

Installation Help sheet

ENERGY DISPLAY METERS FOR SCHOOLS

Finding the IP address of a Z3 data logger on a network.

Document Version: 1.2



Department for
Education



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1 Document Management

Where changes are made to this document, the editor must fill in the version control section 1.2. The editor must include the changes and up there version of the document appropriately.

1.1 Contributors

Please provide details of all contributors to this document.

Role	Department	Name
Owner	aM&T	Matthew Dillane

1.2 Version Control

Please document all changes made to this document since initial distribution.

Date	Version	Author	Checked	Section	Amendment
26/05/10	1.0	Matthew Dillane			
29-6-10	1.1	Matthew Dillane	TP	2	Added Introduction
29-6-10	1.2	Matthew Dillane	TP	8	Added Glossary of terms
20-9-10	2	Matthew Dillane	TP	-	Final Issue

2 Document Introduction

This document will help you during the commissioning process using the Z3 logger for Energy Display Meter project.

There will be occasions, when things don't go to plan and this document will help you find those faults and leave site with a working dashboard.

3 Responsibilities

Role	Name	Responsibilities
Technical Lead	Matt Dillane BGB	Lead Technical Engineer for BGB
Installers	Service Providers	Install and Commission hardware.

4 Logger IP

The following will help you locate the IP address of the logger.

Get the (Media Access Control) MAC address from the logger

On the left hand side of the logger is the serial number. This consists of three parts. The first part on the left will be '3000'. This notates the type of logger. The centre part (highlighted in red in figure 1.) is the last few digits of the MAC address. In this case it is 00065D or '00-06-5D'. Make a note of this number. The last four numbers are the batch number.



Figure 1. Image showing the middle section of the part number.

5 Run and CMD

Using the PC that the dashboard software is installed on do the following:

1. Go to Start
2. Go to Run
3. Type CMD

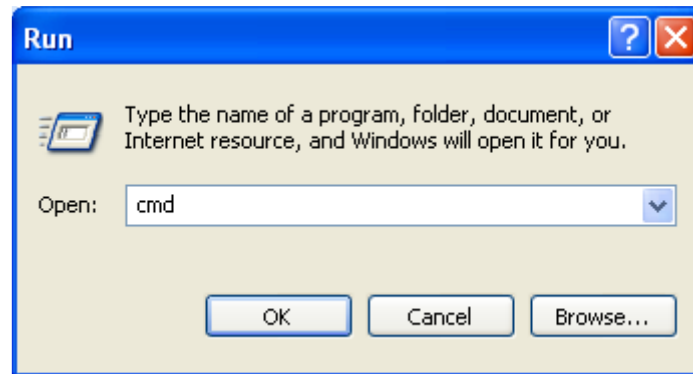
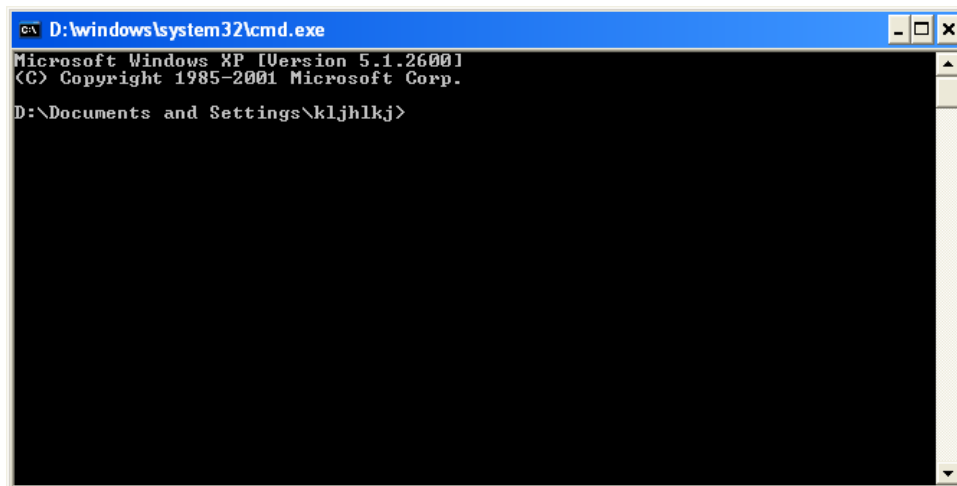


Figure 2. Example showing the Run dialogue box.

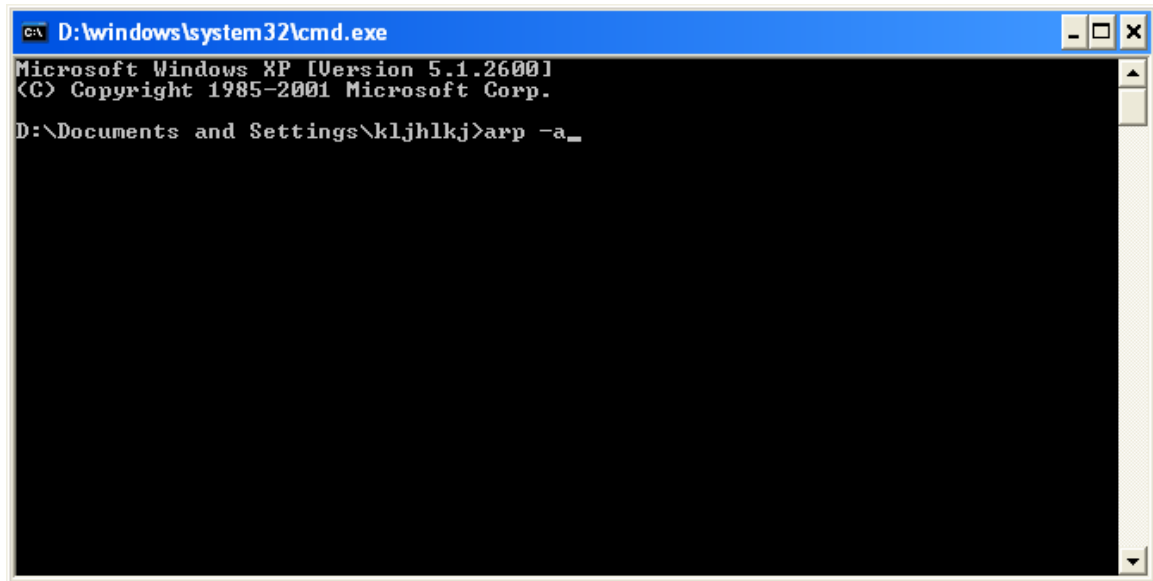
4. Then hit the return key

You will now see the following screen:



5. Type the following command:

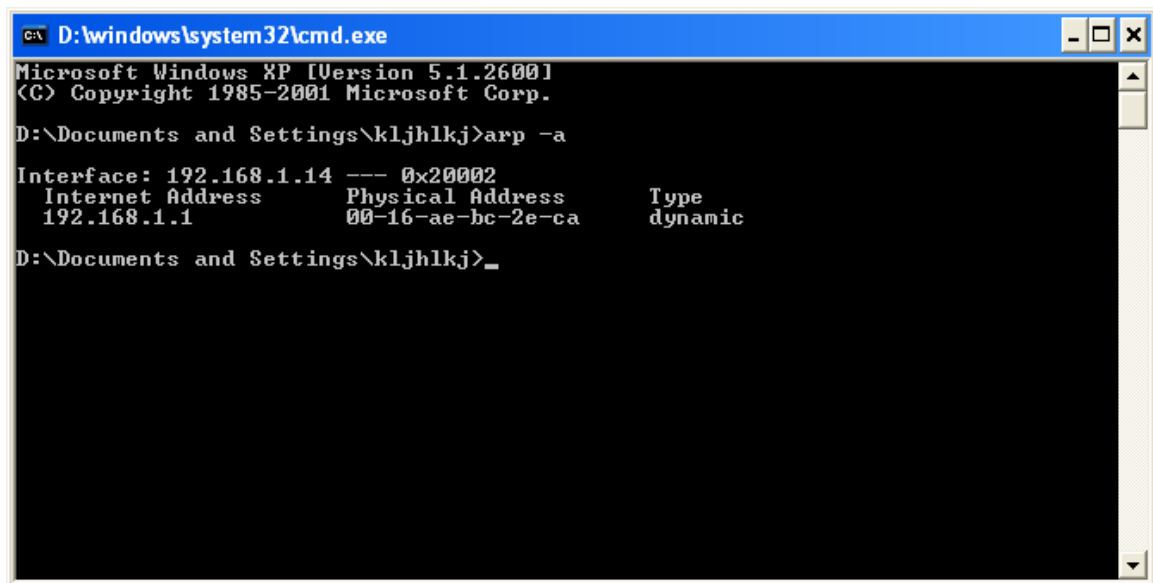
'Arp -a' as shown in the image in figure 3.



```
c:\ D:\windows\system32\cmd.exe
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.
D:\Documents and Settings\kljhlkj>arp -a_
```

Figure 3. Example showing 'arp -a' command typed.

6. Then hit return:



```
c:\ D:\windows\system32\cmd.exe
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.
D:\Documents and Settings\kljhlkj>arp -a
Interface: 192.168.1.14 --- 0x20002
Internet Address      Physical Address      Type
192.168.1.1          00-16-ae-bc-2e-ca    dynamic
D:\Documents and Settings\kljhlkj>_
```

Figure 4. Example showing the MAC addresses and IP addresses.

7. The 'arp' command will show you all of the devices on that subnet.

6 ARP explained

You will notice that there are four fields, as shown in figure 3.

Interface: This is the computer you are using.

Internet Address: This is the IP address of a device. This could be a printer or PC or any network enabled device.

Physical Address: In this example the MAC address of the logger is '**00-16-ae-bc-2e-ca**'. This is the MAC address, no other device in the world will have this address. It is made up of letters and numbers. If we were looking for a logger, the part we would be checking against the serial number would be the last three pairs of numbers. Which would be '**bc-2e-ca**'? If we were to compare that to the logger serial number, the logger would be '**3000-BC2ECA-1002**'.

Type: The type denotes how it gets an IP address. If it is dynamic then the network gives its IP address. If it says fixed, then it has been programmed with a fixed IP address, that is to say some person has given the IP address to the logger.

7 IP address located

Once you have located the IP address you can use it to continue the testing.

8 Glossary of Terms

8.1 DHCP

Dynamic Host Configuration Protocol. DHCP is a communications protocol where a range of IP addresses (see 8.2 for IP Address explanation) are managed centrally and assigned automatically to computers or devices on demand. The alternative is to use static IP address where each computer is permanently allocated a fixed IP address.

An advantage of DHCP (over static IP address allocation) is that it removes the burden of configuring each computer to use a unique IP address and removes the need to manually keep records on which IP address has been allocated to which computer. The disadvantage is that the IP address of a computer cannot be known in advance and its IP address may change over time.

8.2 IP Address

Every machine on the Internet has a unique identifying number, called an IP Address.

A typical IP address looks like this:

- 216.27.61.137

To make it easier for us humans to remember, IP addresses are normally expressed in decimal format as a "dotted decimal number" like the one above. But computers communicate in binary form. Look at the same IP address in binary:
11011000.00011011.00111101.10001001

It is possible that the IP address can be given automatically by DHCP and in some cases it has to be programmed manually.

8.3 MAC Address

Media Access Control address is a Hardware serial number that uniquely identifies a device on a local area network (commonly a NIC). (Sometimes also referred to as a NIC's "physical address".)

A MAC address is 6 bytes in length (i.e. 48 bits) and is normally written as a 12 digit hexadecimal number, with dashes or colons between each pair of hexadecimal digits. The first three bytes identifies the manufacturer and the second three bytes represent a unique serial number generated by that manufacturer. MAC addresses should therefore always be unique (although some cards and switches allow the MAC address to be cloned).

To lookup the MAC address of a device on a local network try:

- ping device
- arp -a ip-address

A MAC address will look like the following:

18-a9-05-2c-47-25

As we can see the MAC address is in 6 bytes.

Byte 1= 18

Byte 2 = a9

Byte 3 = 05

Byte 4= 2c

Byte 5 = 47

Byte 6 = 25

The bytes in these 6 different numbers are in hexadecimal, and the byte is made of two bits. For example byte two from the list above is made of two bits, 'a' and '9'.

In hexadecimal there are sixteen possible number and range from 0 to 15. As a computer cannot accept double digit numbers we use letters to continue counting from 9.

0,1,2,3,4,5,6,7,8,9,a,b,c,d,e,f

Having noted this if you are ever given a MAC address with any letter greater than f, say g or m, then it is not correct. It can only range from 0 to f.

8.4 Subnet and Networking

Some portion of the IP address represents the network number or address and some portion represents the local machine address (also known as the host number or address). IP addresses can be one of several classes, each determining how many bits represents the network number and how many represent the host number. The most common class used by large organizations (Class B) allows 16 bits for the network number and 16 for the host number. Using the above example, here's how the IP address is divided:

```
<--Network address--><--Host address-->  
130.5 . 5.25
```

If you wanted to add subnetting to this address, then some portion (in this example, eight bits) of the host address could be used for a subnet address. Thus:

```
<--Network address--><--Subnet address--><--Host address-->  
130.5 . 5 . 25
```

To simplify this explanation, we've divided the subnet into a neat eight bits but an organization could choose some other scheme using only part of the third quad or even part of the fourth quad.