



# Instruction Manual

## Installation of new nodes

### Part Number Instruct-Nodes

Revision Number	Revision Date	Approved by	Signed off by	Comments
Rev 0	20 <sup>th</sup> Mar 2016	JMA	MAS	
Rev 1	16 <sup>th</sup> Sept 2016	JMA	MAS	Change part number of demo kit to 30150 to 35150. Removed myUserMain.py from list of bullet items to be saved in Portal. Changed document header

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## 1.0 Preparing new nodes to be entered onto the network

Install Portal onto the PC or laptop – information on how to obtain Portal and how to install it can be found in two manuals;

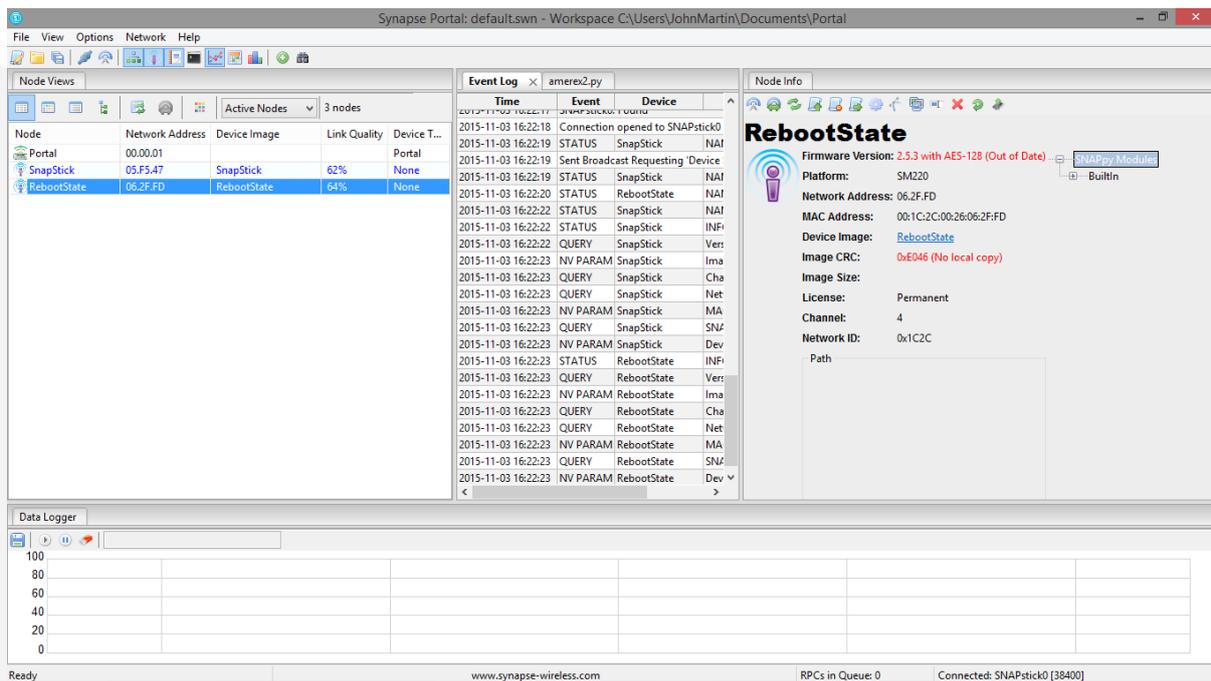
*Instruction Manual - Demonstration Kit - Part Number 35150*

*Instruction Manual - Portal – Part Number Portal GUI*

Ensure the site controller has been configured prior to starting the following procedure and is connected to the network.

*Setting Up Site Controller Manual – Part Number 30500*

Start-up Portal and connect a snap stick to the PC or laptop as described in the Portal Manual.



The screenshot shows the Synapse Portal software interface. The 'Node Views' window displays a table of nodes:

Node	Network Address	Device Image	Link Quality	Device T...
Portal	00.00.01			Portal
SnapStick	05.F5.47	SnapStick	62%	None
RebootState	06.2F.FD	RebootState	64%	None

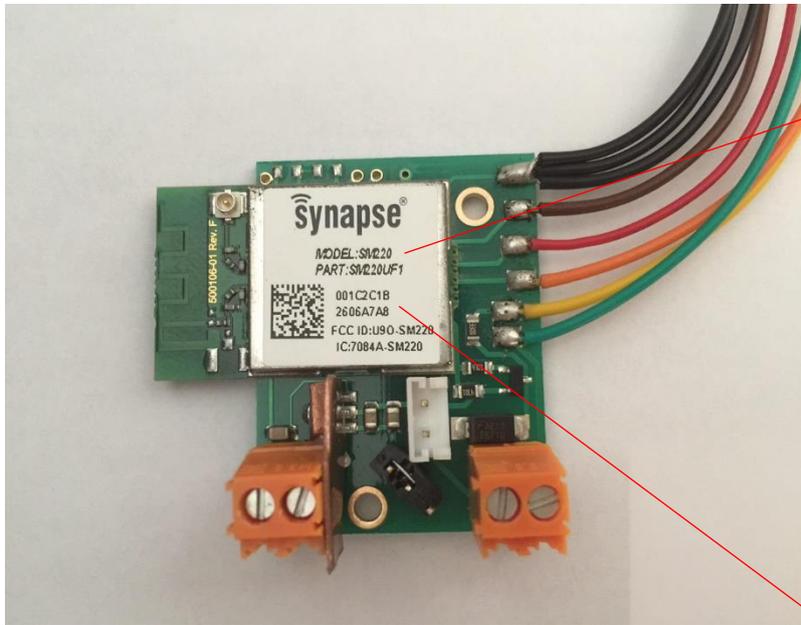
The 'Event Log' window shows a list of events for the 'RebootState' device, including connection events, broadcast requests, and status updates.

The 'Node Info' window for 'RebootState' displays the following details:

- Firmware Version:** 2.5.3 with AES-128 (Out of Date)
- Platform:** SM220
- Network Address:** 06.2F.FD
- MAC Address:** 00:1C:2C:00:26:06:2F:FD
- Device Image:** RebootState
- Image CRC:** 0xE046 (No local copy)
- Image Size:** Permanent
- License:** Permanent
- Channel:** 4
- Network ID:** 0x1C2C

The site controller will be visible in the Node View window, as shown above 'RebootState'. This could have a different name so check the network ID of the device to ensure it is the site controller. The name of the site controller can be changed at any time by going to the 'Rename Node' to the left of the red X in the Node Info window.

The external nodes can now be programmed through Portal.



Make a note of the type of node it is (example Model: SM220).

Make a note of the last six digits of the MAC address of the node you wish to connect to the network and is to be re-programmed.

The MAC address in this case;

001C2C1B2606A7AB

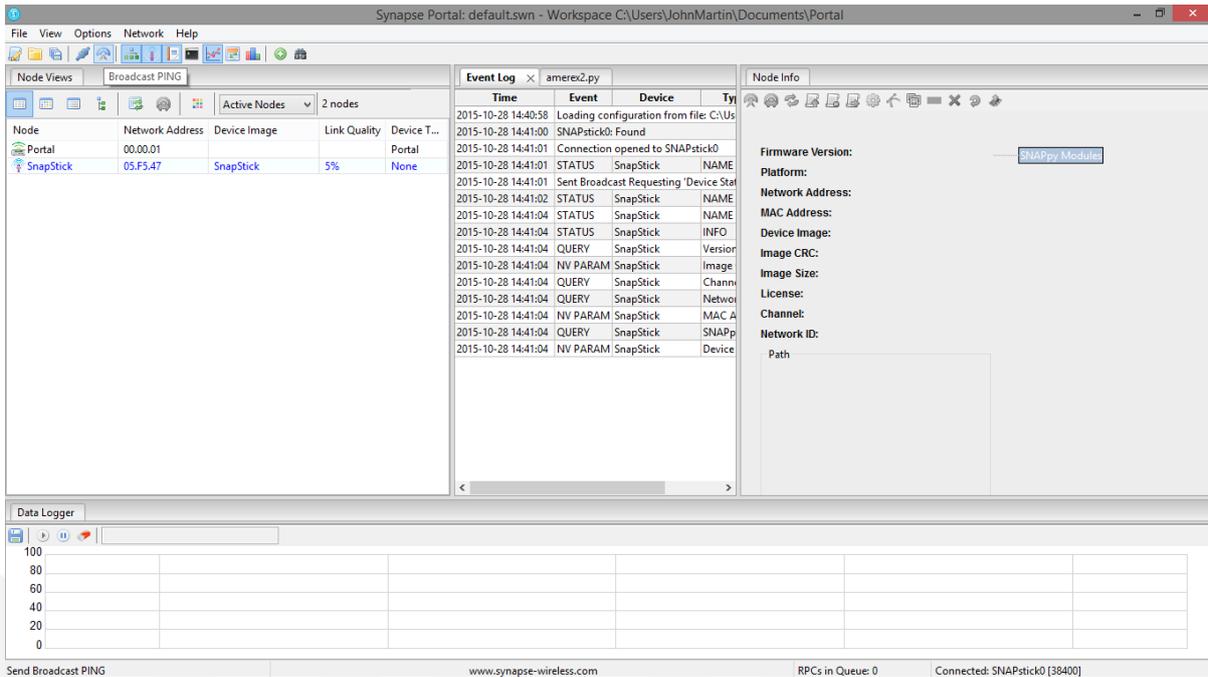
The node address for the network is the last six digits of the MAC address; In this case – ‘06A7AB’

As the nodes are programmed check the site controller ‘:~\$ nodes’ folder to check for the correct network address and ‘:~\$ revNodes’ for the correct designation and network address which the nodes have been allocated. This will be covered later in the manual.

For node designations see section ‘Examples of Device Designations’

## 2.0 Finding a Node

If the node does not appear automatically in the Node View window of Portal, use the Broadcast PING icon to locate the node(s) on the network.



The screenshot shows the Synapse Portal interface. The 'Node Views' window displays a table with the following data:

Node	Network Address	Device Image	Link Quality	Device T...
Portal	00.00.01			Portal
SnapStick	05.F5.47	SnapStick	5%	None

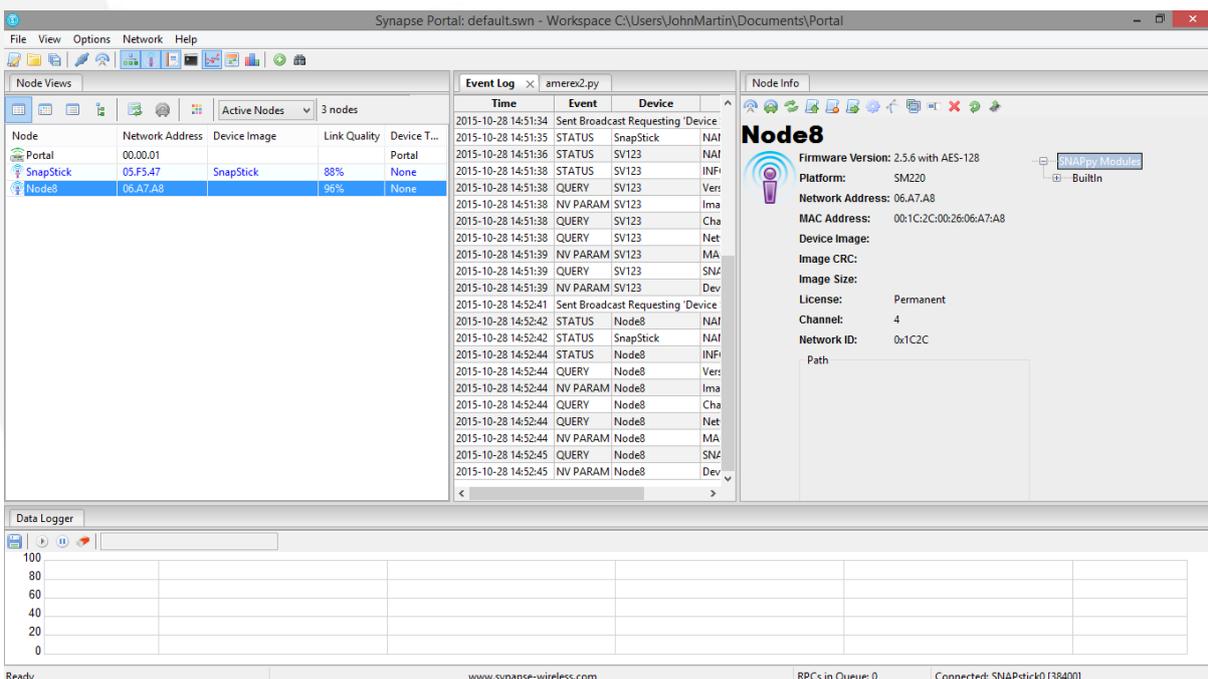
The 'Event Log' window shows the following events:

Time	Event	Device	Type
2015-10-28 14:40:58	Loading configuration from file: C:\Us		
2015-10-28 14:41:00	SNAPstick0: Found		
2015-10-28 14:41:01	Connection opened to SNAPstick0		
2015-10-28 14:41:01	STATUS	SnapStick	NAME
2015-10-28 14:41:01	Sent Broadcast Requesting 'Device Stat		
2015-10-28 14:41:02	STATUS	SnapStick	NAME
2015-10-28 14:41:02	STATUS	SnapStick	NAME
2015-10-28 14:41:04	STATUS	SnapStick	INFO
2015-10-28 14:41:04	QUERY	SnapStick	Version
2015-10-28 14:41:04	NV PARAM	SnapStick	Image
2015-10-28 14:41:04	QUERY	SnapStick	Chann
2015-10-28 14:41:04	QUERY	SnapStick	Netwo
2015-10-28 14:41:04	NV PARAM	SnapStick	MAC A
2015-10-28 14:41:04	QUERY	SnapStick	SNAP
2015-10-28 14:41:04	NV PARAM	SnapStick	Device

The 'Node Info' window shows the following details for the SnapStick node:

- Firmware Version: SNAPpy Module
- Platform: SNAPpy Module
- Network Address:
- MAC Address:
- Device Image:
- Image CRC:
- Image Size:
- License:
- Channel:
- Network ID:
- Path:

Once the node has been correctly identified, in this case *Node 8* with a network address of *06A7AB* the programming can commence.



The screenshot shows the Synapse Portal interface. The 'Node Views' window displays a table with the following data:

Node	Network Address	Device Image	Link Quality	Device T...
Portal	00.00.01			Portal
SnapStick	05.F5.47	SnapStick	88%	None
Node8	06.A7.A8		96%	None

The 'Event Log' window shows the following events:

Time	Event	Device	Type
2015-10-28 14:51:34	Sent Broadcast Requesting 'Device		
2015-10-28 14:51:35	STATUS	SnapStick	NAI
2015-10-28 14:51:36	STATUS	SV123	NAI
2015-10-28 14:51:38	STATUS	SV123	INFI
2015-10-28 14:51:38	QUERY	SV123	Vers
2015-10-28 14:51:38	NV PARAM	SV123	Ima
2015-10-28 14:51:38	QUERY	SV123	Cha
2015-10-28 14:51:38	QUERY	SV123	Net
2015-10-28 14:51:39	NV PARAM	SV123	MA
2015-10-28 14:51:39	QUERY	SV123	SNF
2015-10-28 14:51:39	NV PARAM	SV123	Dev
2015-10-28 14:52:41	Sent Broadcast Requesting 'Device		
2015-10-28 14:52:42	STATUS	Node8	NAI
2015-10-28 14:52:42	STATUS	SnapStick	NAI
2015-10-28 14:52:44	STATUS	Node8	INFI
2015-10-28 14:52:44	QUERY	Node8	Vers
2015-10-28 14:52:44	NV PARAM	Node8	Ima
2015-10-28 14:52:44	QUERY	Node8	Cha
2015-10-28 14:52:44	QUERY	Node8	Net
2015-10-28 14:52:44	NV PARAM	Node8	MA
2015-10-28 14:52:45	QUERY	Node8	SNF
2015-10-28 14:52:45	NV PARAM	Node8	Dev

The 'Node Info' window shows the following details for Node8:

- Firmware Version: 2.5.6 with AES-128
- Platform: SM220
- Network Address: 06.A7.A8
- MAC Address: 00:1C:2C:00:26:06:A7:A8
- Device Image:
- Image CRC:
- Image Size:
- License: Permanent
- Channel: 4
- Network ID: 0x1C2C
- Path:



In the above screen shot, there is no entry in the ‘Device Image’ section of the ‘Node View’ window – no snappyImage has been load yet. A snappyImage is the program that contains the instruction code for the node.

Only when a ‘*snappy Image*’ has been loaded into the node will there be an entry in this column, this will be covered in the next section – ‘*Load a Snappy Image*’.

The Line Quality is the signal strength reading of the node to the Snap Stick, this should always be as high as possible. The percentage rating can be changed to a dBm reading – see *Instruction Manual - Portal – Part Number Portal GUI* for customisation

*Note:*

*By using AMEREX Integrated Signal Strength meter a LQ reading in the field during the site survey will determine where the nodes can be situated and installed.*

See *Instruction Manual - Demonstration Kit - Part Number 35150* on the use of the AMEREX Integrated Signal Strength Meter.

### 3.0 Load a Snappy Image

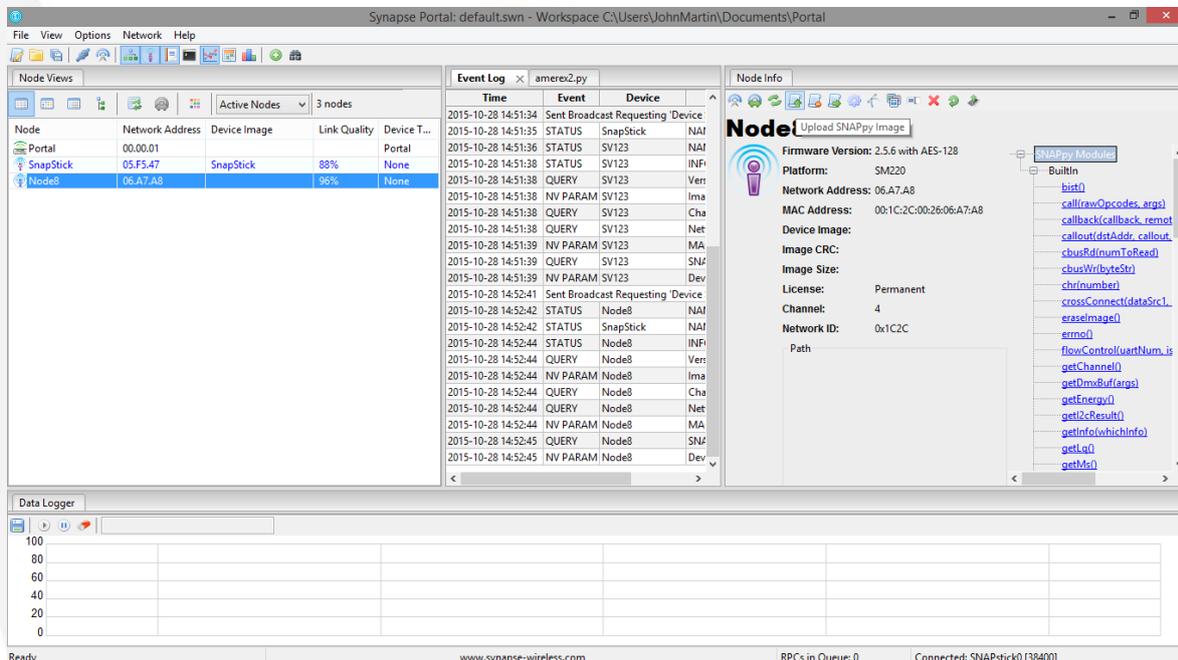
Go to [www.Amerex-Monitoring.com/documents/Downloads/Portal](http://www.Amerex-Monitoring.com/documents/Downloads/Portal) to download the following files which should be saved in; ‘.....\Documents\Portal\snappyimages’ folder of the PC you are using.

- Amerex.py
- myLQRanger.py
- SMswitch.py

Save the following files on your desktop – for later use

- Info.txt (this file contains information on the various files above and need not be saved in the SnappyImages folder.)
- myUserMain.py

To load a Snappy Image onto a node, go to the ‘Node Info’ window and click on the icon with a scroll and upward pointing arrow. This is the Upload Snappy Image icon.



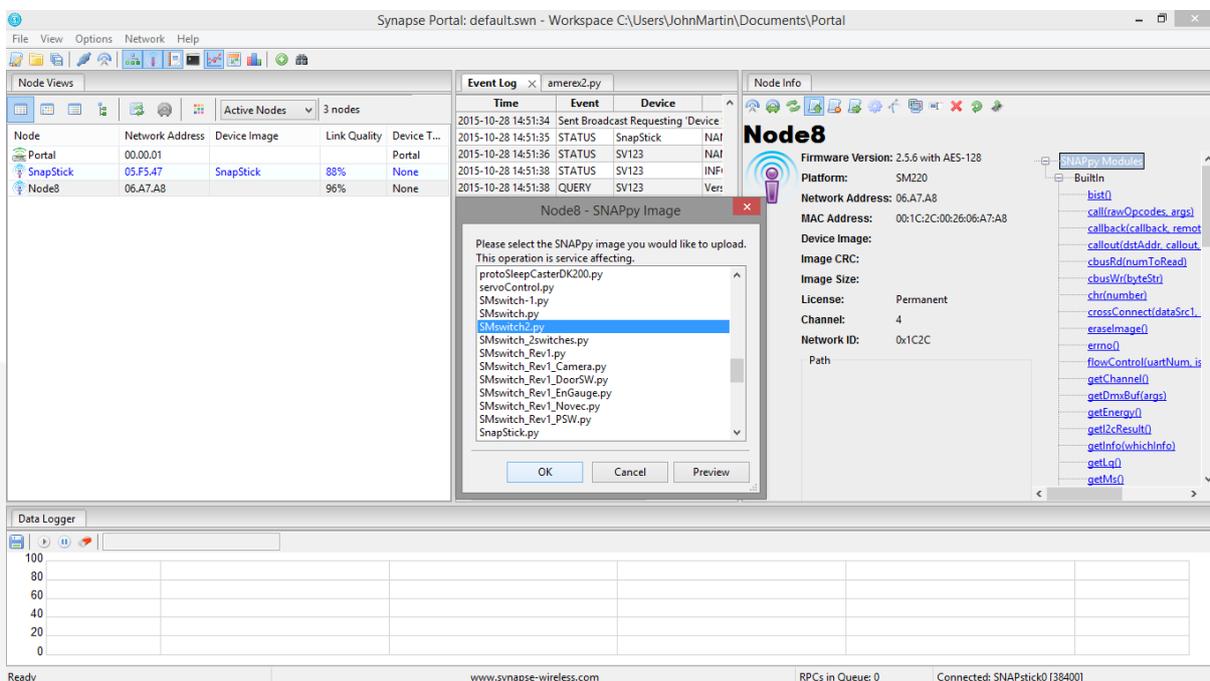
Click on the icon and new window will appear showing all the Snappy Images which have been loaded in the Portal when installed.

The downloaded snappyImages from our web site must be loaded into the snappyImages folder which can be found at (for example)

C:\Users\JohnMartin\Documents\Portal\snappyImages

If you have written a new Snappy Image which you wish to install in the node ensure it has been saved in the correct location

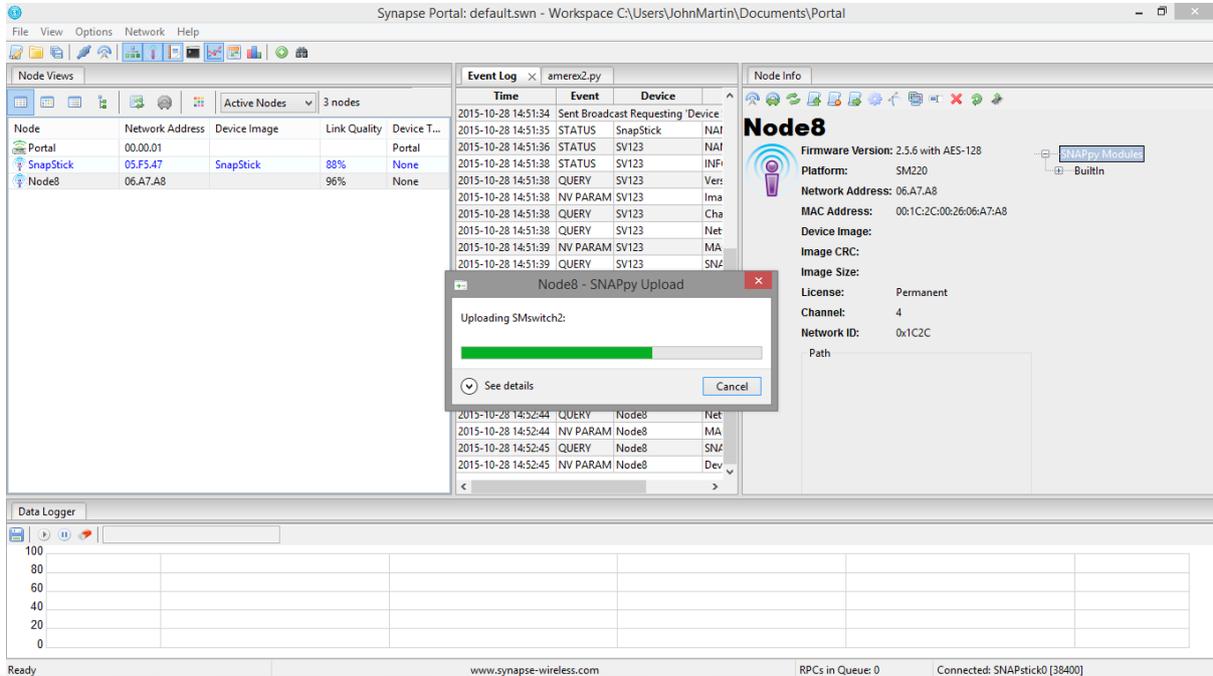
.....\Documents\Portal\snappyImages



The address ...\Portal\snappyImages will be different on other PC's and laptops.

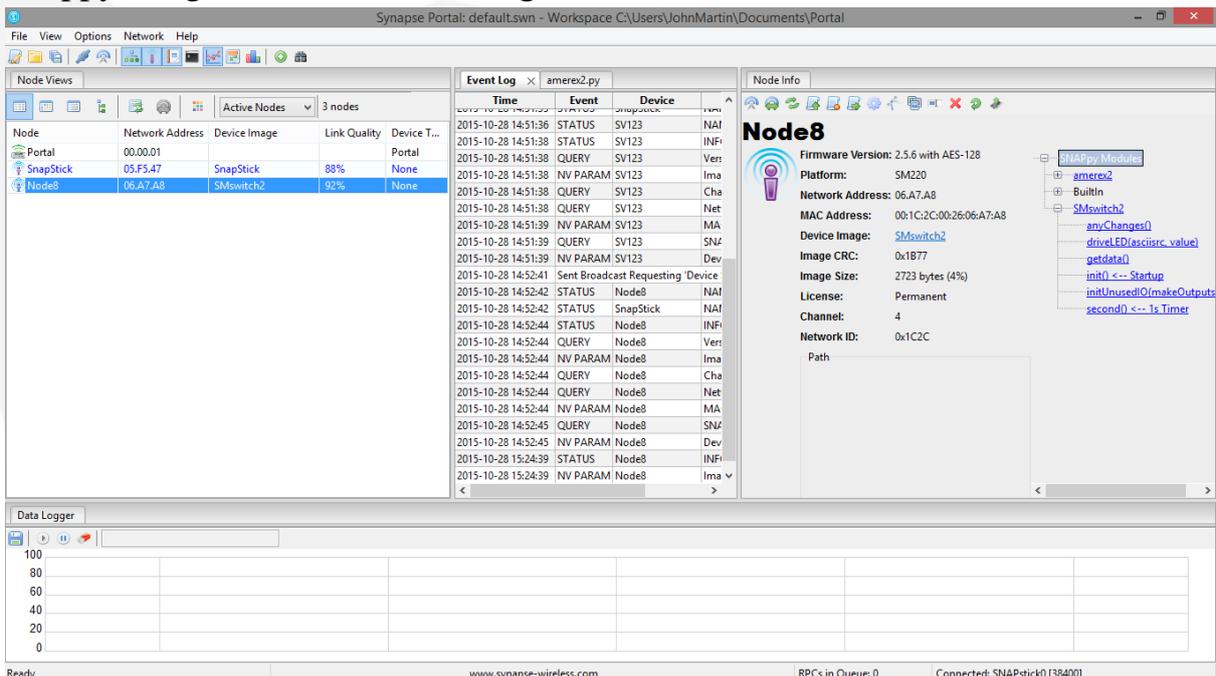
If you are unable to locate the folder Snappy Image, carry out a search using the Windows Search facility.

With snappyImage window open select the Snappy Image you wish to download by clicking on the snappyImage (in this case SMswitch2.py) and press OK



Once you have pressed OK the download window shall appear showing the progress of the download

After the download has been completed the Node Info window will show the Snappy Image with a 'Device Image' name, in this case is SMswitch2.





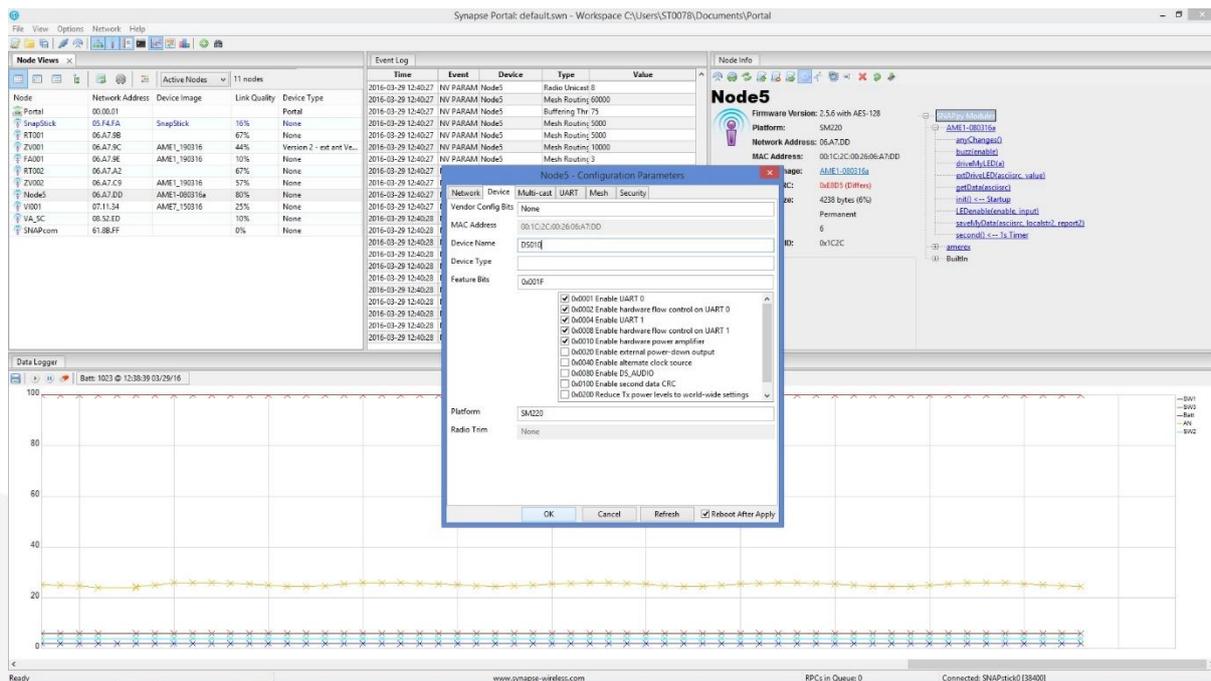
On the right hand side of the ‘Node Info’ window drop down menus show the programs that have been downloaded for this particular snappyImage.

In the Node View window – left side of the above screen shot, the Device Image has been up dated to the Node Info window (SMswitch2).

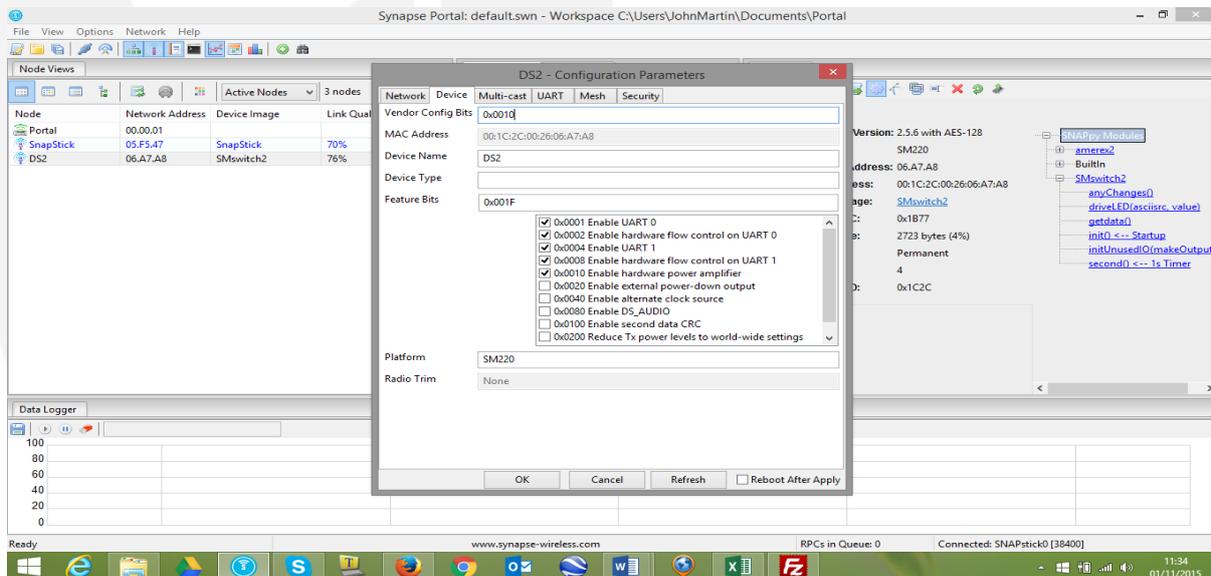
## 4.0 Naming and Loading the Node into the system

To add a node to the system.

Click on the node in Node View, then select the gear wheel icon in the command line of the Node Info window you wish to interrogate.



Click the gear wheel icon and a window shall appear requesting the node details. Select 'Device' tab. Enter the node name, in this case DS010 and enter



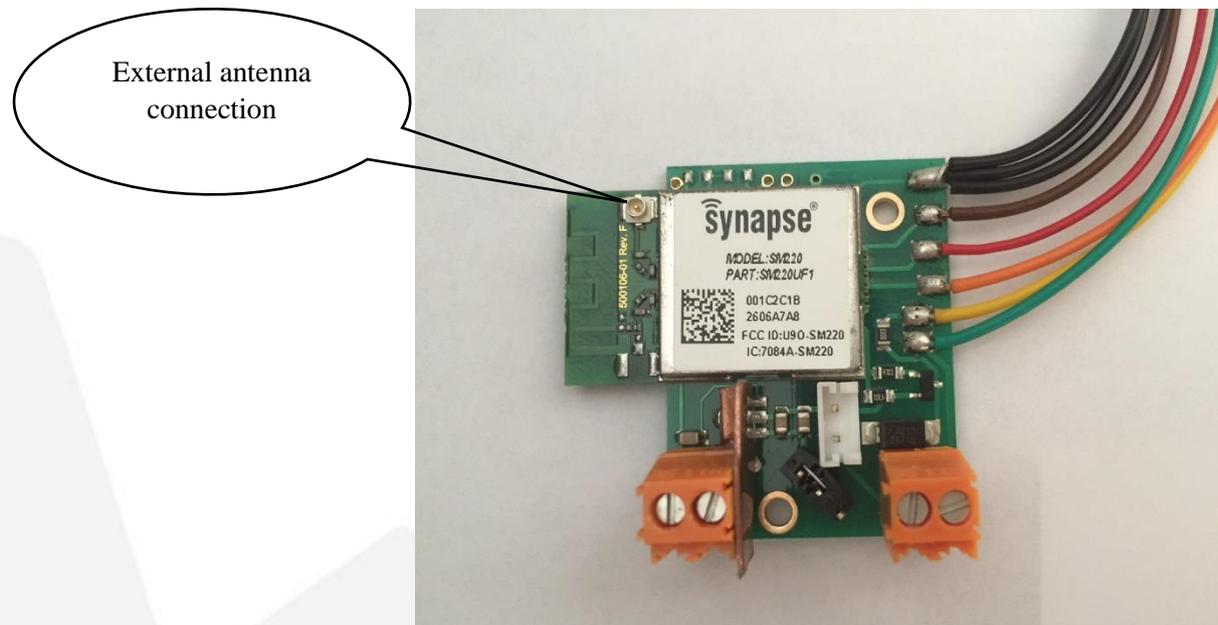
the Device Type, in this case SM220.

If you wish to add a new device name ensure the device two letter designation has been set up in the site controller. This is covered in ‘Setting up the Site Controller’ manual.

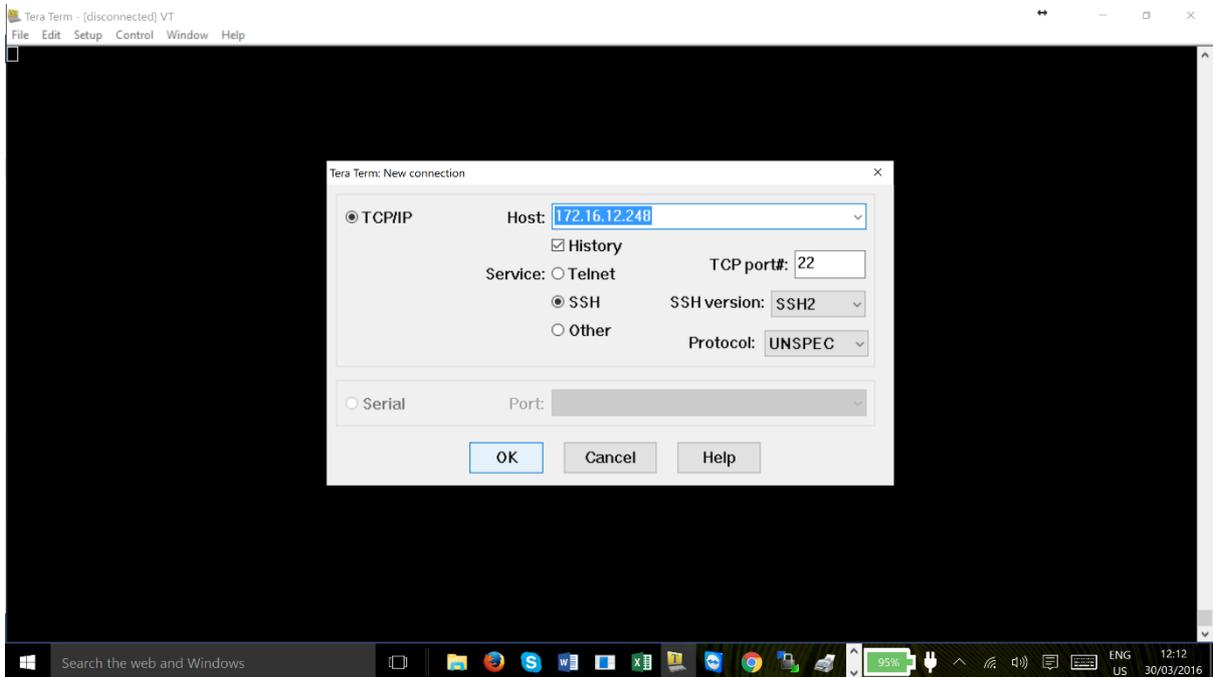
If the node has an external antenna click on click the ‘Vendor Config Bits’ line and enter ‘0x0010’. We recommend the ‘Reboot After Apply’ tick box is ticked at all times and for every node.

Press ‘OK’ and return to the main Portal screen. If the node does not have an external antenna close the window and return to the main Portal window.

(See location of external antenna connection below)

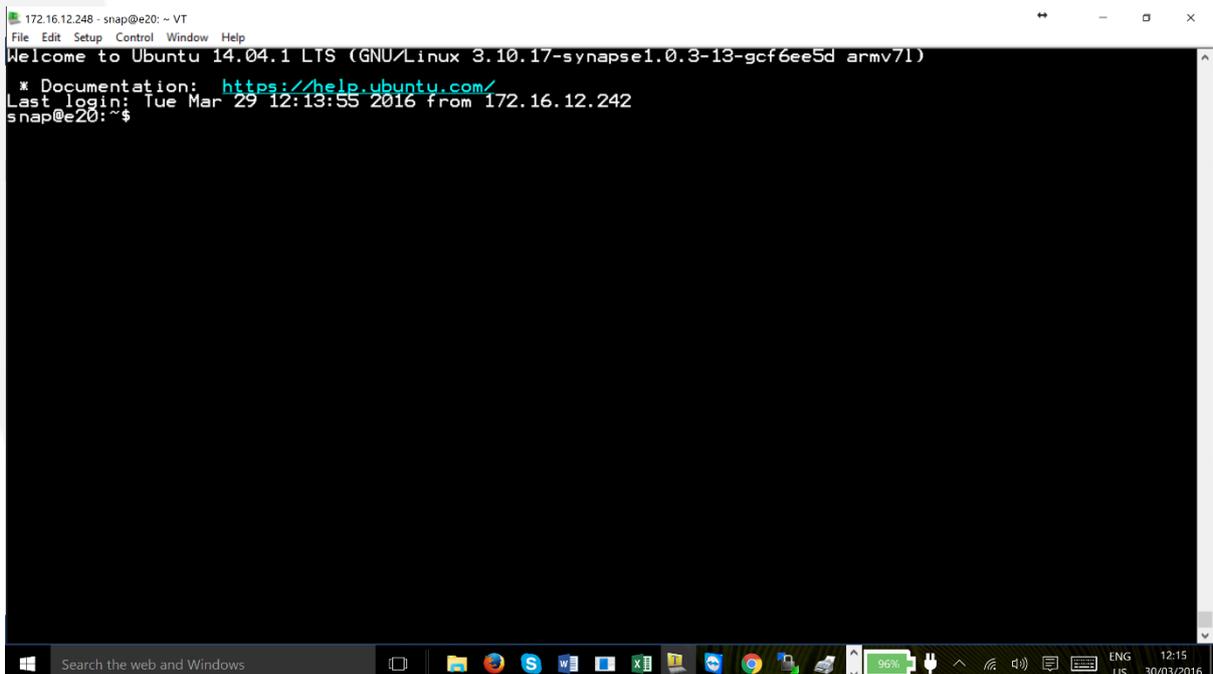


## 5.0 To assign a new device designation



To set a new designation in the site controller connect the PC or laptop to the site controller as previously described in ‘Setting up Site Controller’

Log-on to the site controller via Tera Term com port or via the IP address and login to the site controller in the example above we have chosen to connect via the IP address. Press OK

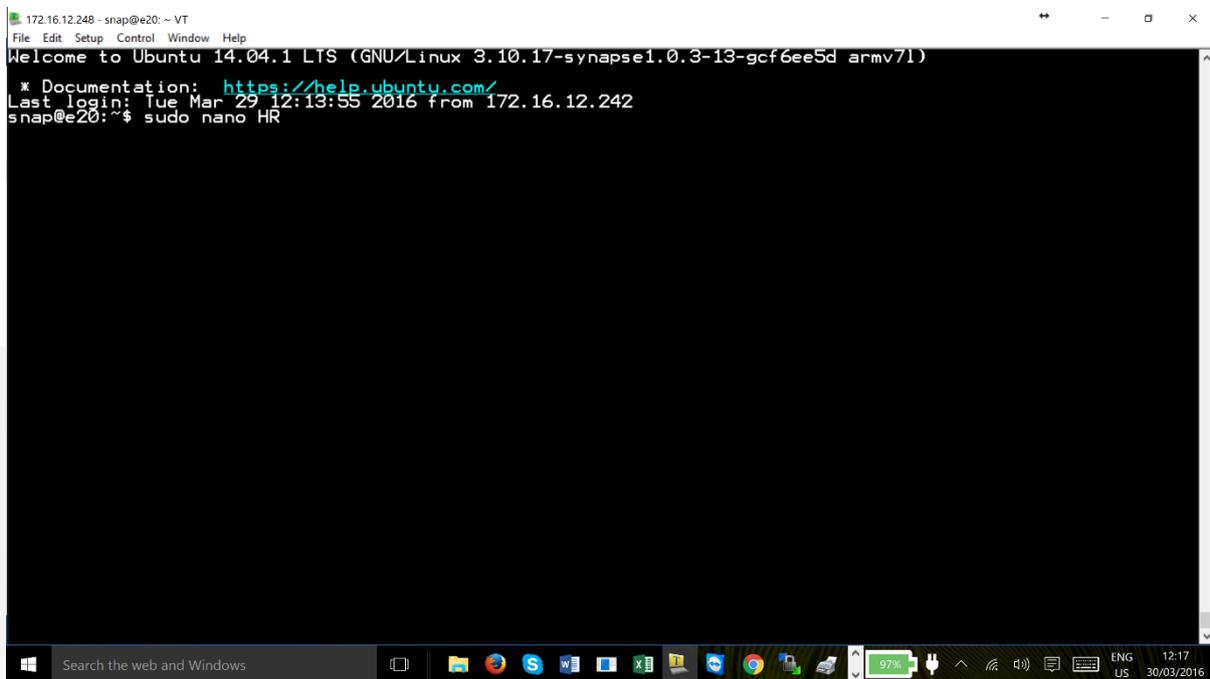


Your PC/Laptop is now connected to the site controller.

Remember to use the Supervisor stop and restart command prior to changing, adding or modifying the site controller programming.

```
sudo /etc/init.d/supervisor stop
```

To create a new designation simply decide the two letter designation. We suggest the new designation is relevant to the device being added for example, a Hose Reel – HR.

A screenshot of a terminal window on a Windows PC. The terminal shows the Ubuntu login prompt and the command 'sudo nano HR' being entered. The terminal text includes: '172.16.12.248 - snap@e20: ~ VT', 'File Edit Setup Control Window Help', 'Welcome to Ubuntu 14.04.1 LTS (GNU/Linux 3.10.17-synapse1.0.3-13-gcf6ee5d armv7l)', '\* Documentation: https://help.ubuntu.com/', 'Last login: Tue Mar 29 12:13:55 2016 from 172.16.12.242', and 'snap@e20:~\$ sudo nano HR'. The Windows taskbar is visible at the bottom, showing the search bar, taskbar icons, and system tray with a 97% battery level and date 30/03/2016.

Enter the following `sudo nano HR` and press enter. The Tera Term editor window will appear. Type in `ddd` and or `a` which are required for this new designation. The data string entered here will depend on the type of node you are using for the particular application.



```

192.168.1.115 - snap@localhost: ~ VT
File Edit Setup Control Window Help
GNU nano 2.2.6 File: HR
ddd

[Wrote 1 line]

Welcome to Ubuntu 14.04.1 LTS (GNU/Linux 3.10.17-synapse1.0.0-svn47887 armv7l)
 * Documentation:  https://help.ubuntu.com/
Last login: Tue Feb  2 04:56:00 2016 from 192.168.1.106
snap@localhost:~$ ls
AP  ZV          maketimes.py      nodes             temp1  temp4  times
PO  filechecker.py  myUserMain-1.py  nvparams.dat     temp2  temp5
SV  fileprep.py    myUserMain.py    revNodes         temp3  temp6
snap@localhost:~$ sudo nano HR
[sudo] password for snap:
snap@localhost:~$ ls
AP  SV          fileprep.py      myUserMain.py    revNodes  temp3  temp6
HR  ZV          maketimes.py     nodes            temp1    temp4  times
PO  filechecker.py  myUserMain-1.py  nvparams.dat     temp2    temp5
snap@localhost:~$

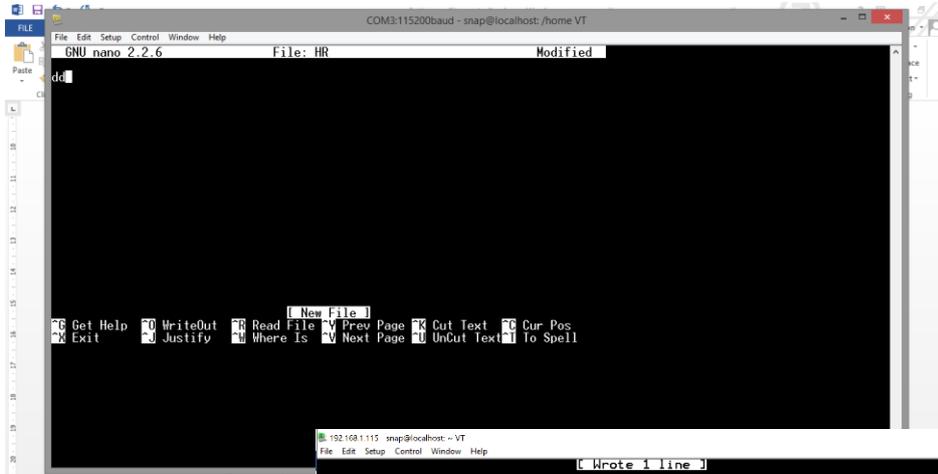
```

The `d` is for a digital input on/off and `a` is for an analogue input 4-20mA. For example `ddd` which would be for the hose reel - door open, pressure ok and the hose activated, this makes three digital inputs.

### Data String Matrix

Board type	Part No.	Description	Data string possibilities					
AME1	30112	3 digital inputs	d	d,d	d,d,d			
AME7	30110	1 analogue and 3 digital inputs	a	a,d	a,d,d	a,d,d,d		
AME4	30109	2 analogue and 4 digital inputs	a	a,a	a,a,d	a,a,d,d	a,a,d,d,d	a,a,d,d,d,d
AME5	20115	5 analogue and 8 digital inputs	Any combination of 5 analogue and 8 digital inputs					

Possible combinations of analogue and digital inputs for each board type.



Press CTRL and X to exit the editor, press Y to save the file.

To check the file data, enter 'cat HR' and press enter. The window will now show the 'ddd' that was entered earlier.



Continue this process for any and all new device designations.

Once all the designations have been saved in the site controller and all changes have been made restart 'supervisor'

```
sudo /etc/init.d/supervisor restart
```

## Populating the Site Controller

Once a node has been set-up in Portal (example DS010) click on DS010 and go to 'Node Info' window. On the right hand side of the 'Node Info' window click on the '+' beside the '[SMswitch2](#)'. A drop down menu will appear, click on '[getData\(asciisrc\)](#)'.

A small window will appear asking for the ID of the node enter the node ID for the device. Type in the Network address in our example '06a7ab'. It must have the '' in the window at the start and end of the node ID. Press OK.

Once the all the nodes, or if it is a large system, a portion of the nodes have been loaded, check via *sudo filechecker.py* in Tera Term there is no error in the number of files between ‘nodes’ and ‘revNodes’.

If there is an error check the ‘nodes’ and ‘revNodes’ folders either by WinSCP or Tera Term to locate the problem. Check the number in each folder, their two letter designation and number, for example DS010 (these reside in revNodes) and their Network ID / Address, for example 06a7ab (these reside in nodes)

Resume the up-loading of the node information once the issue has been resolved.

Repeat the above procedure for all the nodes you wish to connect to the mesh network. The site controller will automatically write the node name and other information to various folders and associated folders.

As the nodes are programmed check the site controller folders; ‘:~ \$ nodes’ to check for the correct network address and ‘:~ \$ revNodes’ for the correct designation and network address you shall be allocating the nodes.

Once the nodes and site controller(s) have been configured they are ready for deployment into the field as per the results of the site survey.

## Family of Boards.

AMEREX Integrated have a family of nodes, the most popular being;

### **Part Number 30112**

Three Digital Node

3 x Digital inputs  
1 x Relay (Dry contacts) output  
1 x LED

### **Part Number 30110**

Single Analogue Node

1 x Analogue input (4-20mA)  
2 x Digital inputs  
1 x Monitored Digital input  
1 x Relay (Dry contacts 200mA) output  
1 x LED

### **Part Number 30109**

Dual Analogue Node

2 x Analogue (4-20mA)  
2 x Digital inputs  
2 x Monitored Digital input  
4 x Relay (Dry contacts 3 Amps d.c.)  
output

### **Part Number 30114**

Dual Analogue Node

5 x Analogue (4-20mA)  
8 x Digital inputs  
16 x Relay (Dry contacts 3 Amps d.c.)  
output

Note – Not all the inputs need to be used, if they are not required do not enter any ‘a’s or ‘d’s in the data line.

When contacting AMEREX Integrated regarding a new designation please state the following;



### Digital - Example of device information using 30112

Designation Letters	HR
Range of devices	1 to 999
Data	ddd

### Analogue - Example of device information using 30110

Designation Letters	GD
Range of devices	1 to 999
Data	addd

### Analogue and Digital - Example of device information using 30109

Designation Letters	FT
Range of devices	1 to 999
Data	aadddd

### Analogue and Digital - Example of device information using 30115

Designation Letters	PH
Range of devices	1 to 999
Data	aaaaddddddd

The number of data points will depend on the module being employed.

## 6.0 Command Codes used in Tera Term/Site Controller

Some of the codes require the prefix '*sudo*' prior to the command instruction. The following commands will include the prefix if required. The commands are case sensitive.

Useful Commands	
Command Code	Description
<code>sudo python myUserMain.py</code>	Runs the main program for the entire system and sends data back to the AMEREX-Integrated server.
<code>sudo nano 'filename' example sudo nano EN001</code>	Creates a file 'filename' and launches program editor.
<code>sudo touch 'filename' example sudo touch EN001</code>	Creates a file 'filename'
<code>cat 'filename' cat EN001</code>	Reads the data within the specified filename.
<code>ls</code>	Lists the files and or folders within the current folder.
<code>ifconfig</code>	Shows information on the state of the site controller and connection to the internet.
<code>cd ..</code>	Steps back one folder (remember the space between the cd and the double dots).
<code>cd ~</code>	Return the user back to the home directory
<code>cd 'folder name'</code>	Changes the folder or directory to folder name for example <code>cd Nodes</code>
<code>sudo rm 'filename'</code>	This deletes the filename.
<code>sudo mkdir 'folder name'</code>	Makes a folder.
<code>sudo rmdir 'folder name'</code>	Removes folder.
<code>cd/media/ramdrive</code>	Looks at the data that has been sent to the server
Arrow up and arrow down	These keys skip through the last commands entered.
<code>sudo /etc/init.d/supervisor stop</code>	Stops 'supervisor' program to allow the user to modify the site controller program
<code>sudo /etc/init.d/supervisor restart</code>	Restarts 'supervisor' program to after the user modified the site controller program
<code>sudo cp 'filename' /folder path/file name Example sudo cp sunrise.gif /usr/share/monkey/sunrise.gif</code>	Moves folders in Tera Term if access is denied in Win SCP

## 7.0 Specifications – Site Controller

OS	Ubuntu 14.04 LTS , Linux kernel 3.10.17
CPU architecture (800 MHz)	Freescale i.MX 6 featuring ARM® Cortex-A9
Flash	4GB eMMC
RAM	512M DDR3, 400MHz
Network	10/100 Ethernet, WiFi, SM220
USB host	USB 2.0 Type A (host)
USB client	1 micro B – Serial USB - SiLabs CP2102
Operating Temperature operating temp	-40C to 70C* UL certified for 65C maximum
Board Size	15.5cm x 9cm x 2cm
Input Voltage	11-26V DC from an approved FM panel
	AC power supply sold separately – non-FM approved system
Options	
Cellular Option	Internal cell modem
Storage Expansion	uSD –internal
LEDs / Buttons	4 (programmable)
LEDs	3 Buttons (programmable)

\*When running an application that demands unusually intensive CPU/Memory resources at 70C, the temperature on the processor core might reach up to 90C resulting in performance degradation. For more information, see [http://cache.freescale.com/files/32bit/doc/app\\_note/AN4579.pdf](http://cache.freescale.com/files/32bit/doc/app_note/AN4579.pdf).

Barrel or DC Input	Min	Typical	Max	Units
Input Voltage (DC)	11		26	V
Input Current	0.13		1	A
USB A Port (output)				
Supply Voltage	4.75	5	5.25	V
Supply Current			500	mA



## 8.0 Examples of device designations

Item No.	Description of node	Designation ID	Node data
			<i>d=digital a=analogue</i>
1	Fire \Extinguisher	FE	dd
2	Gas detector	GD	add
3	Priority (ZV example for Sprinkler Valve	ZV	d
4	Clean agent	CA	addd
5	Alarm panel	AP	ddd
6	Door switch	DS	d
7	AMEREX Integrated Camera	TV	ddd
8	OS&Y valve	OS	ddd
9	Fire Alarm Panel	AP	ddd
10	Post indicator valve	PO	dd
11	Carbon Dioxide	CO	add
12	Foam monitoring	FM	aaddd
13	Fire tank	FT	aaddddd
14	Hydrant	HY	dd
15	Skid	SK	aaddddd
16	Pull switch	PU	d
17	Remote fire extinguisher	EN	dd
18	Novec monitoring (control room)	NM	dd
19	Butterfly Valve	BV	dd
20	Fire Water Tank	FT	aaddddd
21	Fire Hydrant	HY	d
22	Remote Skid	SK	aaddddd
23	Pump House	PH	aaaaaddddd
24	Chiller	CH	dd
25	Electrical Switch Board	SB	dddd
26	Air Conditioning Unit	AC	dd
			<i>d=digital a=analogue</i>

The above is a list of example designations, if the type of equipment is not on the list above please notify [jallison@amerex-fire.com](mailto:jallison@amerex-fire.com) and the new designation will be added to our data base.