Cube400 IP
Network Installation Guide

1 Introduction

The Cube400 IP meter is a standard Ethernet TCP/IP component designed for inclusion in a computer system such as a Microsoft® Network. Depending on the hardware and settings of the network, access to the meter may be made within the local intranet or over a wider area network such as the World Wide Web.

Immediate connection to the meter is made using a standard CAT5 socket. Standard, low-cost cabling may be used to connect the meter to the network. A host of standard devices may be used to make the physical connection to the network such as direct wired CAT5 sockets, routers, wireless access points, mains signalling access points etc. The selection of the connection method is made to suit the layout of the network and may take into account other factors such as security and cost.
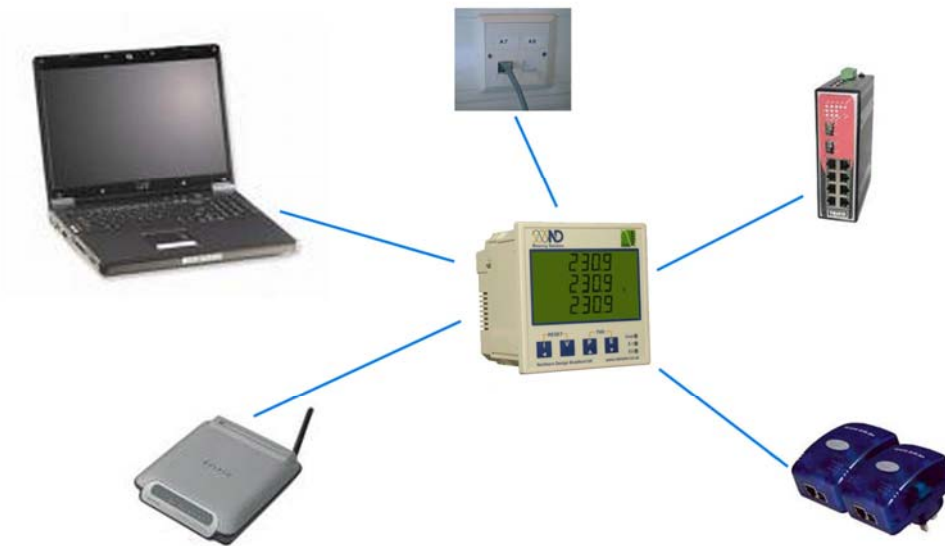

Figure 1. Meter Network Options

2 Meter IP Addressing

2.1 Fixed IP Address

Each device is recognised on a single computer network using a unique identification number (IP address). Each device on a network must have a different IP address. The format of IP addresses is set by the network protocol making the meter compatible with all IP networks globally. IP addresses are expressed as 4 numbers each in the range 0 to 255 and written down using "dot notation".

The **Cube400** is factory set with a fixed **IP Address**:

<p align="center">192 . 168 . 1 . 127</p>

The user may change the IP address via the keys/display of the meter or using a standard web-browser as described in Section 4.2.

2.2 Subnet Mask

Larger computer networks may be conceptually divided into smaller more manageable networks ("sub-nets") by means of an extension to the IP addressing protocol referred to as "Subnet Masks". By adding a Subnet Mask to a device's IP address it identifies which "sub-net" it is connected to. This sub-net may be used to identify a physical location for a group of network devices or possibly to conceptually separate networks of similar equipment such as **Cube400** meters.

The **Cube400** is factory set with a **Sub-Net Mask**:

<p align="center">255 . 255 . 255 . 0</p>

The user may change the Subnet Mask via the keys/display of the meter or using a standard web-browser as described in Section 4.2.

2.3 Default Gateway

Local area networks (LANs) provide access to wider area networks via one or more access points called gateways. For example access may be given to the World Wide Web via a single access point.

Devices on a LAN may be directed to a wider area network by being provided with the address of the desired gateway.
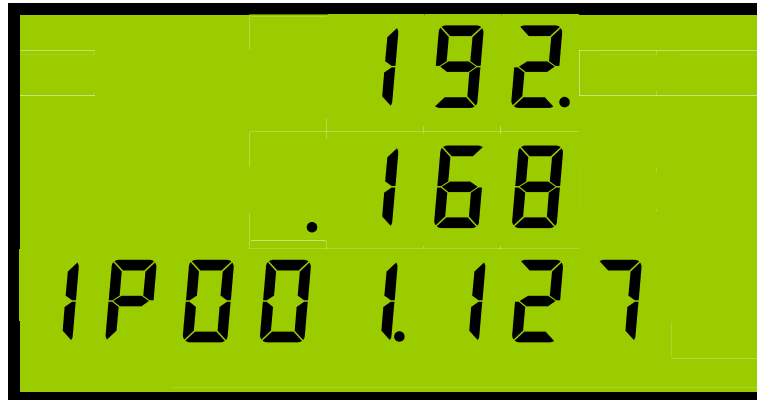
The **Cube400** is factory set with a **Default Gateway**:

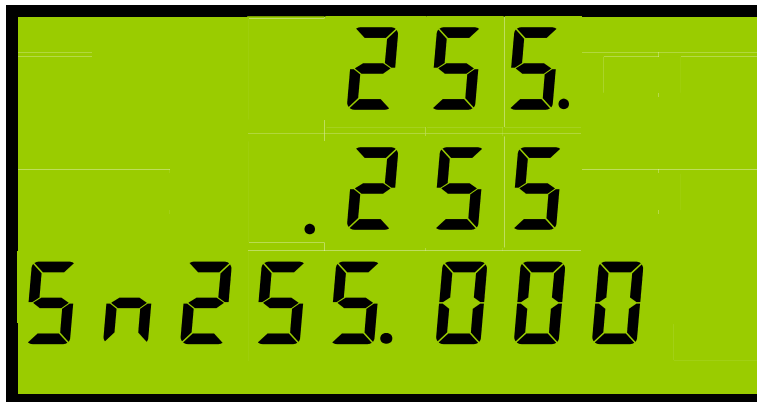<p align="center">192 . 168 . 1 . 254</p>

The user may change the Default Gateway via the keys/display of the meter or using a standard web-browser as described in Section 4.2.

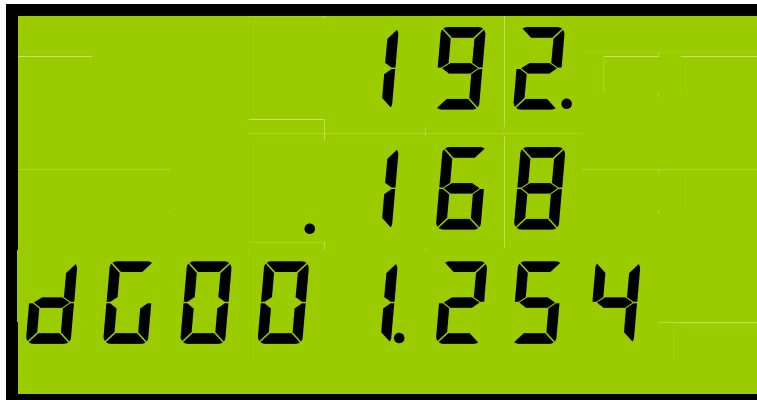## 2.4 Displaying the Meter Network Settings

Press [V] and [P▲] keys together to step through the Network Settings display menu pages.

IP Address 192.168.1.127

Sub Net Mask 255.255.255.0

Default Gateway 192.168.1.254

2.5 Changing The Meter Network Settings

The following pages allow programming of *IP Address*, *Subnet Mask* and *Default Gateway*.

- To enter programming mode press [◄ I] and [V] together and hold for approximately 5 seconds. (for further information on programming mode refer to the meter operating manual).

- Press [◄ I] to step past each programming page until the *IP Address* setup page is displayed.

- Press [V] to step through each of the 4 displayed address bytes, on a page, to be changed. This byte will flash to show it is being changed.

- Press [▲ P] or [▼ E] to increment or decrement the flashing byte (Flashing stops until the key is released).

- Press [◄ I] to select the next address in the sequence *IP-Address ->*, *Subnet Mask -> Default Gateway.*

- Press [◄ I] to step past all setup pages until the meter returns to standard monitoring mode.

The programmed network settings are retained in the meter's secure memory during auxiliary power failure.

3 Ethernet Connection

3.1 Meter Auxiliary Supply

A single phase auxiliary A.C mains connection must be supplied to the meter as a minimum in order to test/configure the network.

Check the meter label to determine the required voltage for each meter and connect as shown:
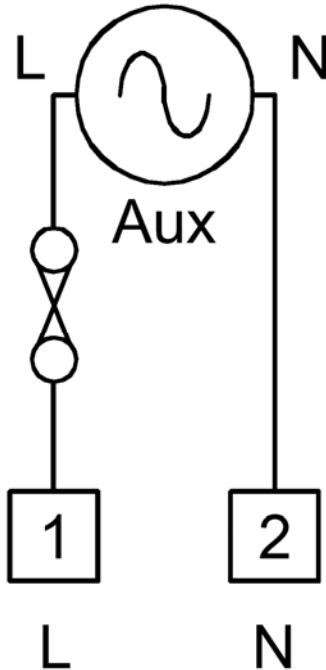

Figure 2. Auxiliary Mains Supply

> # WARNING!
> Access to live meter terminals must be prevented by mounting in a secured panel enclosure

3.2 Connecting To A Laptop/PC

3.2.1 General
It is possible to connect a single meter to a Laptop or PC, which is not part of a computer network. This may be useful for example to configure individual meters via the Ethernet interface before connection to a network.

3.2.2 Connection
Connect the meter auxiliary supply as described in Section 3.1.

Plug the CAT5 crossover adaptor provided into the RJ45 socket of the PC/Laptop. Plug one end of the CAT5 cable provided into the crossover adaptor and the other end into the RJ45 socket of the meter as shown below.
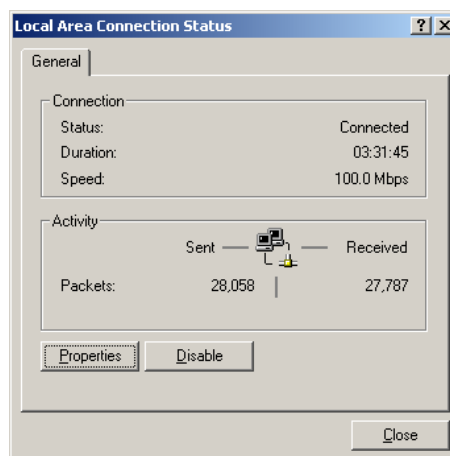

Figure 3. Meter to laptop Direct Connection
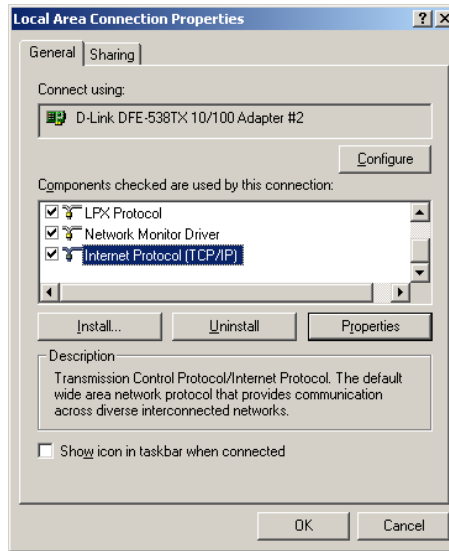
3.2.3 Laptop/PC Setup
Ensure the Laptop/PC network settings are configured to communicate with a single fixed IP address.
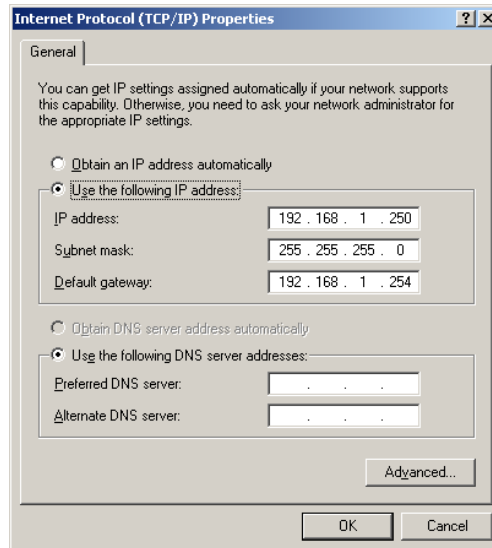
For MS Windows®:
- From the **Start** menu select **Settings** - **Control Panel**.
- Open the **Networks and Dial-Up Connections** Dialog.
- Double Click on the **Local Area Connection Icon**.

- Click on the *Properties* button.

- Select *Internet Protocol (TCP/IP)* from the component list as shown above.
- Click on the *Properties* button.

- Select the *Use the following IP address* radio button.
- Enter a fixed *IP Address* for the PC. This must have the first 3 numbers the same as the meter address and the third number different eg. Meter=192.168.1.127, PC=192.168.1.250.
- Enter the *Subnet Mask* setting for the meter.
- Enter the *Default Gateway* setting for the meter.
- Click on the *OK* button.
- Close the *Local Area Connection Properties* dialog box.

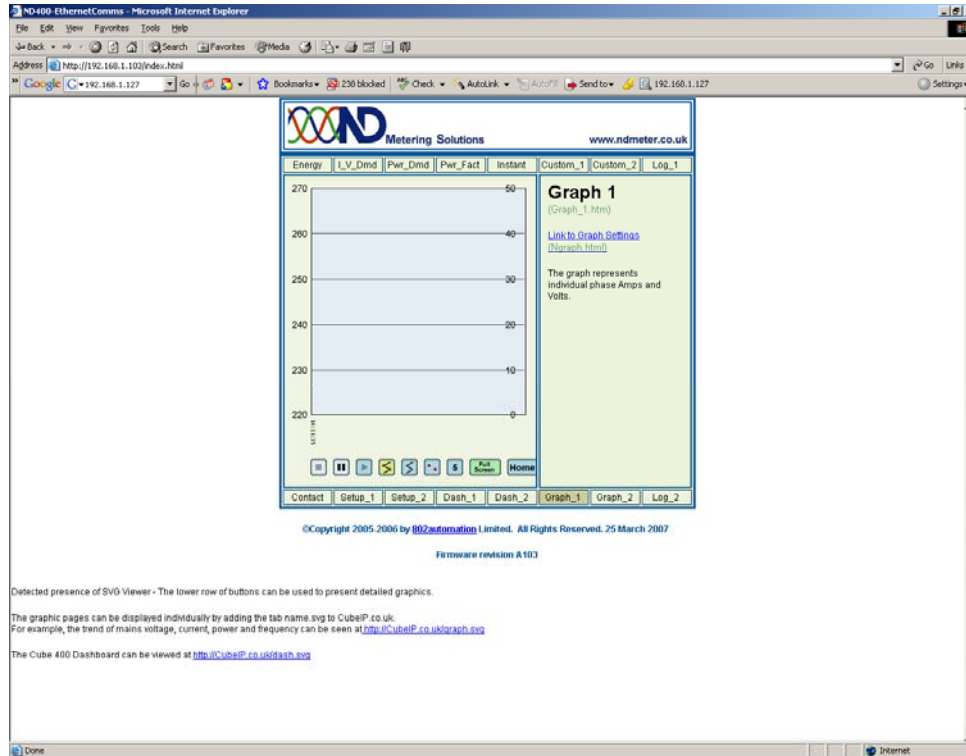The PC is now configured to talk only to the connected meter.

3.2.4 Testing The Connection

Open a browser such as Internet Explorer or Firefox.

Enter the meter IP address in the Address Bar.

The meter web site should now be displayed in the browser window.

3.3 Connecting To A Computer Network

3.3.1 General
Before connecting a meter to a computer network it is essential that the meter IP settings are suitable for the network configuration.

If single/multiple meters are to be connected to a network a single/range of Fixed IP addresses must be free and allocated before the meters are added. This prevents a clash of addresses between existing hardware and the meters.

3.3.2 Ask The Network Administrator (recommended)
The Network Administrator would assign a *Range of IP Addresses* available at convenient physical locations on the network.

The *Subnet Mask* should be configured for the sub-net containing the meters or the default network value mask as required.

The *Default Gateway* available for the meters to route to a required access point (e.g. a gateway to the World Wide Web) should be noted.

Program each meter with a unique IP address from the range provided, the subnet mask and the Default Gateway as described in Section 2.5.

3.3.3 Determine The Network Values (advanced)
It is advised that the Network Administrator provides the information required to setup the meters to prevent possible clashes with other network equipment (Section 3.3.2).
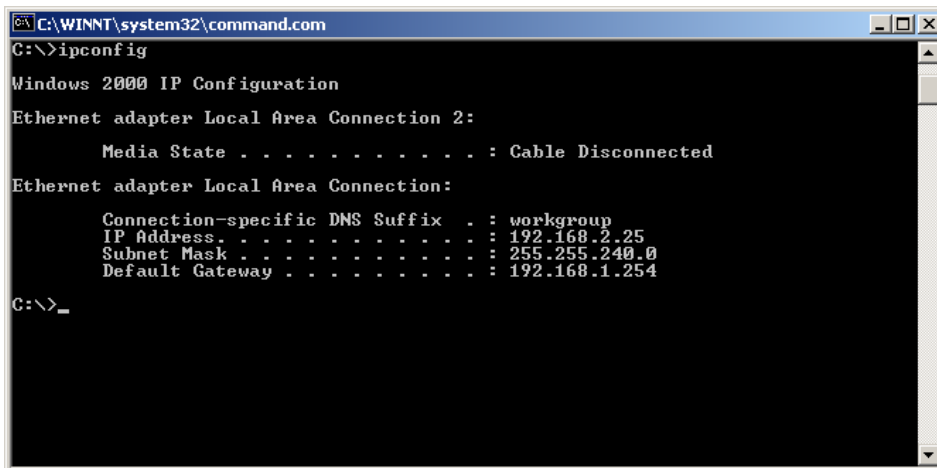
If the Network Administrator cannot provide the information necessary to setup the meters it may be possible to determine the *Default Gateway* and *Subnet Mask* as follows:

On the Windows Start Menu select Run.

Enter "*COMMAND*" and select the OK button to open a *DOS Command* window as shown
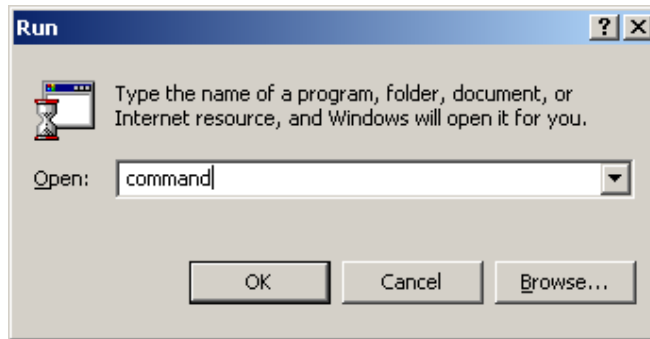
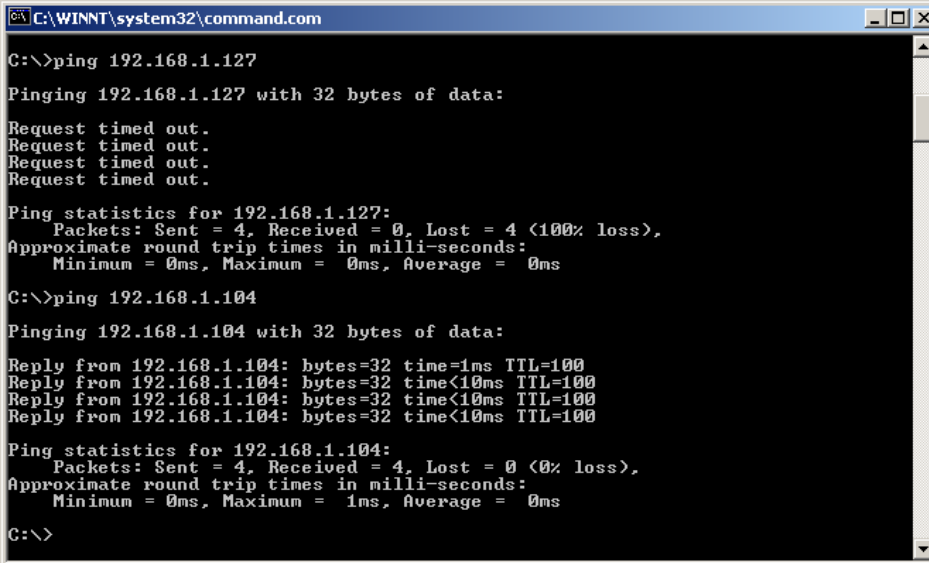At the command prompt (e.g. "*C:\>*") type *ipconfig* and press enter.

Take a note of the *Subnet Mask* and *Default Gateway*. The IP address here is the IP address of the PC running the DOS command window and is not required.

Program each meter with the *Subnet Mask* and the *Default Gateway* as described in Section 2.5.

Program each meter with a unique *IP Address*, which is currently not in use on the network.

To check if an IP Address is in use:

At the command prompt (e.g. "*C:\>*") type *ping IP Address* (e.g. ping 192.168.1.127). and press enter.

```
C:\WINNT\system32\command.com

C:\>ping 192.168.1.127

Pinging 192.168.1.127 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.1.127:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum =  0ms, Average =  0ms

C:\>ping 192.168.1.104

Pinging 192.168.1.104 with 32 bytes of data:

Reply from 192.168.1.104: bytes=32 time=1ms TTL=100
Reply from 192.168.1.104: bytes=32 time<10ms TTL=100
Reply from 192.168.1.104: bytes=32 time<10ms TTL=100
Reply from 192.168.1.104: bytes=32 time<10ms TTL=100

Ping statistics for 192.168.1.104:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum =  1ms, Average =  0ms

C:\>
```

Repeat this command for each IP Address in the required range.

The DOS Command window above shows two possible outcomes of the *ping* command.

1. ping 192.168.1.127   *Request timed out*. (NO equipment on network with this IP Address).

2. ping 192.168.1.104   *Reply from 192.168.1.104*. (Equipment exists on network with this IP address).

The meters may be programmed with *IP Addresses*, which have a reply to *ping* of type 1.

NOTE: Although *ping* may suggest an unused *IP Address* it is possible that the network has this address reserved for a device, which is currently switched off. Your network administrator should be able to advise a range of available IP Addresses.

3.3.4 Connection

Connect one end of the CAT5 cable provided into the Meter and the other end into an RJ45 socket of a network access point (wired socket, hub/switch, Wireless access point etc).

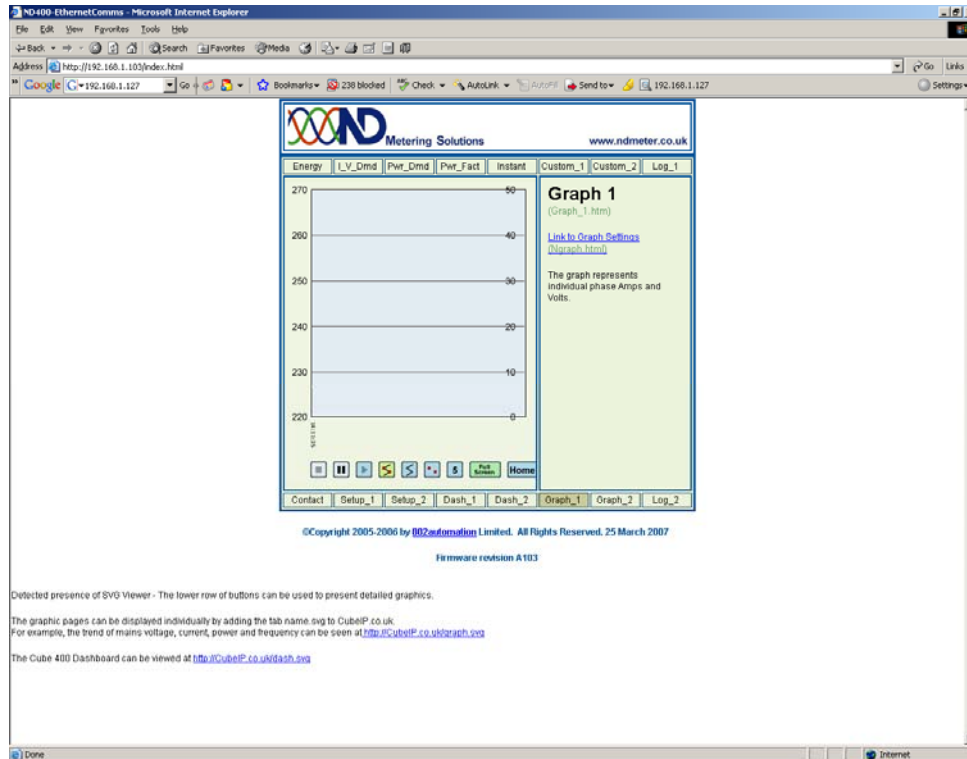
Figure 4. Meter Network Connection

3.3.5 Testing The Connection

Open a browser, such as Internet Explorer or Firefox, on a PC with access to the sub-net containing the meters.

Enter the meter IP address of one of each meter in turn in the Address Bar.

The meter web site should now be displayed in the browser window.

4 The Meter Web-Site

4.1 Introduction

Each meter hosts a built in web site, which allows meter readings and other data to be viewed in a standard browser such as Internet Explorer or Firefox.

It is possible to replace the standard web pages with alternative HTML pages allowing the meter to provide custom styles and data views.

4.1.1 Java Script

The standard web site uses Java Script to extract electricity data from the metering circuit and make them available for display on the web pages. *Java Script must be enabled* in the browser in order to see the meter readings.

4.1.2 SVG Viewer

The meter web site displays data as dynamic graphs and analogue meter images. This is made possible using *Scalable Vector Graphics* format. This is made possible using a *Scalable Vector Graphics Viewer*, which must be installed on the local computer (the PC running the browser). This is similar to viewing Portable Document Format (PDF) files over the internet.

To install the viewer visit the adobe.com website at:

http://www.adobe.com/svg/viewer/install/main.html

Firefox browser from *Mozilla* may be used as an alternative to *Microsoft Internet Explorer*. This browser has a built in SVG viewer so there is no need to download it separately.

The *Firefox* browser is available at:

www.mozilla.com/firefox

4.2 Network Setup Page

A setup page is available in the meter web site but this may not be accessed via a "clickable" link in the standard web pages.

To access the Network Setup Page type http://*IP Address*/network.html into the address bar e.g:

http://192.168.1.103/network.html

IP Address	192	168	1	103
Subnet Mask	255	255	255	0
Gateway	192	168	1	254
Primary DNS	192	168	0	51
Seconadry DNS	0	0	0	0

The MAC address is allocated during manufacture and is not field alterable.

MAC Address	00	1B	E5	10	10	24
Power Cycles	56				

It is possible to change the Network setup using the browser by typing new values into the boxes in the Network Setup Pages.

NOTE: As you change network settings using this method communications with the meter may be lost in the browser. For example if the **IP Address** is changed the meter will only be available at the new address. This may take some time to occur as the Network system may maintain old links in a buffered memory.

It is advisable to cycle auxiliary mains power (Power Off, Wait 10 seconds, then Power On again) to force the network to renew contact with the meter at the new address.