com • info@campbellsci.com.cn

Campbell Scientific Ltd.

Fahrenheitstraße 13
28359 Bremen
GERMANY

www.campbellsci.de • info@campbellsci.de

Campbell Scientific do Brasil Ltda.

Rua Apinagés, nbr. 2018 – Perdizes
CEP: 01258-00 – São Paulo – SP
BRASIL

www.campbellsci.com.br • vendas@campbellsci.com.br

Campbell Scientific Spain, S. L.

Avda. Pompeu Fabra 7-9, local 1
08024 Barcelona
SPAIN

www.campbellsci.es • info@campbellsci.es

Please visit www.campbellsci.com to obtain contact information for your local US or international representative.