EMBEDDED DATA SYSTEMS

EDS

http://www.EmbeddedDataSystems.com

FEATURES

- Wireless communication over the widely accepted 2.4 GHz frequency band
- Mesh network topology, which essentially enlarges the wireless network and provides additional transmission routes for the Sensor data
- Transmission strength reported on all devices, allowing troubled areas to be identified and addressed proactively (e.g. adding Repeaters)
- Globally unique 64-Bit EUI (Extended Unique Identifier)
- Plug-N-Play installation achieved by simple cable linking process
- Acknowledgements and retries provide robust wireless transmissions
- *Complies with FCC, Industry Canada and CE Marking requirements*

DESCRIPTION

Embedded Data Systems' is pleased to announce the addition of our **MeshNet Repeater,** MN-RPTR, to the MeshNet Wireless Sensor System. The intuitive design of the MeshNet System makes setup of robust wireless Sensors networks fast and pain free. The wireless Sensor system uses the universally accepted 2.4 GHz radio frequencies. Upon release the MeshNet Sensor System has dedicated Sensors for *monitoring temperature, humidity, visible light, and barometric pressure* with additional devices expected.

The MeshNet Repeater is designed to improve the size and reliability of the Wireless Sensor Networks. It achieves this through a number of capabilities:

- Increases signal strength of transmissions
- Improved receiving sensitivity
- Provides additional paths of communication between the Controller and Sensors allowing transmission paths to adjust (self heal) as wireless environment changes

Part Number:

MESHNET REPEATER   MN-RPTR

Quick Start Guide

Getting started with the MeshNet Controller is simple. Just follow a few easy steps:

1. **Link a MeshNet Repeater to the MeshNet Controller.** Using the custom "Linking Cable" provided, insert the straight 3.5mm connector end into the jack located on the front of the MeshNet Controller. Insert the right angle 3.5mm connector into the jack located inside the MeshNet Repeater (or Sensor). *(Use only the custom "Linking Cable" provided by EDS or linking will not occur.)* If power is not already applied to all devices, do so now. The internal "linking" process takes under 2 seconds; the LED on the face of the MeshNet Repeater will flash at a 1/2 second rate when complete. Once the LED signals success, power and the "Linking Cable" should be removed. (If after 5 seconds the LED does not flash at the 1/2 second rate, repeat the process)

2. **Apply power to the MeshNet**

Controller a second time. The green PWR/ACT LED located on the front of the Controller will begin to flash at one-second intervals, indicating that the product is operating normally. Power must be 5 volts +/- 10% at 400 milliamp.

3. **Connect it to your Network**. Connect a live network cable to the Ethernet Port on the device. The green LED on the Ethernet connector will light, indicating a valid network connection. The yellow LED on the Ethernet connector blinks only when there is network traffic.

4. **Determine the IP address of the MeshNet Controller** by checking your DHCP server logs or using EDS Appliance Scanner Software available from the EDS website. If the MeshNet Controller does not find a DHCP server running on your network, it will default to the following IP address: 169.254.1.1.

5. **Configure your device**. Type the IP address of the MeshNet Controller into your web browser (e.g., http://192.168.1.27) and press enter. Select the menu item "Network" under "System Configuration". When the name and password is requested, enter "**admin**" for the name and "**eds**" for the password. A webpage similar to the one shown to the right will enable you to configure and monitor various aspects of your MeshNet Controller.

CONGRATULATIONS! You have successfully installed a MeshNet Wireless Sensor System. *Please refer to the Web Access section of the Operation Manual to obtain an understanding of the function of each of the web pages served by the MeshNet Controller.*
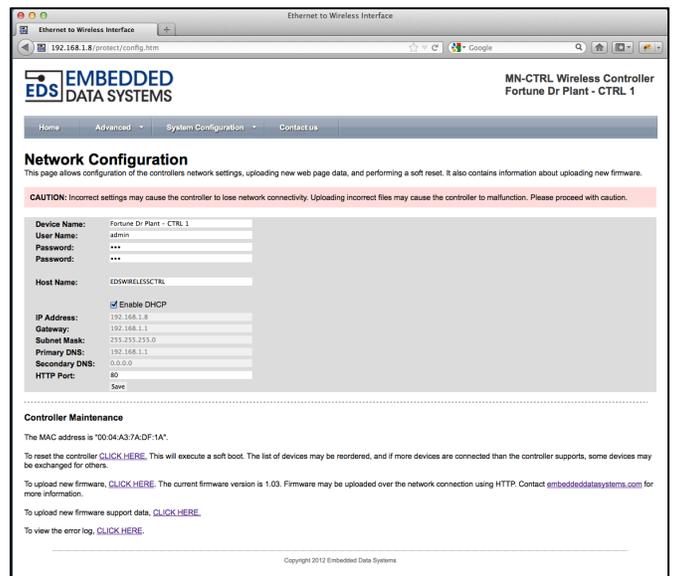
Some things to keep in mind:
- Support is provided for MeshNet Controller IP address identification only when utilizing the EDS Appliance Scanner Software (http://short.eds.bz/apps-edsscanner). Please consult your network administrator if you cannot locate the DHCP address.
- *For instructions on appropriate placement of the components of the MeshNet Wireless Sensor System, please refer to Proper Placement section of the Operation Manual.*

SYSTEM DESCRIPTION

The MeshNet Repeater is part of the MeshNet Wireless Sensor System designed to monitor and control real world physical parameters wirelessly. Other required components are the MeshNet Controller and MeshNet Sensors. The Controller communicates with the Environmental Sensors and presents the data via Ethernet. The Sensor, Repeater and Controller communicate with each other using a proprietary protocol and are not compatible with other wireless networks. The Repeater is an optional component in the system, used to extend the range of the Controller.

Controller: Each system must have 1 Controller. The Controller interfaces the wireless network to a local area network or the Internet, using Ethernet. It manages, reads and writes to the wireless devices, presents the data in easy to use formats such as HTTP, XML and SNMP, and optionally pushes the data on a timed basis to a HTTP Post server.

Repeater: Repeaters are optional; they are used to extend the distance between the Controller and a Sensor. Many Sensors can communicate with the Controller through a single Repeater. Each Controller can manage up to 7 Repeaters, but there can be only 1 Repeater between a Controller and Sensor.

Sensor: Sensors, such as a MeshNet Environmental Sensor, provide the means to monitor and control real world parameters. They are typically battery-powered devices that wake up on a timed basis, take readings, send them to the Controller and check if any data is waiting.

OPERATION

All data from the Wireless Environmental Sensor is read using a MeshNet Controller. This can be done through HTTP or SNMP, and an option is provided for pushing the data to a HTTP Post server. All data that is retrieved from the Controller programmatically, is XML or SNMP. *See the MeshNet Controller manual for more information*.

Devices Connected

This is the number of Wireless Sensors communicating with the MeshNet Controller through this Repeater.

OPERATIONAL PARAMETERS

EUI

The EUI, or Extended Unique Identifier, is a globally unique 64-bit number, represented by 16 hexadecimal digits. This number can be used by software to uniquely identify this device.

Controller RSSI

This is the strength of the radio signal at the Controller. Higher numbers equate to stronger signals. Due to hardware limitations, the highest number that can be displayed is -34 dBm, however the actual signal strength may be much higher.

Device RSSI

This is the strength of the radio signal at the Repeater. Due to hardware limitations, the highest number that can be displayed is -34 dBm, however the actual signal strength may be much higher.

Address

This is the address of the Repeater, which was assigned by the Controller.

Repeater

When the Repeater joins the Controller, it is assigned a Repeater number, which is displayed here.

Health

This is a number ranging from 0 to 7, where 0 is not connected and 7 is healthy. The number is incremented when a packet is received from the Repeater, and decremented when a packet is not received after a predetermined period of time. Numbers less than 7 indicate a week wireless link or other problem.

Version

Installed firmware version of the Repeater.

Username

The Username is a user programmable string that may be up to 29 characters long. It is saved in non-volatile memory and so is retained even when power is cycled. Use this string to uniquely identify each MeshNet Repeater.

Send Counter
Counts the number of times a packet has been sent to the Controller. This number has a maximum of 4294967296. When the maximum is reached, the number rolls back to 0 and begins counting up again.

WRITE PARAMETERS
Repeaters sleep when not reading the Sensors or sending data in order to conserve power. When sleeping, they cannot receive wireless data. Because of this, writes have to be queued by the Controller and sent when they are awake.

Writes Pending
Number of writes waiting to be sent to the Repeater.

Writes Succeeded
Number of writes that have been receive and acknowledged by the Repeater.

Writes Failed
Number of writes that were not able to be sent to the Repeater or were not acknowledged.

WIRELESS COMMUNICATIONS
The device communicates via an industry standard 802.15.4 wireless link. Wireless packets are acknowledged, all data is checked for errors using CRC and corrupted data is resent.

DIAGNOSTIC PARAMETERS
The following parameters are provided for diagnostic purposes. Wireless communications are acknowledged and retried if no acknowledgment is received. The parameters below can be used to determine link quality.

Connection Counter
Counts the number of connections to the Controller. When a device is first powered, it connects to a Controller, obtaining an address and thus belonging to the network. If the signal strength is good, power is not lost at the Controller and the Controller does not change channels *(see Channel Hop in the Wireless Setup section of the MeshNet Controller manual),* this number will stay low. A high number could be due to low signal strength, periodic interference or power problems. Maximum is 65535, after which the number rolls over to zero and continues to count up.

Message Attempts
Number of times a packet has been sent. This number is the same as Send Counter, except that it can be reset and has a maximum of 65535, after which it stays at that number.

Message Packet Retries
Number of times a packet had to be resent due to no acknowledgment being received. Maximum is 65535, after which it stays at that number.

Message Failures
When no acknowledgment is received, the packet is resent. After 4 retries, the message has failed. The counter increments when such a failure has occurred. Maximum is 65535, after which it stays at that number.

Message Counter Reset
The above 3 message counters can be reset to zero.

EDS MN REPEATER DEVICE ID

ID	Features
EDS2101	MeshNet Repeater with high power radio

EDS MN ENVIRONMENTAL SENSOR IDS

ID	Features
EDS1064	Temp
EDS1065	Temp, humidity
EDS1066	Temp, barometric pressure
EDS1067	Temp, light
EDS1068	Temp, humidity, barometric pressure and light

SPECIFICATIONS

PARAMETER	MIN	TYP	MAX	UNITS
Operating Temperature	-40	-	85	°C
Operating Humidity (non-condensing)	0	-	90	%
Storing Humidity (non-condensing)	0	-	90	%
Supply Voltage	4.5	5.0	5.5	Volts
Active Current	-	135	-	mA
Enclosure Dimensions (L x W x H)	4.109	2.233	1.594	Inches

Notes:

Regulatory Compliance

FEDERAL COMMUNICATIONS COMMISSION (FCC) COMPLIANCE STATEMENT

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.

INDUSTRY CANADA (IC) COMPLIANCE STATEMENT

This Class B digital apparatus complies with Canadian ICES-003.
Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

EUROPEAN COMMUNITY (EC) DIRECTIVES CONFORMITY

APPLICATION OF COUNCIL DIRECTIVE 2004/108/EC Standard to which Conformity is Declared:

EN 61326-1:2006	(Emmissions)
EN 61326-2-3:2006	(Immunity)
EN 61000-3-2:2006+A1:2009+A2:2009	(Harmonics)
EN 61000-3-3:2008	(Flicker)

Caution: *The manufacturer is not responsible for any radio or television interference caused by using other than recommended cables or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate this equipment.*