Zigbee Plogg Setup Guide

IMPORTANT SAFETY WARNING

The device is operated by software controlled from a remote source and power can be interrupted and turned ON again without notice. Please ensure that any connected load that can be switched off by the Plogg device can be returned to full power safely whilst unsupervised.

A failure in the operation of the software could result in the random re-instatement of power to the connected load. IF the load cannot be operated unsupervised then either the Plogg unit must be disconnected or the load switched OFF at source once the operation cycle of the load has been completed.

The maximum current that can be operated through the device is limited by the relevant plug format for each country and this may be less than the maximum rating of 16A. The Plogg is rated for mains alternating current supply, single phase, at 230 V ~ nominal and 50Hz frequency and 120V ~ nominal, 60Hz frequency.

This device contains a normally closed relay.

The plug is earthed.

There are no serviceable parts and in the event of a failure please disconnect the device, notify Energy Optimizers Limited at the address given below and return the device to us for inspection and, if appropriate, replacement. The device contains live MAINS circuitry. Do not attempt to open the device, disassemble, crush, puncture, short external power sockets or plug pins or expose the device to temperatures greater than 40^{o}C. Please contact Energy Optimizers Limited if in doubt due to damage or malfunction and also the cleaning requirements and methods.

MEASUREMENT CATEGORY II – the device is intended for measurements performed on circuits directly connected to the low voltage mains installation (230V ~ A.C.) e.g. household appliances, portable tools, personal computer equipment.

NORTH AMERICA CONNECTION

The PLOGG meter must be plugged in a suitable single phase AC mains supply rated at nominal 120V. 60 Hz frequency via a socket complying with NEMA 5-15R. The load (appliance) should be connected to the PLOGG via a NEMA 5-15 plug fitted with 12AWG three core cable. The load should be general purpose, resistive.

UK CONNECTION

The PLOGG meter must be plugged into a suitable single phase AC mains supply rated at nominal 230V, 50 Hz frequency via a socket complying with BS1363/A. The load (appliance) should be connected to the PLOGG via a 13A plug (BS1363) fitted with 1.2mm^2 or 1.50mm^2 3 core cable in accordance with BS6500.

The PLOGG is activated approximately 3 seconds after the mains supply has been turned on.

The PLOGG contains an embedded transceiver which is an approved RF device operating at 2.4gGHz bandwidth.

NORMAL OPERATION

Normal Environmental Conditions:

a) Indoor use only;
b) Altitude up to 2000m;
c) Temperature of 5°C to 40°C;
d) Maximum relative humidity of 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C;
e) MAINS supply voltage fluctuations of up to +/- 10% of the nominal voltage;
f) POLLUTION degree 1, normally only dry, non-conductive pollution.

Connection to the Mains Supply

The Plogg is a type of adaptor and under normal circumstances the Plogg is connected to the mains supply via the Plogg's (UK 13A) plug connection. The appliance load is connected via the Plogg's (UK 13A) socket. Once connected to the mains supply and the mains supply is switched ON then A.C. power supply at nominal 230V ~ is available at the Plogg socket and a connected load/appliance will receive power as though connected directly to the mains supply socket.

The Plogg should be connected to a wall or floor mains socket only where it is not difficult to remove from the socket.

The device is intended for operation in ambient temperatures below a maximum of 40°C

The Plogg meter records electrical power consumption (kWh and kVAR) and, if applicable, electrical power generated. The data is stored within the Plogg's 64kB memory and can be downloaded in a text file format via the RF wireless connection to a Windows enabled PC or Laptop or viewed as instantaneous readings on the installed Plogg Manager software.

A number of electrical parameters are measured including Volts, Amps, Watts, kWh, kVARh and phase angle.

If the device is not operated in the manner and under the conditions specified above then the protection provided by the equipment may be impaired.

Under the Waste Electrical and Electronic Equipment Regulations 2006 this product should be disposed separately from other household waste and in specially designated local authority operated recycling sites.

PROTECTION - The device is protected against electric shock in NORMAL CONDITION and in SINGLE FAULT CONDITION.

The device is protected against excessive energy in the case of a fault in the unit by a fusible resistor.

METERING - The device contains a Teridian meter system chip with the following features:

Wh accuracy over temperature and 2000:1 range <0.5%
Exceeds IEC62053 /ANSIC 12.20
Voltage reference <50ppm/°C
Four quadrant metering
Voltage/current angle
40-70Hz line frequency range with same calibration
22 bit delta-sigma ADC

Battery backup for RTC
8-bit MPU (80515) – 1 clock cycle per instruction

Technical Assistance

In the first instance support for all technical questions relating to the operation and maintenance of the Plogg should be directed to the person or organisation that supplied the Plogg.

If you require further assistance or the support received from your direct supplier does not answer your questions then please contact the manufacturer:

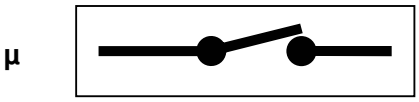
Energy Optimzers Limited
Estate Road 1
South Humberside Industrial Estate
Grimsby
DN31 2TA
United Kingdom

Tel: +44 1472 266731
Fax: +44 1472 360112

Email: sales@energyoptimizers.co.uk

SYMBOLS

Safety Alert Symbols are used to warn of a potential personal injury hazard. This symbol is used in conjunction with the signal word or can be used alone. This symbol is used on both product safety labels and in literature which can describe the potential hazard in greater detail.



The Plogg contains a normally closed relay as indicated in the sign above. The relay is energised through the operation of the Plogg and the relay is then opened and the connected load is disconnected from the mains supply.

UL - North American Product Safety Certification

Underwriters Laboratories (UL) is an independent product safety testing and certification organization. The UL Mark on a product means that it has been tested by UL and determined to meet UL's requirements. Products are also periodically checked at the manufacturers' facility. Mark indicates compliance with U.S. (UL) and Canadian (CSA) safety standards such as, UL 61010-1 and CSA 61010-1.

FCC - North American EMI Verification

The U.S. Federal Communications Commission (FCC) enacted electromagnetic-interference (EMI) regulations for various products such as transmitters, receivers, information technology, and similar microprocessor-based equipment. To streamline authorization procedures for computers and similar devices, and to align FCC requirements with those of world markets, the FCC amended Parts 2 and 15 allowing manufacturers' self-authorization. NI products comply with U.S. FCC and Industry Canada EMI Verification requirements for a Class A digital device according to FCC Part 15 and ICES-003.

WEEE ANNEX IV Symbol

WEEE - Waste Electrical and Electronic Equipment Directives

In 2003, the European Parliament passed the Waste Electrical and Electronic Equipment (WEEE) directives to encourage the reuse, recycling, and recovery of WEEE and to improve the environmental performance of all operators involved in the life cycle of electrical and electronic equipment, especially those dealing with WEEE. Member states were required to adopt legislation by August 13, 2005. National Instruments is actively working with our European branch offices and subsidiaries to fully comply with these regulations as local legislation is passed. The regulations apply to all electrical and electronic equipment on the European Union market in that falls into any of 10 categories. National Instruments products fall under Category 9, Monitoring and Control Instruments.

EU RoHS - Restriction of the Use of Certain Hazardous Substances
RoHS - The National Instruments RoHS marking symbolizes a product which is RoHS-compliant. NI is releasing RoHS-compliant products as part of the NI Hazardous Substances Reduction initiative. This NI initiative is a voluntary program modeled after the European Union RoHS (2002/95/EC) directive, which restricts the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE) in new electrical and electronic equipment put on the market in the European Union. The RoHS directive applies to eight categories of electrical and electronic equipment but excludes products in Category 9, Monitoring and Control Instruments, under which NI products fall.

SOFTWARE INSTALLATION PROCEDURE

SOFTWARE DOWNLOAD

Please go to www.plogg.co.uk and to the Technical Support page.

This is the software download page and you will need to download the Plogg PC Manager to a convenient folder on your Laptop or PC.

The Plogg Manager programme is the principal operating software package for the Plogg.

The Terminal Manager (optional download) is a support tool not normally required but can be downloaded as an alternative control system to aid support issues.

Another support tool often used by OEM engineers is the Telegesis Terminal and this can be found at the Telegesis web site

http://www.telegesis.com/

http://www.telegesis.com/telegesis_zigbee_technology_-_technical_support_/telegesis_terminal.htm

EAP Unit

Connect the EAP unit first, following the commands in the first half of the Telegesis manual provided with the device and download the Lantronix device manager from the CD provided with the unit. You may wish to consult with your I.T. department if this unit is to be accessed by a VPN connection outside of your internal Ethernet. Make a note of the COM port number assigned to the EAP unit.

Please read the following guides for information about how to install the EAP unit with the Ploggs and how to set up a remote access to the EAP mesh network via the Internet.

Installation Guide for Ethernet Acces Point

How to configure the Lantronix COM port redirector software to access an EAP gateway network via the internet

USB Dongle

Download the Telegesis USB driver from the Technical Support page to your PC or Laptop and then plug the dongle into a free USB port. Note the COM port number assigned to the USB device by *right click My Computer, Properties, Hardware, Device Manager, Ports.*

When you have downloaded the Plogg Manager and installed either the USB device or the EAP unit then follow the next instructions.

Introduction

A Plogg network is composed of the following device types:

- One or more Ploggs (Zigbee routers)
- One host controller which acts as the Zigbee mesh coordinator
- Optionally, other host devices acting as routers

For the purposes of this document, a host controller can either be a Plogg USB stick or a Plogg Ethernet Access Point.

Please note that you can have more than one host controller in your Plogg network as long as only one is designated as the coordinator and the others are routers.

Initial Setup

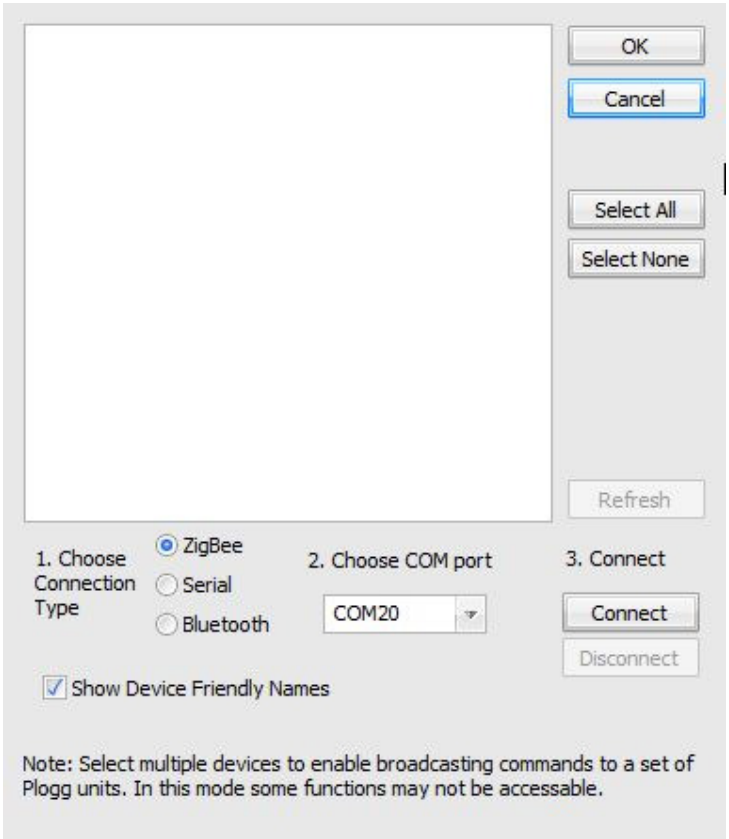
The current release version of the Plogg (1.XX) and Plogg Manager (1.XX) operate solely on a Zigbee network ID 31F4 on channel 11. The Ploggs are all factory set to operate with these parameters and normally this cannot be changed.

Future versions of the firmware (2.XX) and software (2.XX) allow the user to specify the network ID. Additionally, the software will automatically pick a channel with the least interference. Version 2.XX is currently in Beta testing.

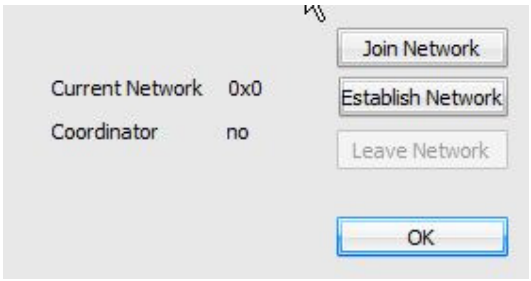
The initial setup can be tricky in certain circumstances. However, we have found that the following instructions will work.

Initialising The Zigbee Network

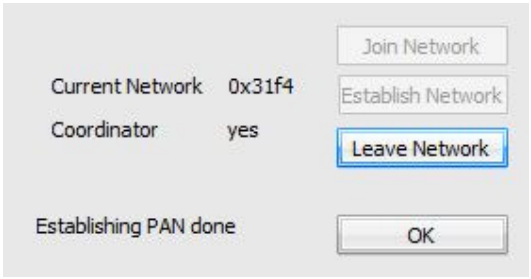
1. Install one host controller that will act as the Zigbee coordinator and ensure that it is working satisfactorily
2. Ensure that no Plogg devices are powered up or plugged into wall outlets
3. Ensure that no other host controllers are powered on
4. Start Plogg Manager and click the “Connect to Button”
   The following dialog box will be displayed.



5. Ensure that the Connection Type is set to Zigbee
6. Ensure that the COM port selected matches the COM port your host controller is operating on
7. Now click the “Connect” button
   The following dialog will be displayed:



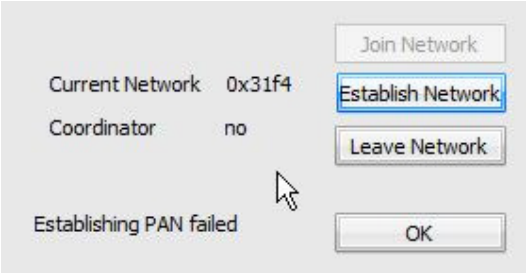
8. Click the “Establish Network” button and wait for confirmation that the command has been completed.
   If all goes well, you should see the following.



This shows that the host controller has established the Zigbee network on ID 31F4 and is acting as the coordinator.

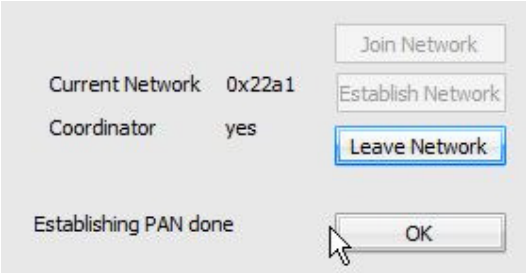
Potential Problems

You may see something like the following:



This shows that the host controller is operating on the correct network ID but cannot coordinate the network. If this is the case, it means there is already a network coordinator in range of your host controller that is operating in network 31F4 channel 11.

You may also see something like this:



This tells us that again, there is already a coordinator for 31F4 on channel 11. In this case, the Zigbee host controller has established a network on a random ID. This is actually part of the Zigbee protocol specification and is normal.

If you do get results similar to these, please refer to the troubleshooting section of this document. Until your host controller is established as the coordinator of network 31F4 you will not be able to connect to your Ploggs.

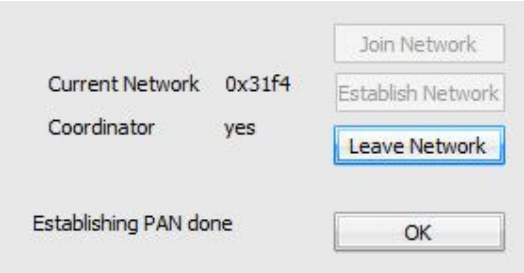
Connecting to the Ploggs

Once you have successfully installed your host controller, and the host controller is coordinating the Zigbee network on 31F4 you can connect to the Ploggs using Plogg Manager.

At this stage, please do not power up all your Ploggs, it"s far easier to do each one in turn which also eliminates any confusion over which Plogg you are actually connected to.

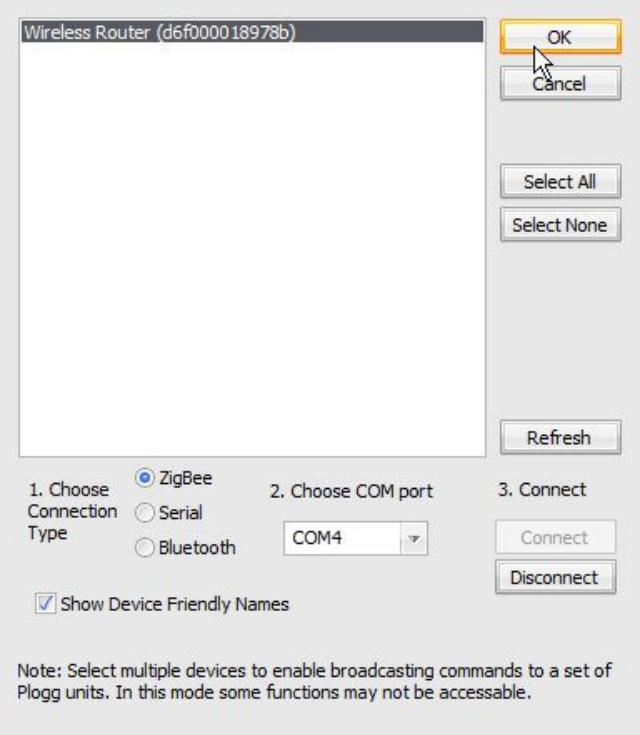
With this in mind, please repeat the following for each of your Ploggs:

1. Connect the Plogg to the power outlet, and if needed switch it on.
2. Start Plogg Manager if it"s not already running.
3. Click the "Connect" button
4. Ensure that the Connection Type is set to Zigbee
5. Ensure that the COM port selected matches the COM port your host controller is operating on
6. Now click the "Connect" button
   The following dialog should be displayed:

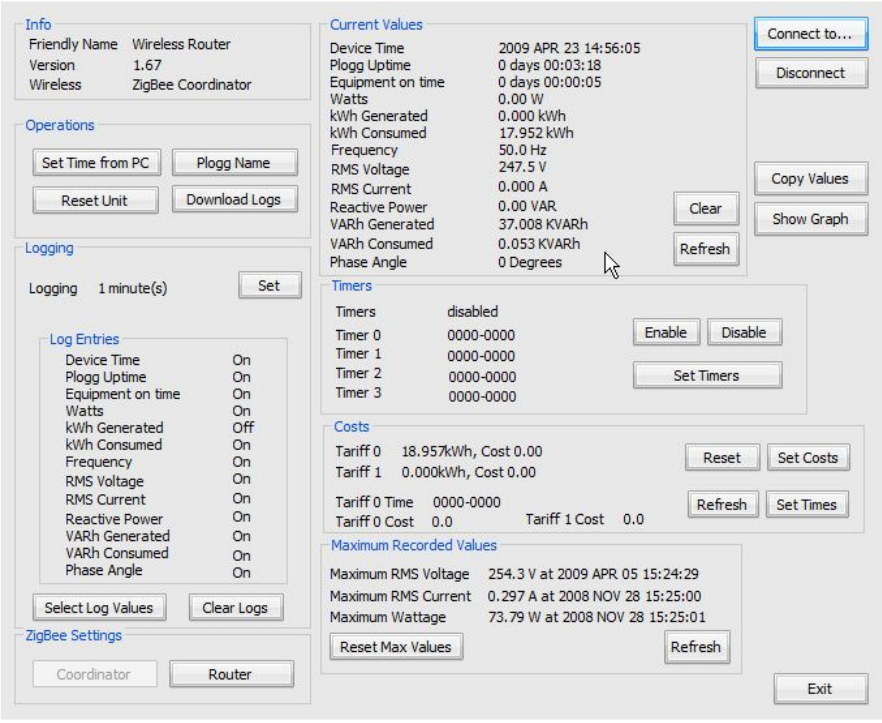


7. Click the "OK" button.
8. Plogg Manager will now search for Ploggs.

9. You should see something similar to this:



10. Click on the Plogg and then click on the "OK" button. Plogg Manager will now connect to the Plogg, retrieve it"s stored values and display them on screen:



11. Click the “Connect to” button
12. Remove the Plogg from the wall outlet
13. Put the next Plogg in the wall outlet
14. Click the “Refresh” button
15. Repeat steps starting from step 9
16. Finally install all successful Ploggs

Potential Problems

At this stage, the only problem scenario is that Plogg Manager cannot see the Plogg device that you are attempting to connect to.

The likely reasons are:

- The Plogg device has been set to be the coordinator of the Zigbee mesh network.
- The Zigbee module has become unseated from the motherboard inside the Plogg.
- The Plogg is faulty
- The Plogg"s Zigbee module has been set to exist on a different network ID and / or a channel other than channel 11. This is highly unlikely.

Please refer to the troubleshooting section of this document if you suspect any of the above mentioned problems.

Adding Further Host Controllers to a Network

If you have more than one host controller e.g. PC with USB or EAP, you can add more to your Zigbee network but they have to be designated as routers and not as coordinators.

You need to install the host controller, and, using Plogg Manager, “Join Network” instead of “Establishing Network”. The host controller should be accepted by the existing coordinator and will now act as a router.

Troubleshooting

If “Establishing Network” fails

If you cannot establish a network using your host controller as the coordinator of network 31F4, try the following:

1. Close Plogg Manager if it’s running
2. Remove all Plogg devices from wall outlets
3. Make sure all host controllers are not powered
4. Get one host controller e.g. PC-USB, up and running
5. Use Plogg Manager to Connect to a network
6. If the “Leave Network” button is enabled click it and wait for confirmation message
7. Click the “Join Network” button and wait for the message “Joining PAN”
8. When this message is displayed, click the “Establish Network” button.

These steps should force the Plogg Manager software to reset your host controller to its default settings. Establishing the network should now be possible.

Changing a Plogg from a Coordinator to a Router

If a Plogg has been designated as a coordinator then you will not be able to establish the network whilst the Plogg is powered. If your host controller is set to be the coordinator then you probably won't be able to see the Plogg through the Plogg Manager unless you leave and then join a PAN.

Whilst we do recommend that that the PC-USB or the EAP is set to be the Coordinator in a mesh network , simply because of the natural sense of having the Plogg Manager located at the coordinator, the mesh can operate with just one Plogg set as the Coordinator and the PC-USB or EAP set as Routers.

To set the Plogg back to being a router:

1. Switch off the Plogg
2. Exit the Plogg Manager
3. Remove the USB dongle from the PC
4. Insert the USB dongle in the PC
5. Switch on the Plogg
6. Start Plogg Manager
7. "Connect" and in dialogue box
    a. Leave Network
    b. Join Network (PAN)

5. The Plogg Manager should confirm that the PC is not a coordinator and the PAN ID is 0x31f4.
6. Press OK and the Search process should reveal the Plogg.
7. Connect to the Plogg and you should be able to see the values, and confirmation that the Plogg is a Zigbee Coordinator.
8. Now click on the "Router" button.
9. The Plogg Manager will report an error message " Error in response from device, manager will now disconnect"

The 'errant' Plogg should now be correctly configured as a router.

