Instruction Manual Programming Site Controller Device

Part Number 30500

Revision Number	Revision Date	Approved by	Signed off by	Comments
Rev 0	20th March 2016	JMA	MAS	
Rev 1	12th Sept 2016	JMA	MAS	Changed to new header

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1.0   Setting up the Site Controller (Part No. 30500)
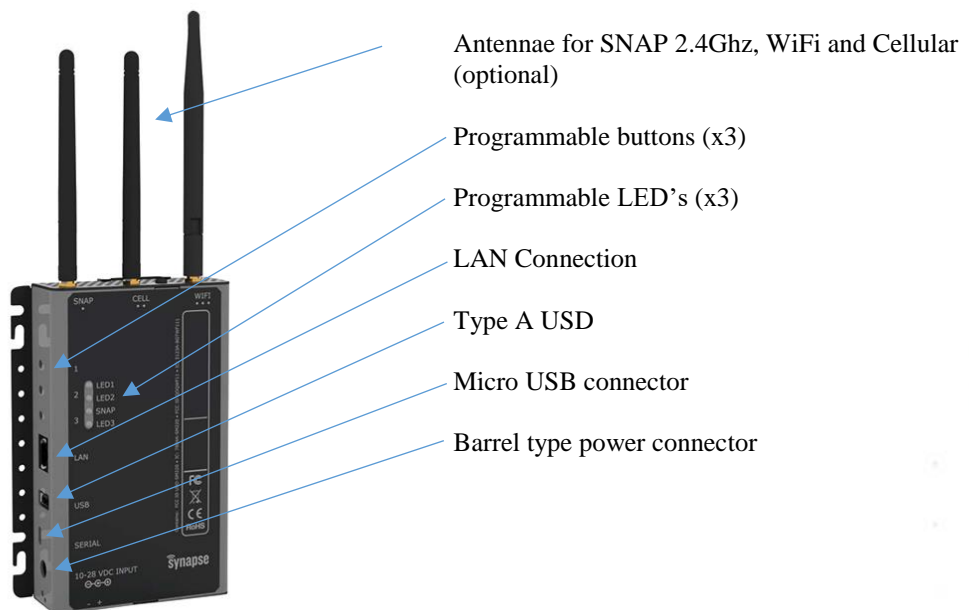
Overview of the Site Controller
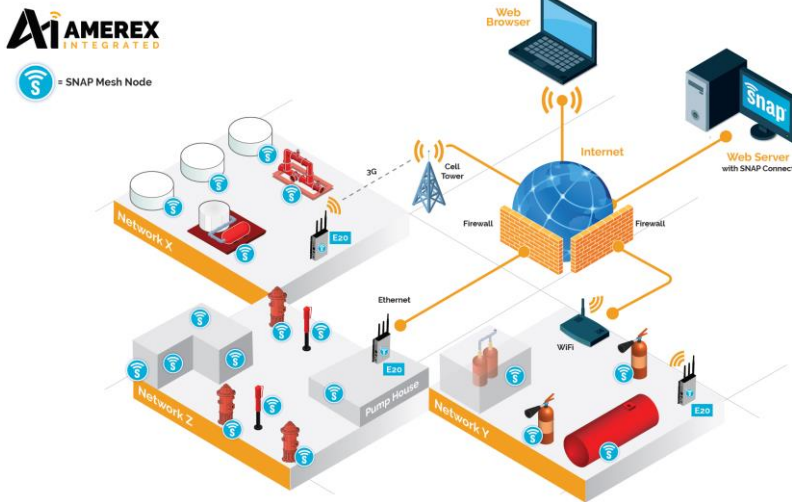
The Site Controller combines a SM220 RF module and an embedded Linux-based computer to provide connectivity (Ethernet, cellular, Wi-Fi, serial,) and site aggregation capabilities to a diverse array of SNAP IoT networks across industrial temperature ranges.

TCP/IP connections can even bridge remote SNAP devices into one common network, an effective method for centralizing data storage, performing web - based analytics, and monitoring remote applications.

Powered by Freescale's i.MX 6 processor, the Site Controller has ample computing power, reliable connectivity options, and a sturdy design that makes it the ideal networking gateway for large - scale IoT deployments.

1.1   AMEREX-Integrated Site Controller

Antennae for SNAP 2.4Ghz, WiFi and Cellular (optional)

Programmable buttons (x3)

Programmable LED's (x3)

LAN Connection

Type A USD

Micro USB connector

Barrel type power connector

Terminal rail power supply connectors under the base of the site controller

1.2   Start-up guide

The site controller can be powered by either, a barrel connector via an a.c. adapter power unit or by 24v d.c. power supply.

The barrel connector is located above the logo.

   10-28VDC

Connect the power supply you wish to use for the site controller (24v d.c. or the barrel connector from the PSU).

The 24v d.c. supply is connected to green terminal connector rail which is polarity conscious.

Important
For use in FM approved systems, the 24v d.c. power supply must be an FM Approved panel.

1.3   Software for the site controller

To access the site controller you will require items of software that will allow you to view and edit the programs. Some of the files are already embedded in the site controller but require activation. The downloadable software can be found on;

www.AMEREX-Integrated/documents/downlod/site controller

- *Tera Term*
- *NotePad++*
- WinSCP

(The above are our suggested software, you can use an alternatives if you wish) You can also find the software on the following sites.

The standard software we recommend is Tera Term, NotePad++ and WinSCP.
For example;
http://download.cnet.com/Tera-Term/3000-20432_4-75766675.html
https://notepad-plus-plus.org/download/v6.8.6.html
http://sourceforge.net/projects/winscp/?source=typ_redirect

Download the following for the site controller and save the .py files for the site controller program and the nodes.

- *Amerex.py*
- *filechecker.py*
- *fileprep.py*
- *maketimes.py*
- *myUserMain.py*
- *SMswitch.py*

- All the above programs are available from AMEREX-Integrated web site, to access follow the link.

www.AMEREX-Integrated.com/documents/downloads/site controller

The embedded list of programs within the Site Controller can be found in the section;

3.1   Programs to be installed from the Site Controller

## 2.0   Installation of software

After downloading the Tera Term and the other software save the files in a folder called '*Installed Programs'* in a location you can easily get to from your desktop or on your desk top itself. We recommend saving all the downloaded programs to this folder. This folder will need to be created by the user.

2.1   Installation of Tera Term

Double click on the downloaded file and follow the instruction on how to install the software.
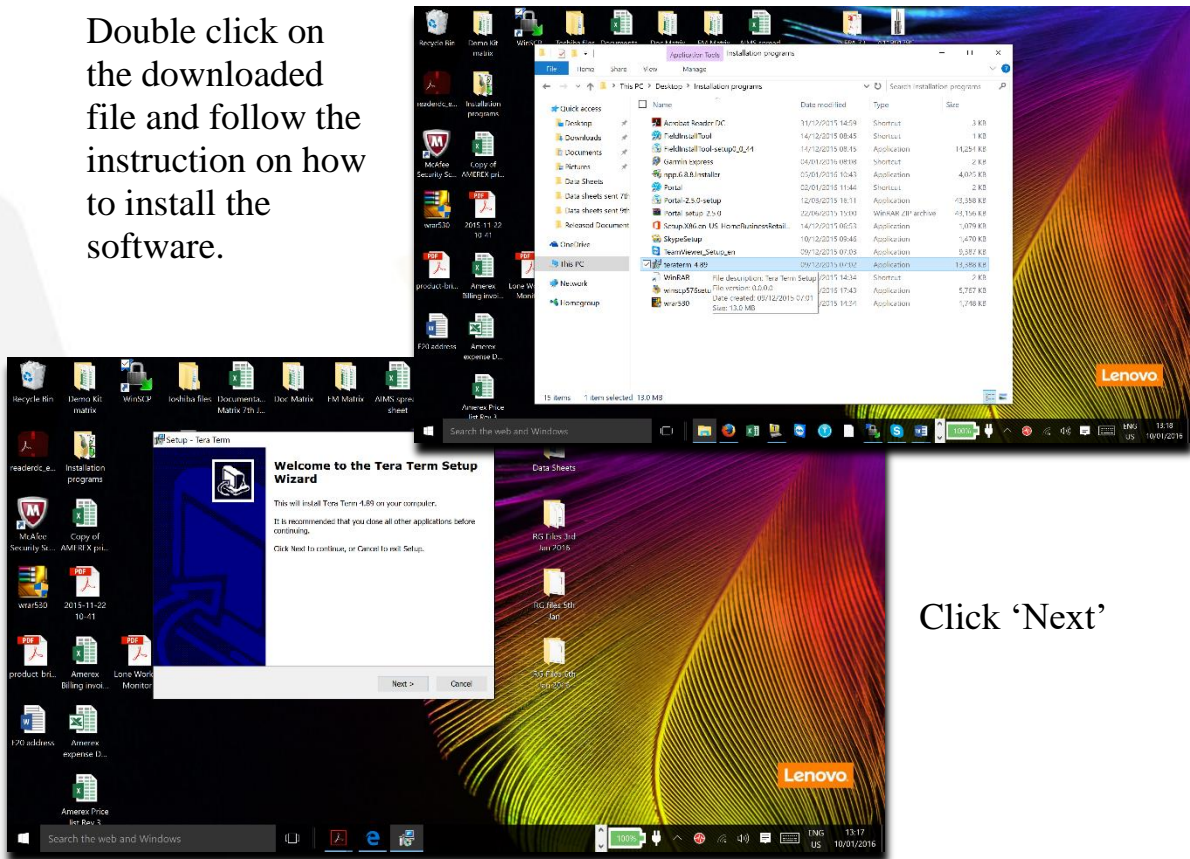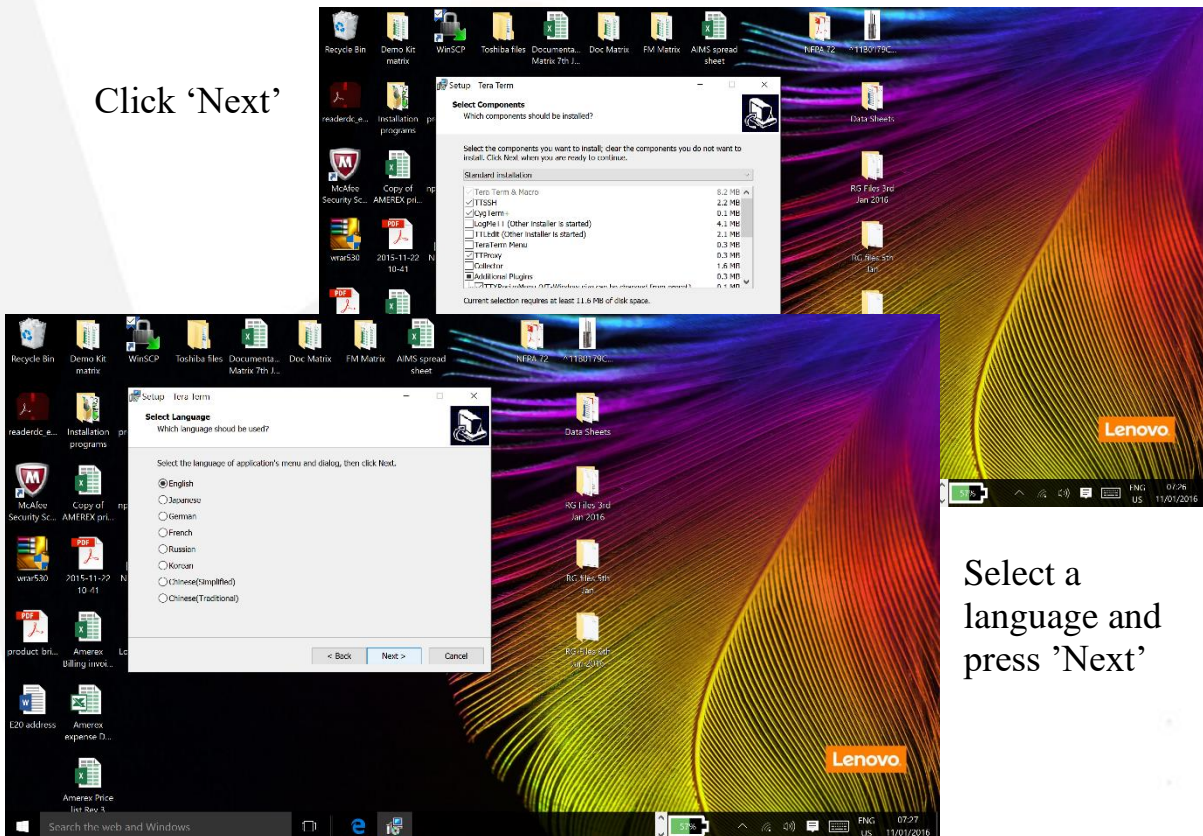

Click 'Next'

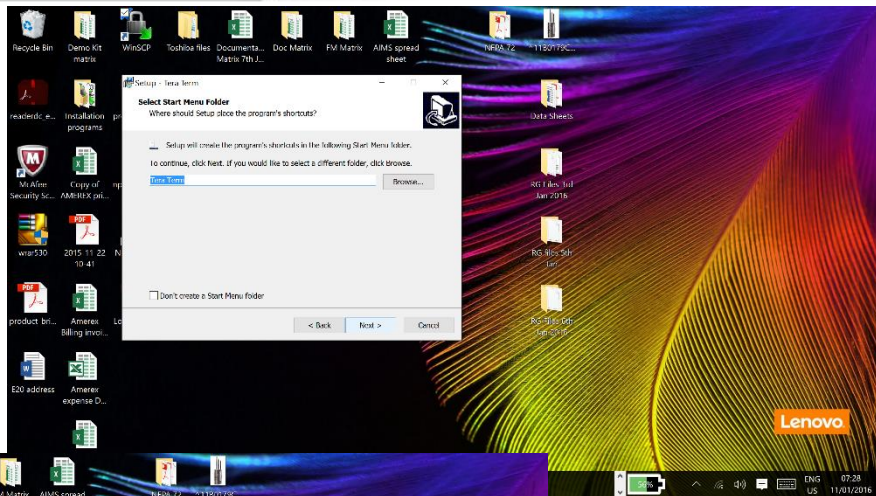Accept the agreement and click 'Next'.
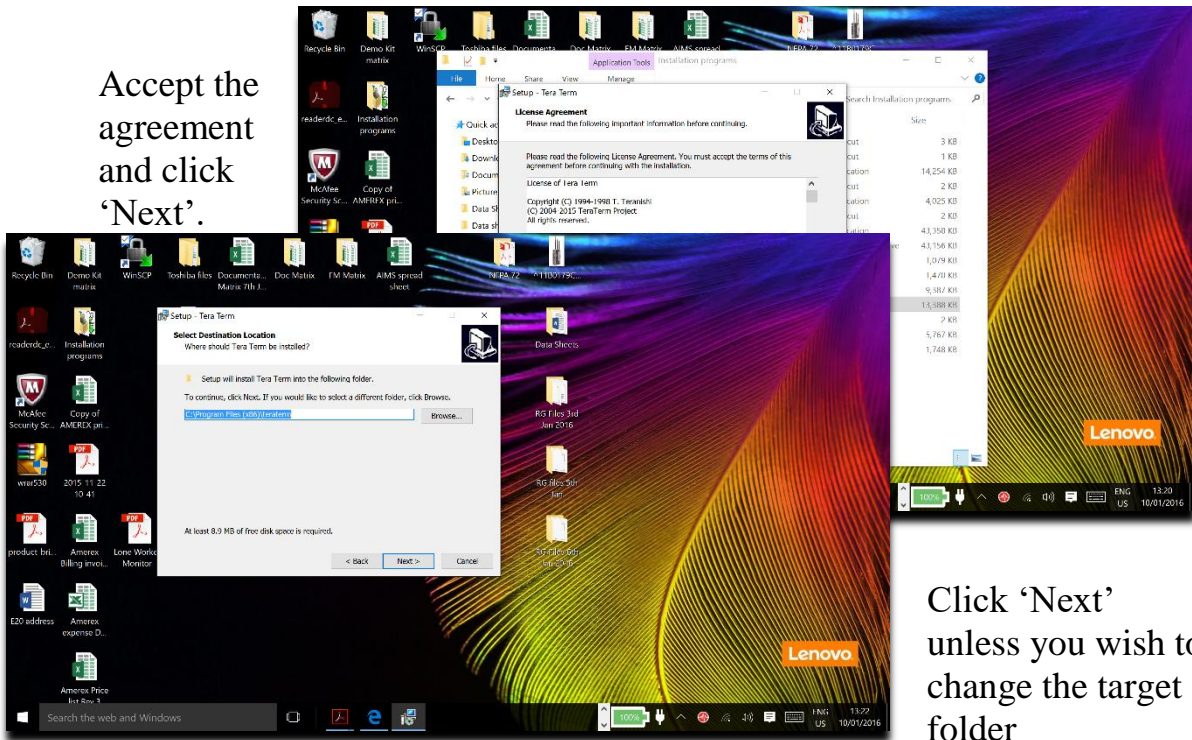
Click 'Next' unless you wish to change the target folder
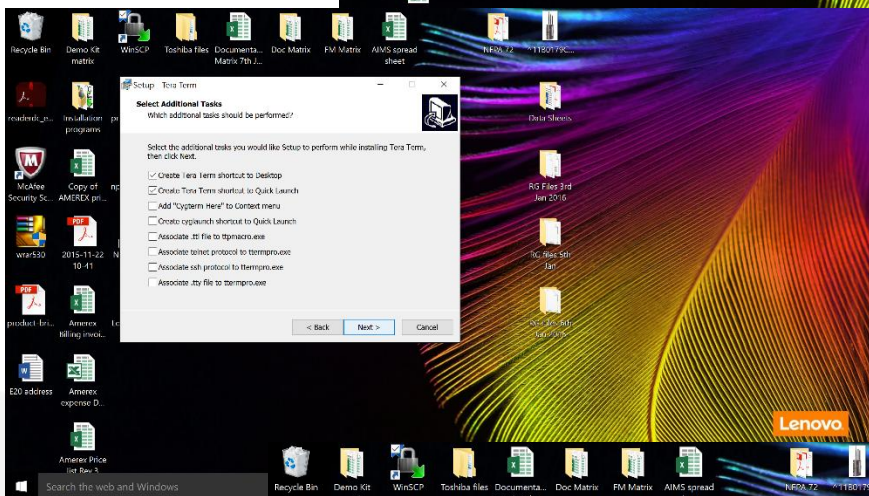
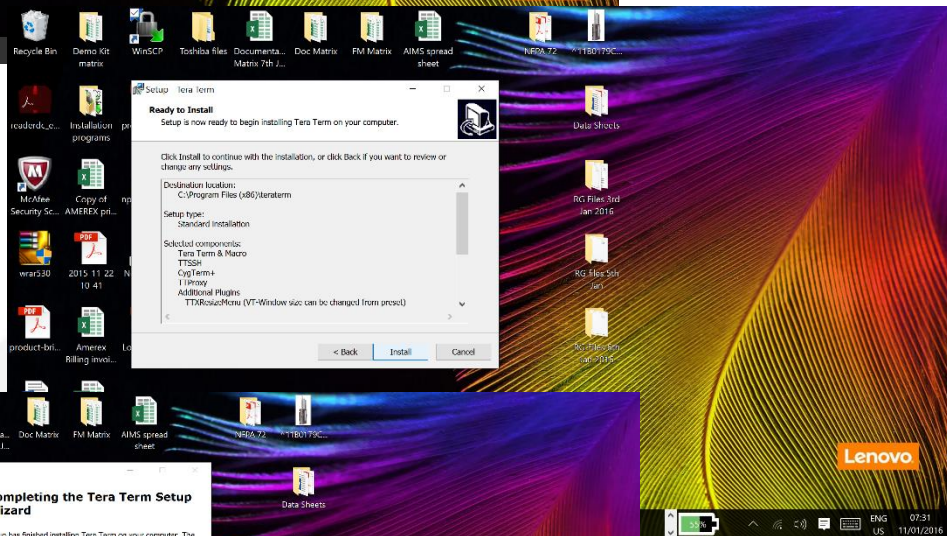Click 'Next'

Select a language and press 'Next'
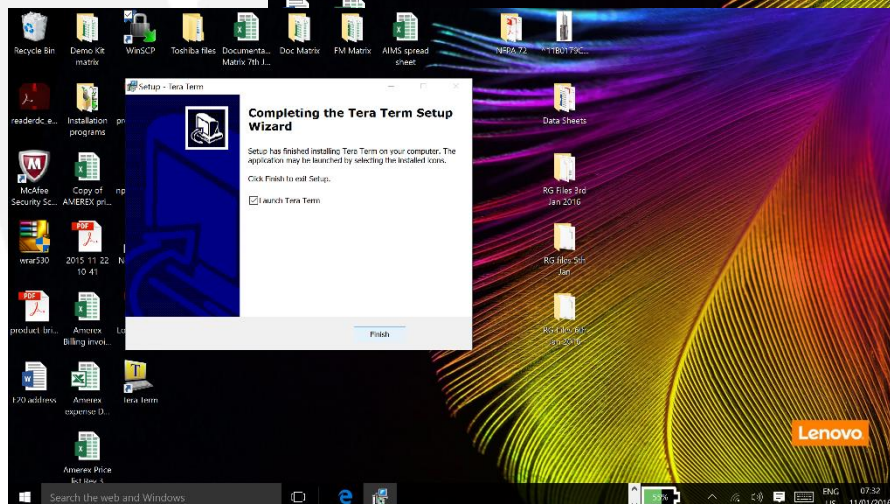
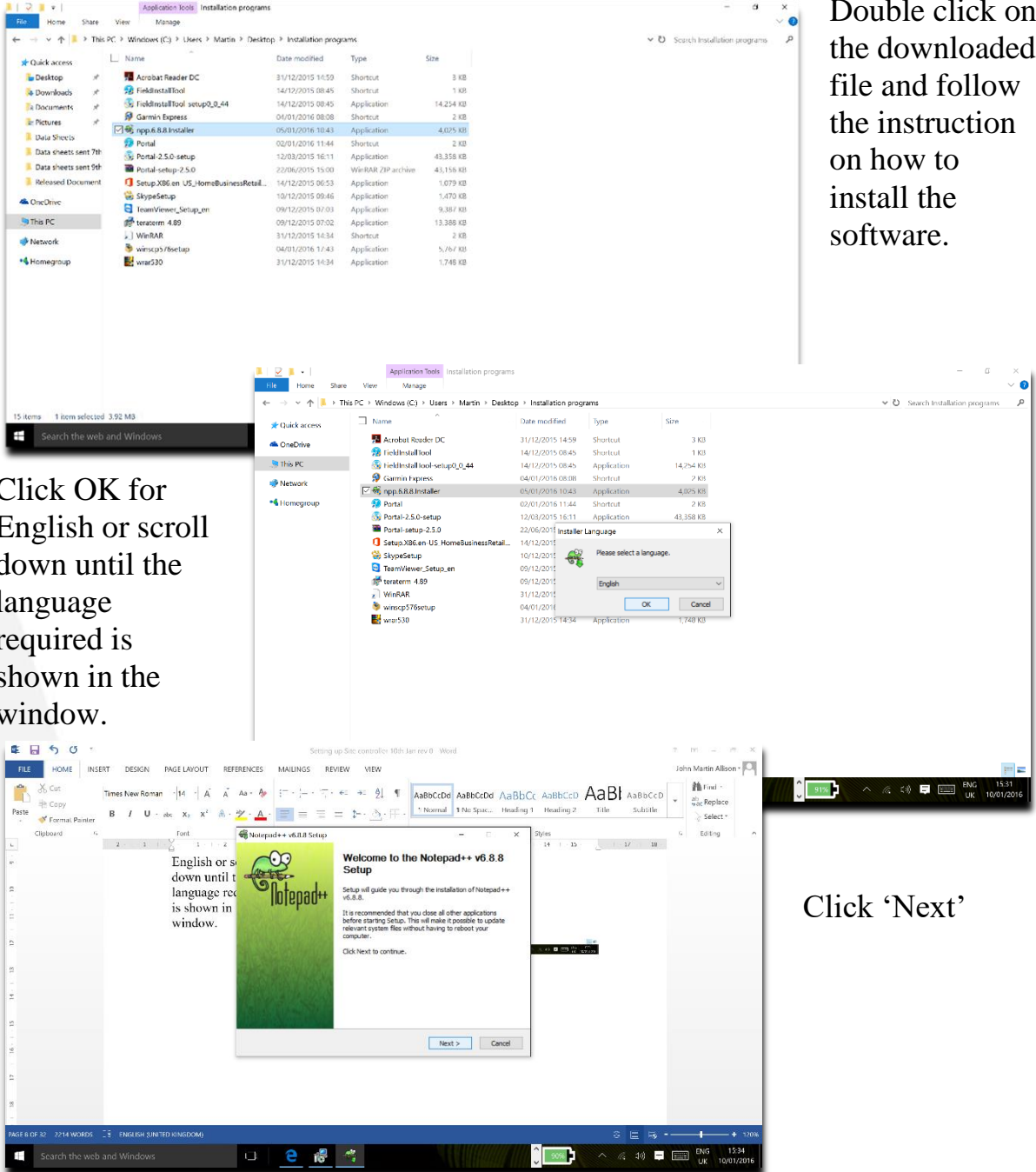Press 'Next' unless you wish to change anything

Click 'Next'

Click 'Install'

If you wish Tera Term to launch after closing the window tick the check box.
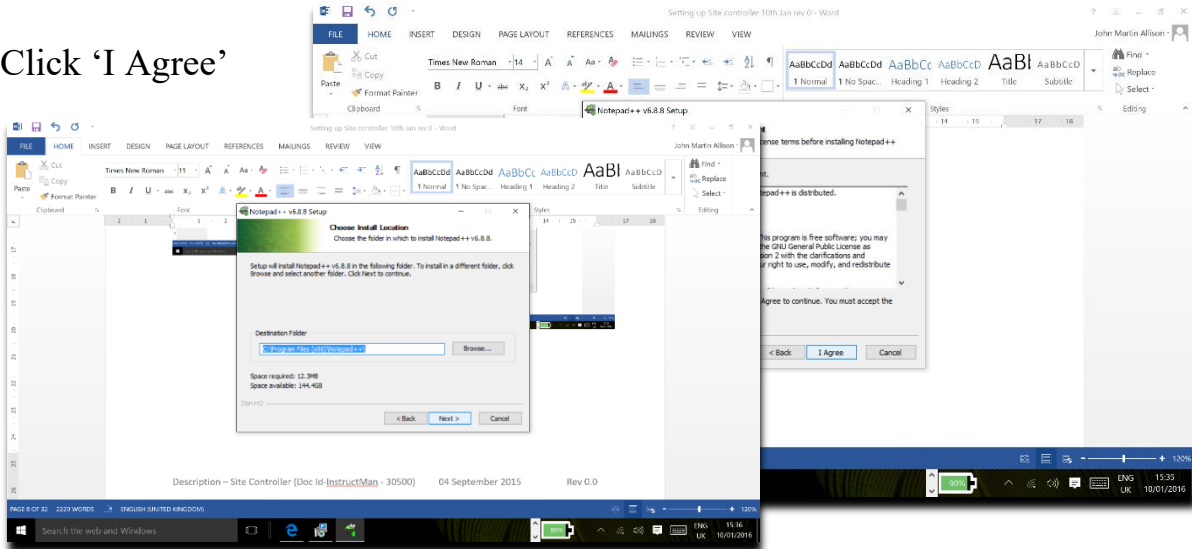Click 'Finish'

2.2   Installation of NotePad++

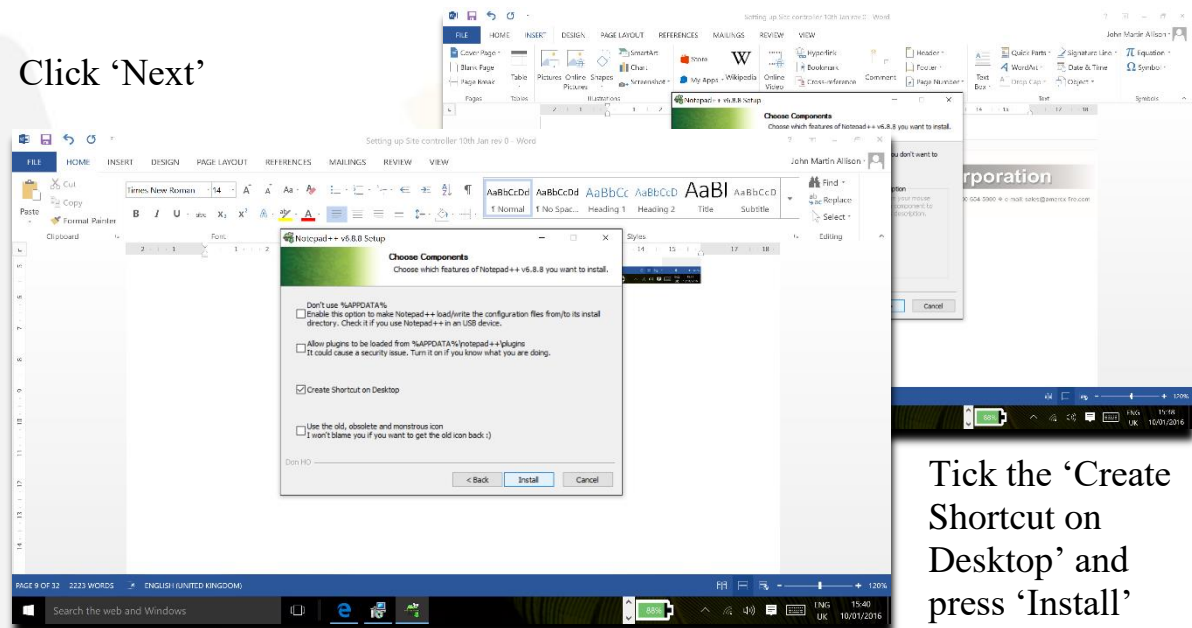Double click on the downloaded file and follow the instruction on how to install the software.

Click OK for English or scroll down until the language required is shown in the window.

Click 'Next'

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Click 'I Agree'
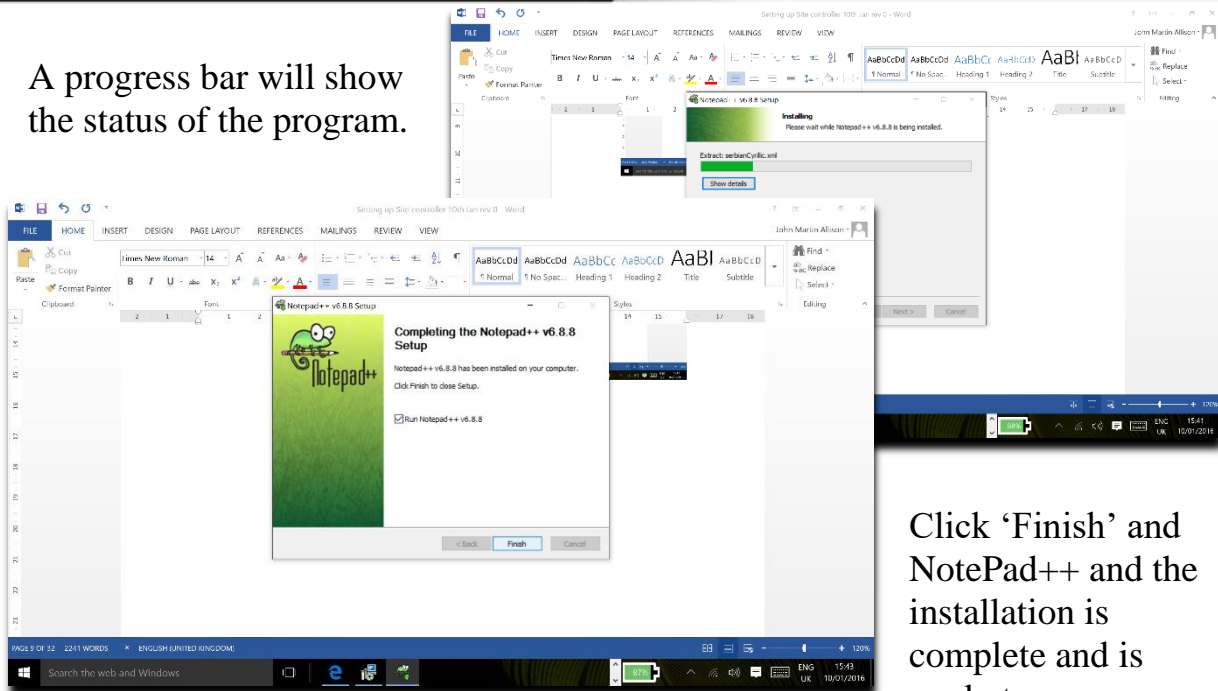

Click 'Next'

Click 'Next'

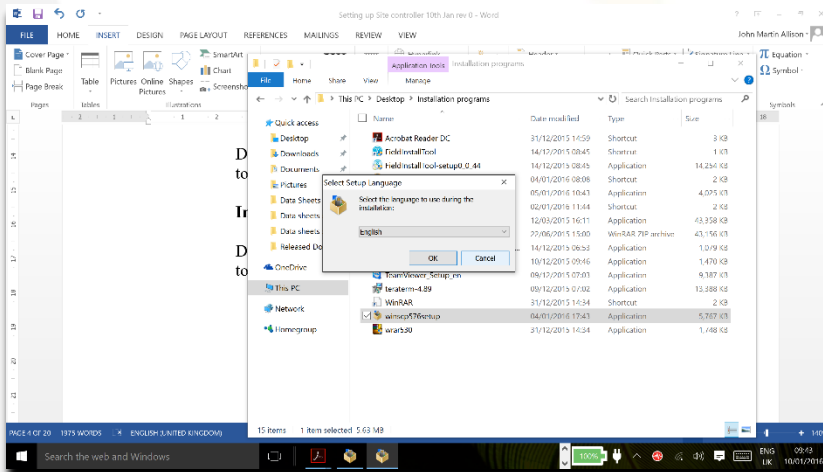Tick the 'Create Shortcut on Desktop' and press 'Install'

A progress bar will show
the status of the program.

Click 'Finish' and
NotePad++ and the
installation is
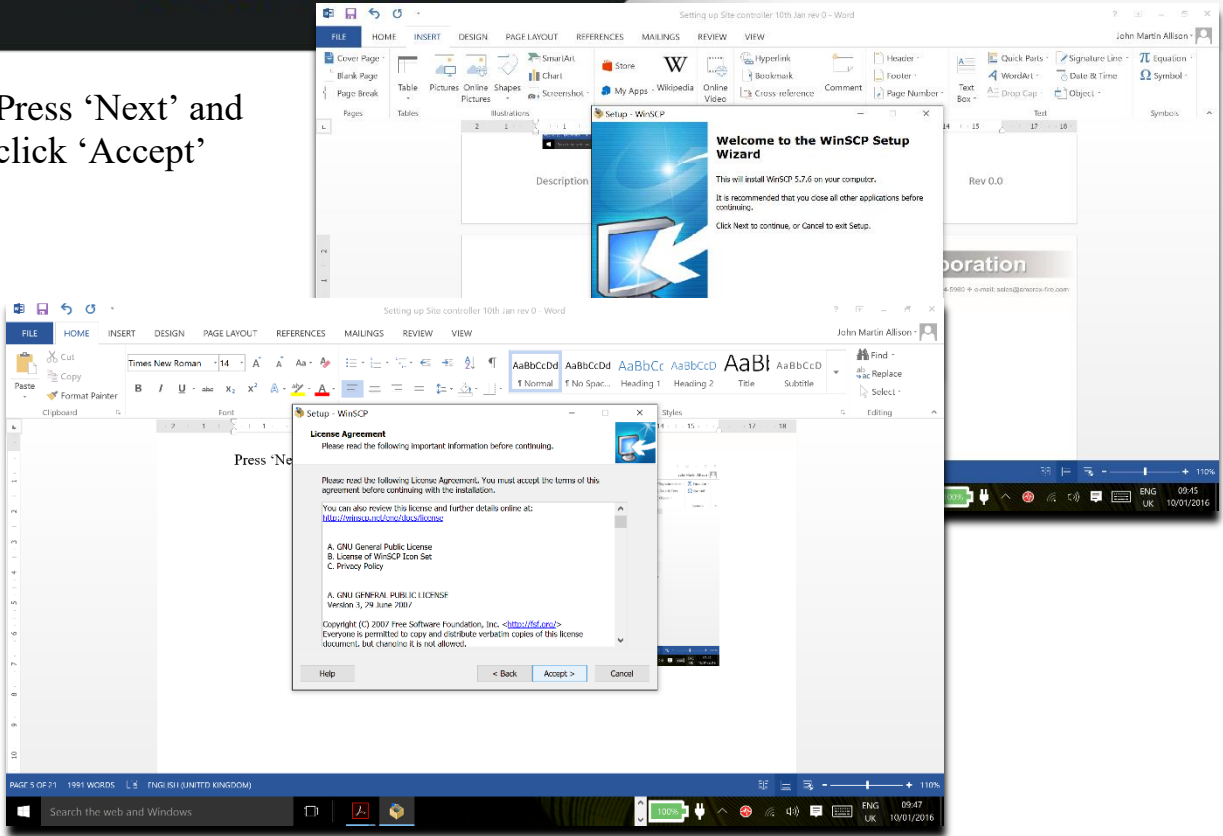complete and is
ready to run.

2.3   Installation of WinSCP

Double click on the downloaded file and follow the instructions on how to
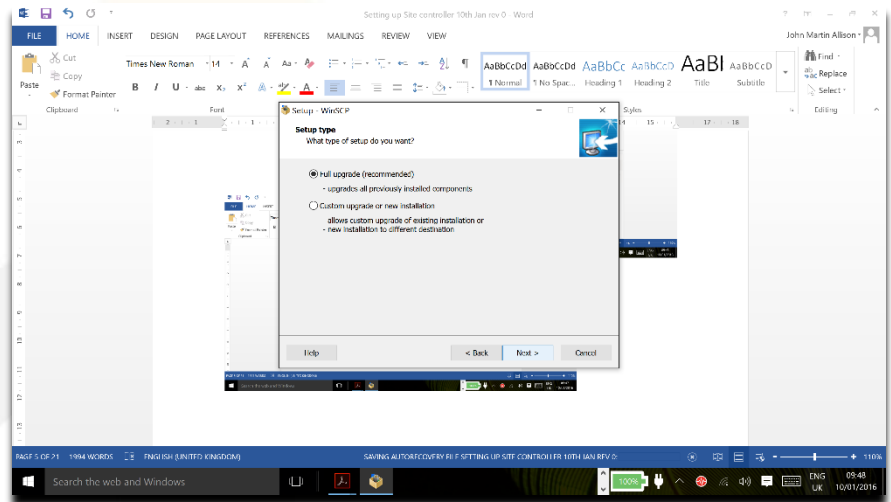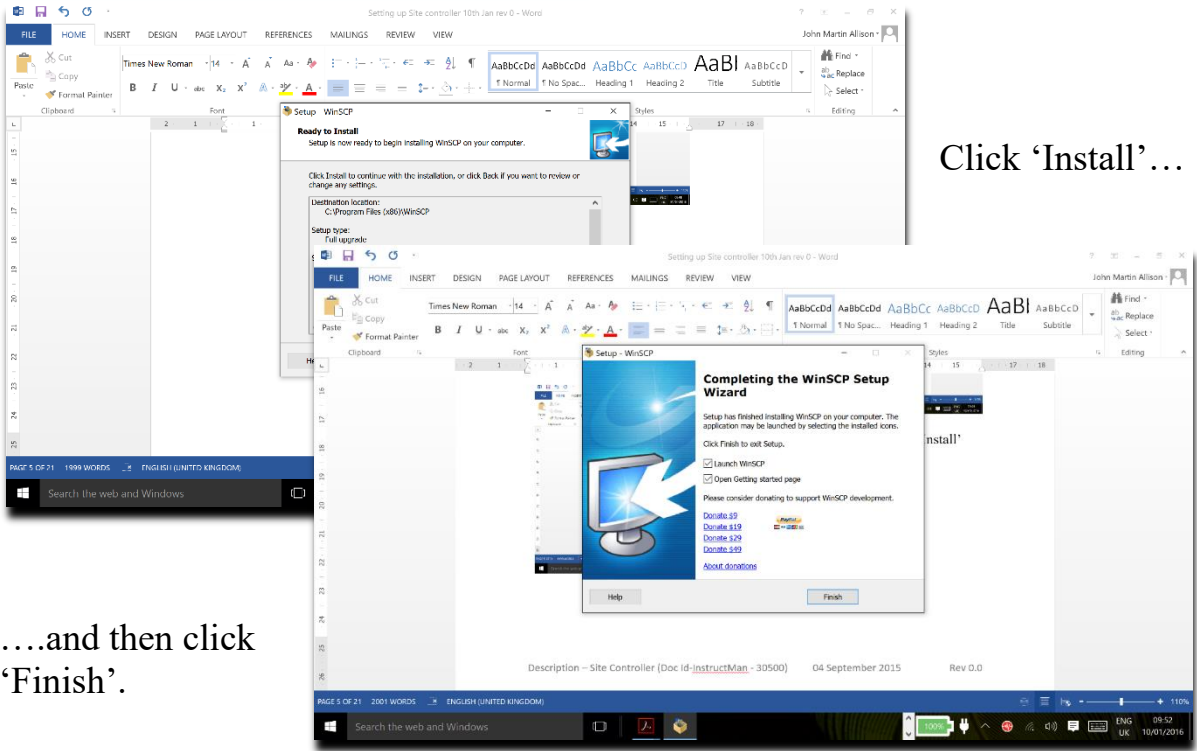install the software.

Select the language
you wish to use – for
the example we have
chosen English

Press 'Next' and
click 'Accept'

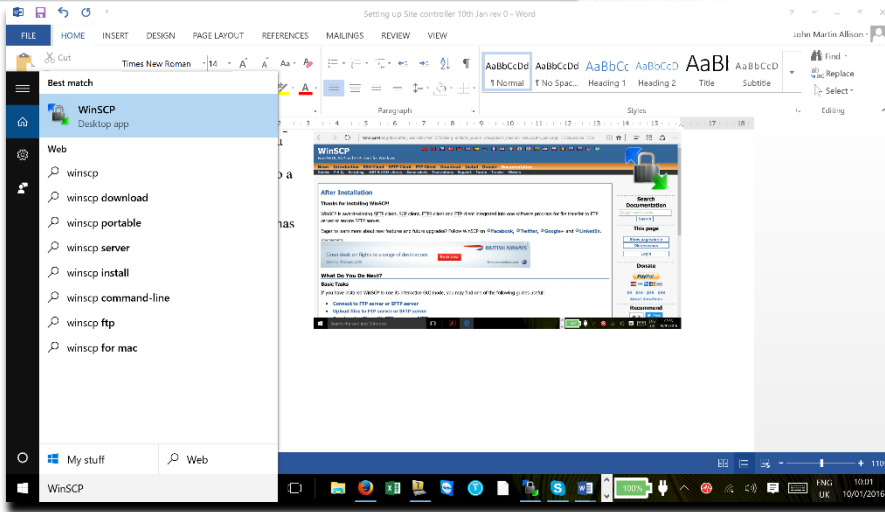

Click 'Next' for
Full Upgrade

Click 'Install'…

….and then click 'Finish'.

You can make a donation if you wish.

On clicking 'Finish' you will be directed to a web

WinSCP has now been installed.

Depending on the version of Windows you are running search for or if you know where the downloaded programs reside on your machine open WinSCP.
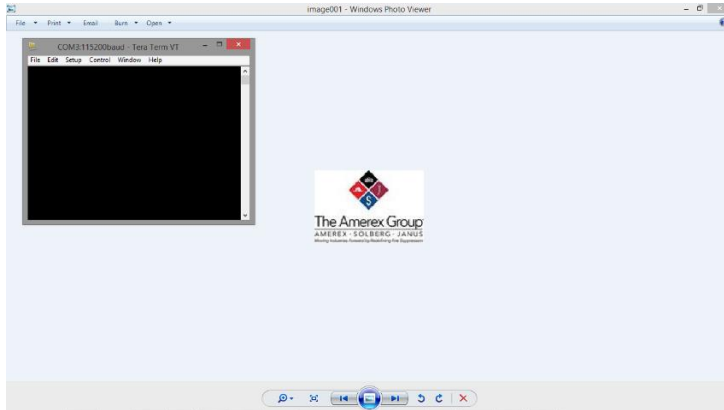
Or check your desktop for the short cut for WinSCP.

2.4   Setting up Tera Term

After 'Tera Term' has been installed on your PC or laptop, connect the micro-usb to the site controller socket (as shown in the earlier photograph) and the USB connector to your PC or laptop.

Double the icon on your desk top to start Tera Term. A similar screen to the one shown in the above insert, should now be on the screen of the PC/Laptop.
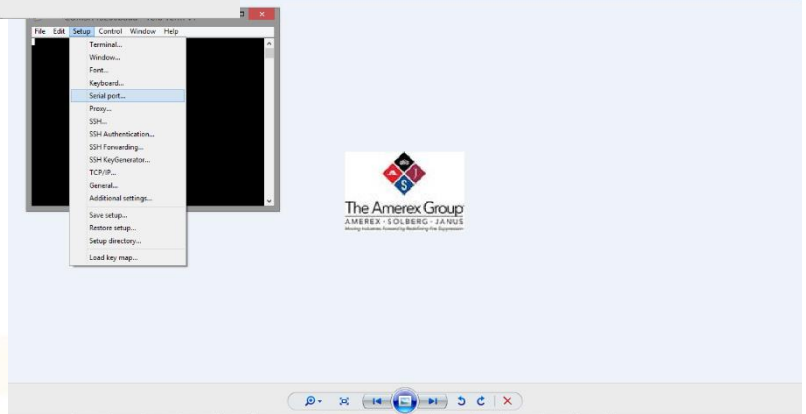
From the Menu line, select the Set Up tab in the Tera Term window. A drop down menu shall appear. Select 'Serial Port'
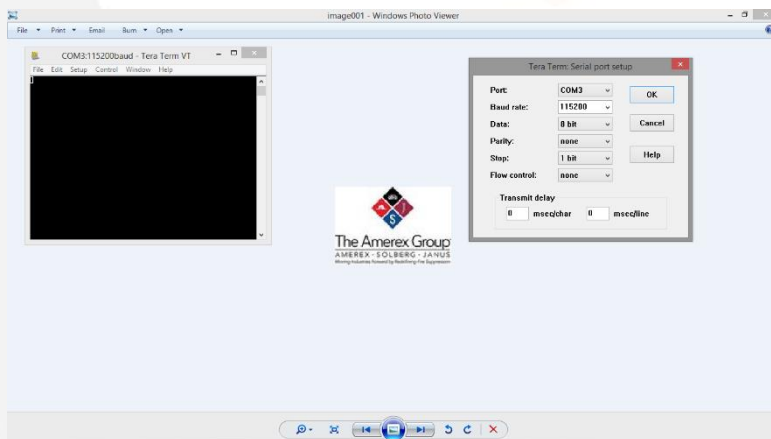
Select the Baud Rate 115200 and click OK. To change the font size click the Setup tab select Font and change to the size you require and click OK

2.5   Connecting your PC, Laptop to the Site Controller

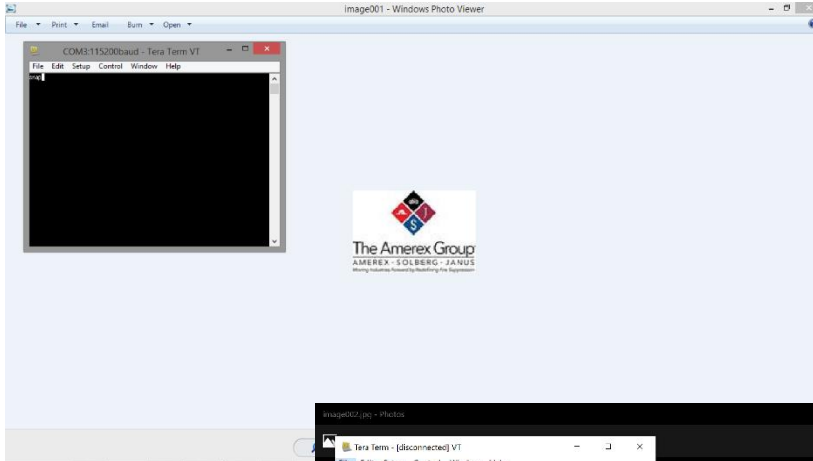Once the set-up has been completed as described above you are now able to connect to the site controller via Tera Term.

There two ways of connection to the site controller, one via the USB port and two via the IP address of the site controller. Both methods are basically the same. Click on 'File' and then 'New Connection' and chose which connection you wish to use. If you are using the USB port click on Serial and the com port number will appear in the window. If you are using the IP method you need to know the IP address of the site controller. Click OK and follow as per below.
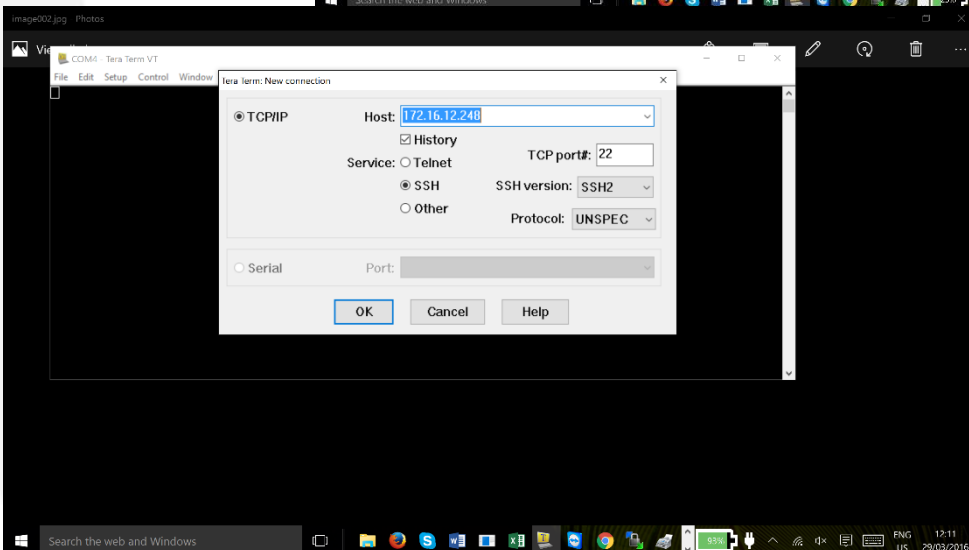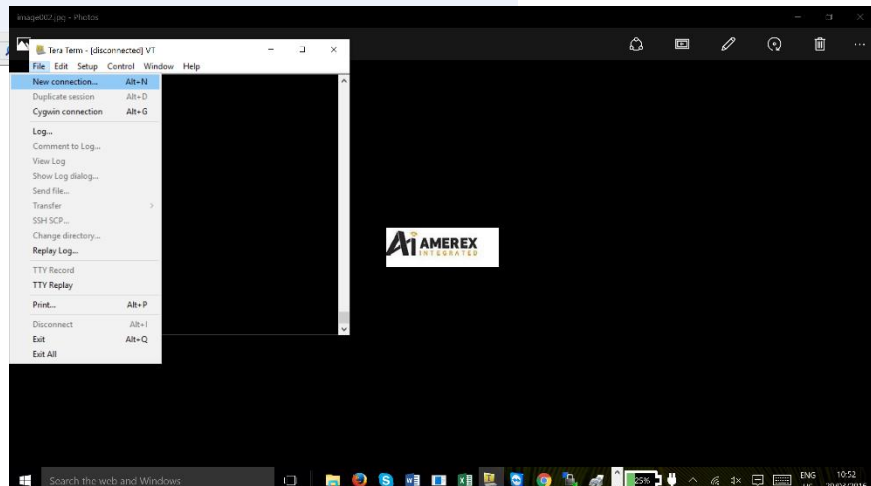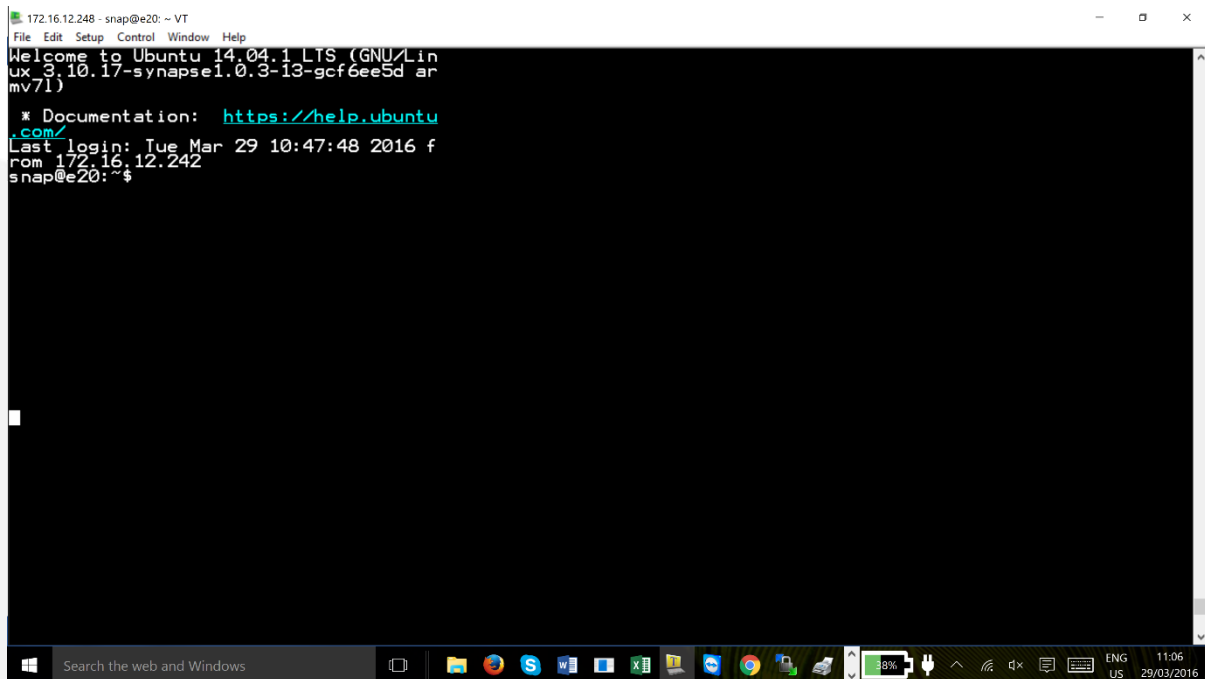
Once connected you will be asked to set a password. The Login is 'snap' and the default password for a first time is 'root'. For the new password we have chosen in this case 'synapse1'. Be careful when entering the password as no letters/numbers are displayed.
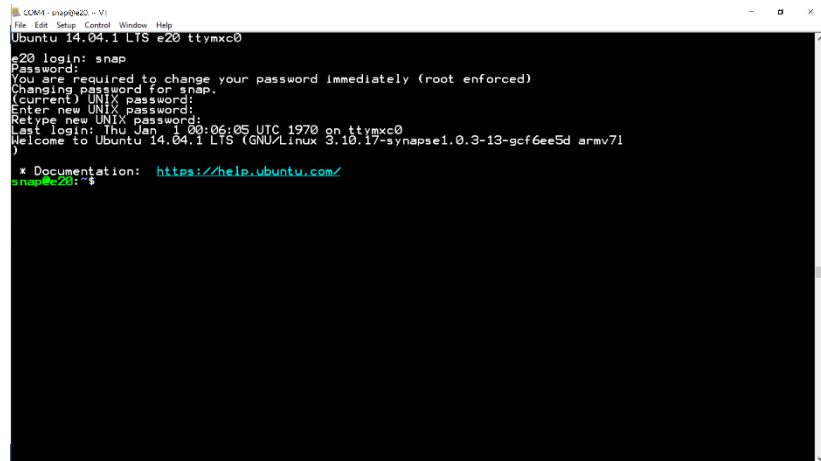

The Tera Term window shall show text indicating you are connected to the Site Controller. snap@e20:~$ is the main folder where all the files will be stored.

Note – the directory indicated above snap@e20:~$ may be different depending on the version of the site controller you have but it will be of this format snap@.......:~$

The PC or laptop is now connected to the site controller.
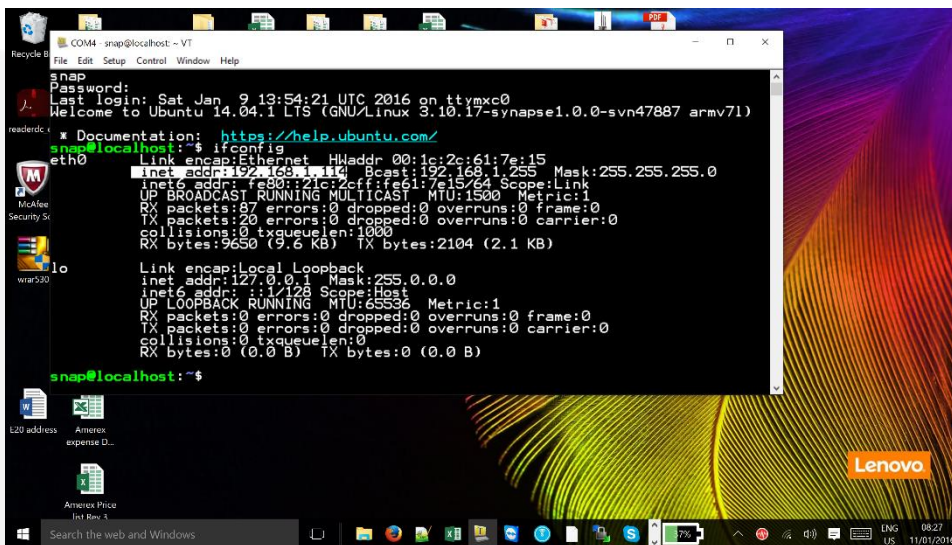
2.6 Finding IP address of site controller via Tera Term

Ensure the PC/Laptop is logged on to the site controller via Tera Term and using the Micro-USB to the PC USB port.

Once connected to the site controller enter 'snap' in the editor window. The system will ask for a password. Type in your password for our example it was 'synapse1', the screen does not show what has been type so ensure the correct entry of the password.

Information will appear on the last login time etc., indicating the PC is logged into the site controller.

After the ……:~$, enter *ifconfig* in the editor window. The IP address will be indicated details of the site controller connections, if it is connected to the network.

The IP address is highlighted and in this case it is; 192.168.1.114. Make a note of the address as it will be required during the setup of WinSCP.

To use Tera Term via IP, enter the IP address in Host: window.
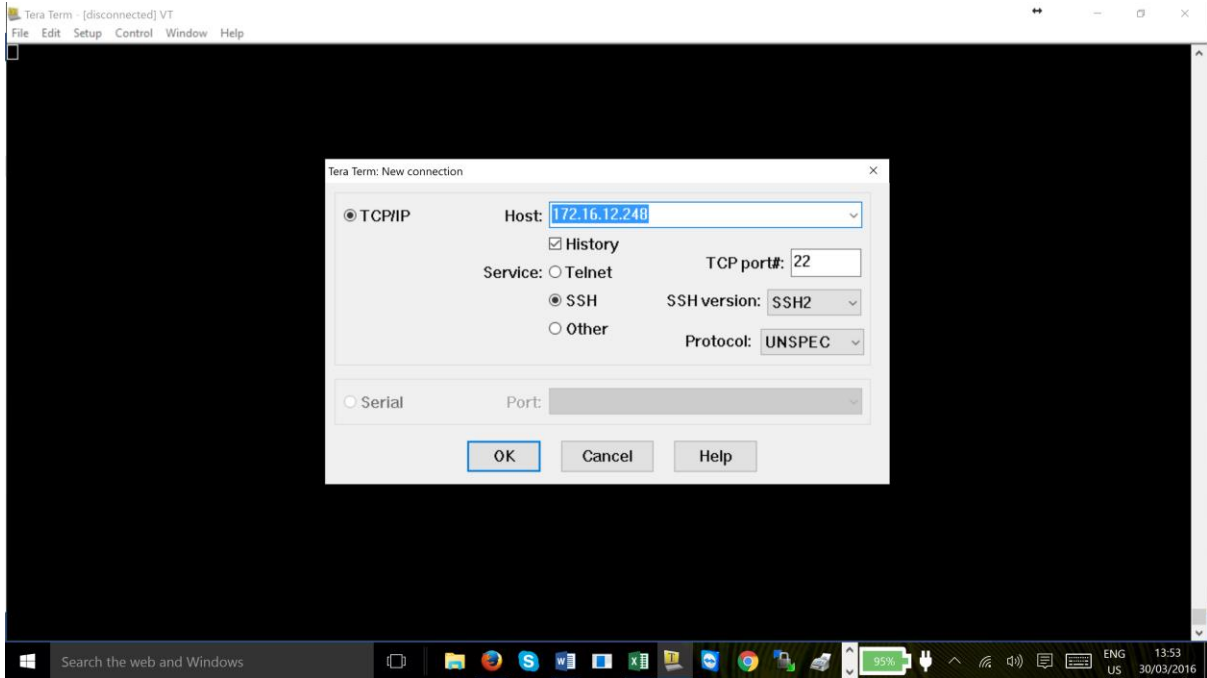
Ensure the settings are as the window indicated above, using your IP address.
Click on 'OK'

2.7   Setting Up WinSCP

Double click the short cut icon for WinSCP.

From the drop down menu 'File Protocol' select SFTP. The host name is the IP address of the site controller by using Tera Term.
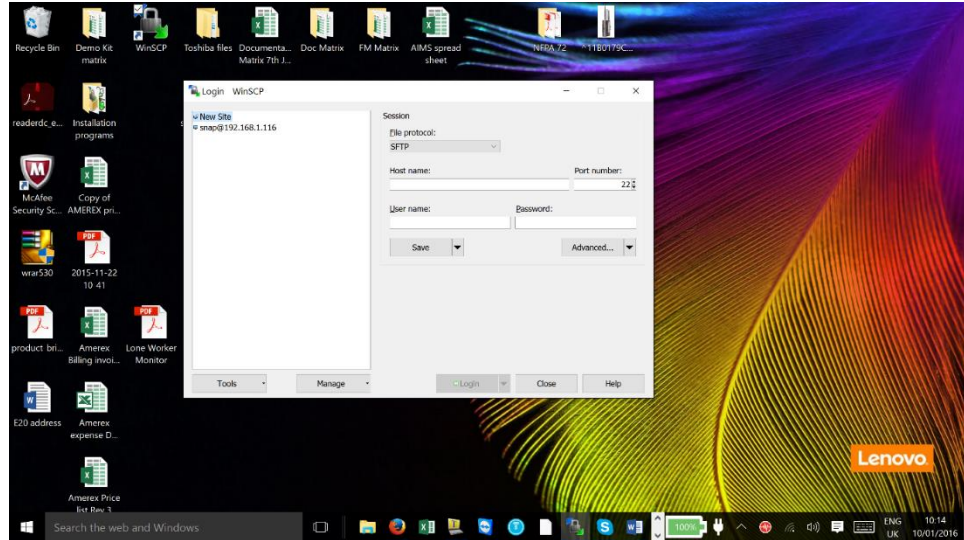
See Tera Term - **Finding IP address of site controller via Tera Term**
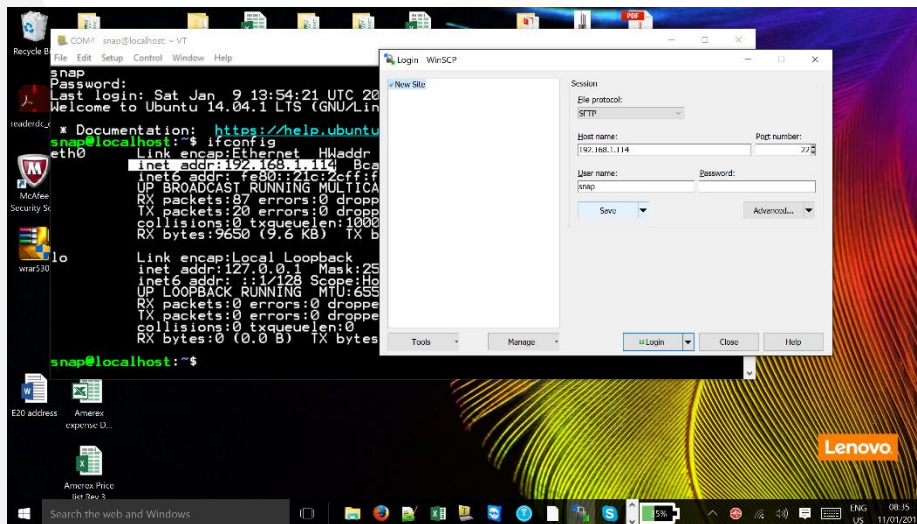
Enter the IP address of the site controller, the Port Number should be 22 (default), User Name - 'snap' do not enter a password.

Click 'Save'

Click 'OK' and if you wish to have Desktop shortcut tick the check box.

Note – the IP address of the site controller must be a static address – see the onsite IT department to arrange this facility
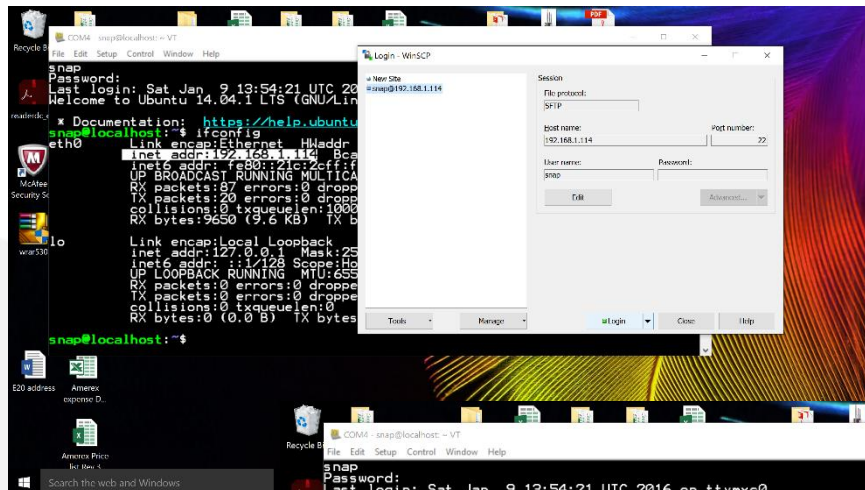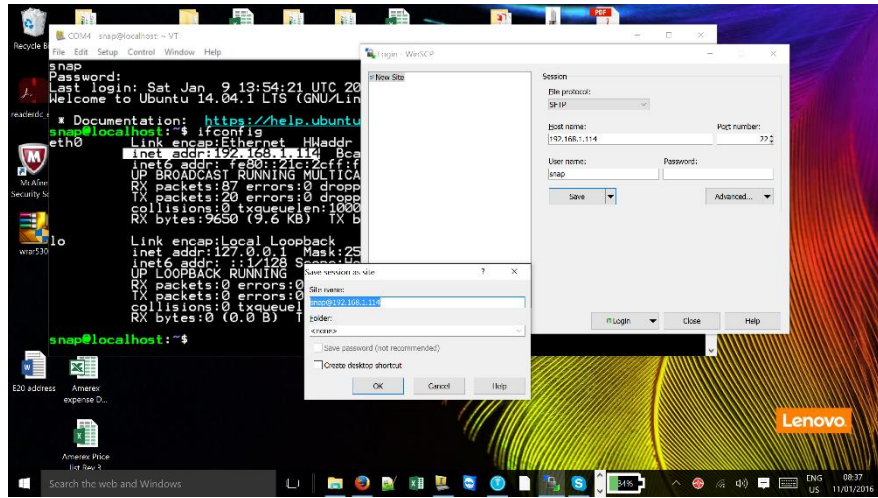
Log in by clicking the 'LogIn' button.

Enter the password you have chosen earlier, we chose 'synapse1' and click 'OK'.
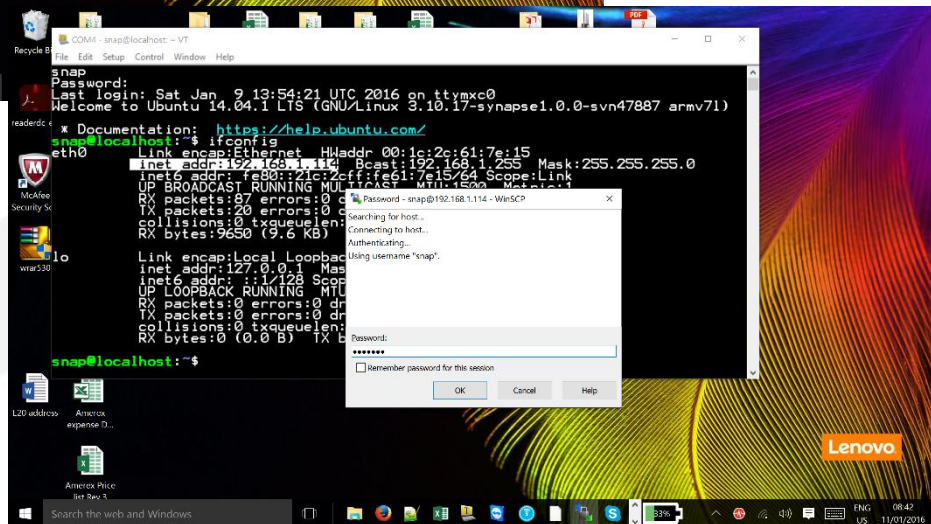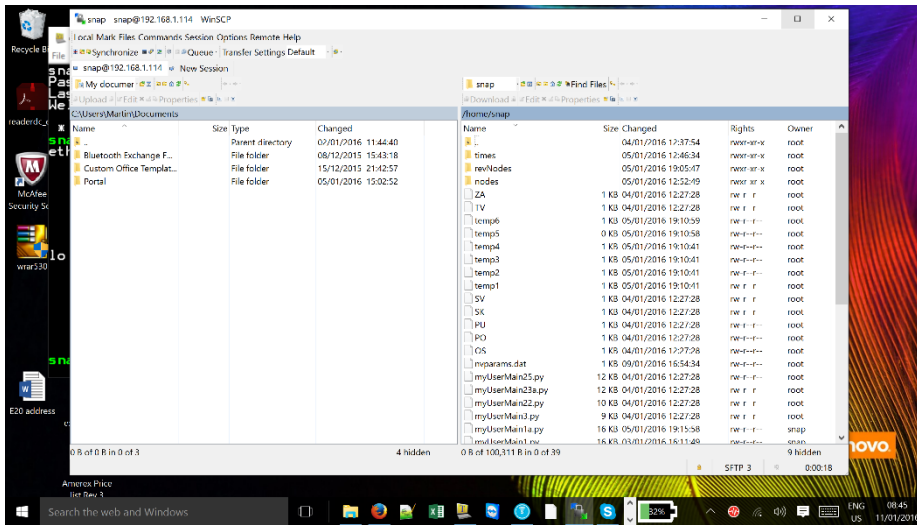
Well done….

WinSCP has been launched successfully.

On the screen you can see two windows – the left hand side is your PC and the right hand side is the site controller 'snap' folder.

3.0 Setting Up the Site Controller

The site controller is supplied with programs already installed but not are not activated. The following section will show you how to activate the required programs.

3.1 Programs to be installed from the Site Controller

The following programs must be installed in the site controller prior to connecting to the mesh network.

sudo mkdir -p /media/ramdisk

sudo mount -t tmpfs -o size=64M tmpfs /media/ramdisk

grep /media/ramdisk /etc/mtab | sudo tee -a /etc/fstab

sudo apt-get install e20-snap-utils

sudo apt-get install supervisor

sudo pip install -i https://update.synapse-wireless.com/pypi snapconnect

Copy each line of the above and paste it in the editor window of Tera Term. Check the folder you are in, snap@e20:~ $.

Note - this may be slightly different depending on the site controller you have but it should be of a similar format as snap@..........:~$
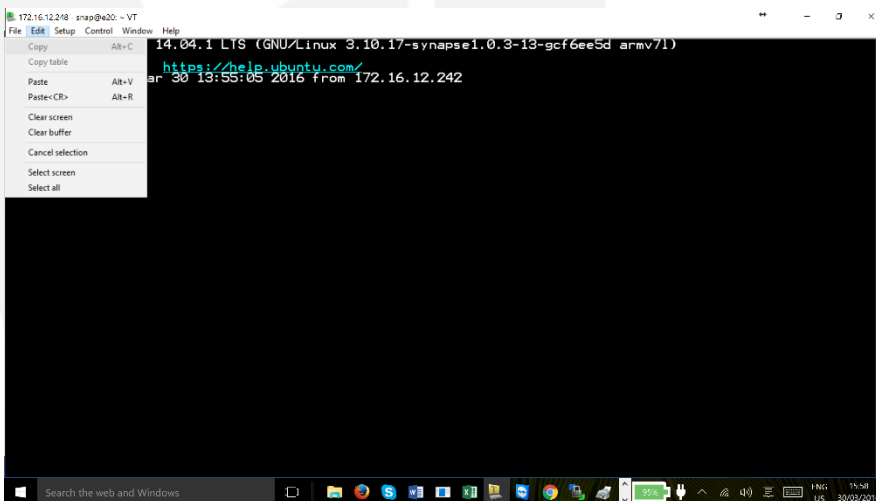
Tera Term does not use the normal CTRL C or CNRTL V for copy and paste, use the command bar 'Edit' tab at the top of Tera Term editor window.

Once the line has been typed in or pasted into the editor press the Enter / Return key and the program will install automatically. Repeat this for first five items.

For the last item the Site Controller must be connected to a network to download the latest software, copy the following into the Tera Term editor window and press enter.

sudo pip install -i https://update.synapse-wireless.com/pypi snapconnect

Note:
The site controller must be connected to the network / internet for this to download the latest version.

The site controller will down load the latest software – this may take a few minutes depending upon the connection with the internet.

4.0　Installing software programs on the site controller

There are two ways the main programs (*myUserMain.py* is one of them) can be installed on the site controller.

a) **Manual Method** – the user will be required to have some knowledge of how to cut and paste functions within programs and by following the section below 'Manual installation of myUserMain.py'

b) **Drag and Drop method** – this does not require as much technical know-how as section a) but still requires the user to have some knowledge of moving files between screens and programs.

Whichever method is chosen there are certain files that must be downloaded from the web site www.AMEREX-Integrated.com/documents/site_controller and loaded into the site controller.

- *filechecker.py*
- *fileprep.py*
- *maketimes.py*
- *myUserMain.py*

Note – Before carrying out any changes, additions, modifications etc., to the site controller programming we recommend you carry out the following.

The 'supervisor' program runs in the back ground and controls all aspects of the programs running in the site controller and requires stopping to make any changes to the site controller. To stop and restart the 'supervisor' program use the following commands in the Tera Term editor window.

sudo /etc/init.d/supervisor stop　　　　this should be used before any changes to the site controller

sudo /etc/init.d/supervisor restart　　　use the restart supervisor to load the new information.

4.1 Manual Method

The files mentioned in the previous section must be up-loaded to the site controller and …Documents\Portal\snappyImages. This can be achieved by the following;

a) Portal must be installed prior to uploading the files from the web site.
   Once the files have been downloaded from the web site, the following files should be copied into the ….Portal\snappyImages folder.

   - *Amerex.py*
   - *SMswitch.py*

   As an example C:\Users\Martin\Documents\Portal\snappyImages, it will be different for your PC. If you are unable to locate the folder carry out a Windows folder search by using the search function in the bottom left of the Windows screen.

   Refer to the Portal Instruction Manual for the uploading of snappyImages to the nodes.

b) The remaining files must be loaded onto the site controller

   - *filechecker.py*
   - *fileprep.py*
   - *maketimes.py*
   - *myUserMain.py*

4.1.1 Creating folders / files on the site controller

The following folders or directories are required to be created in the snap@e20:~ $ folder (this may also be snap@........:~$ format depending on the site controller).

- *nodes*
- *revNodes*
- *times*

To do this, ensure the selected folder or directory is snap@......:~ $

Type in the following after the $ sign

   sudo mkdir nodes and press the enter key

Check if the folder has been created by typing *ls* after the $ sign. The '*nodes*' folder should be indicated in blue bold text. Repeat the same for the other folders – *revNodes* and *times*.

   sudo mkdir revNodes

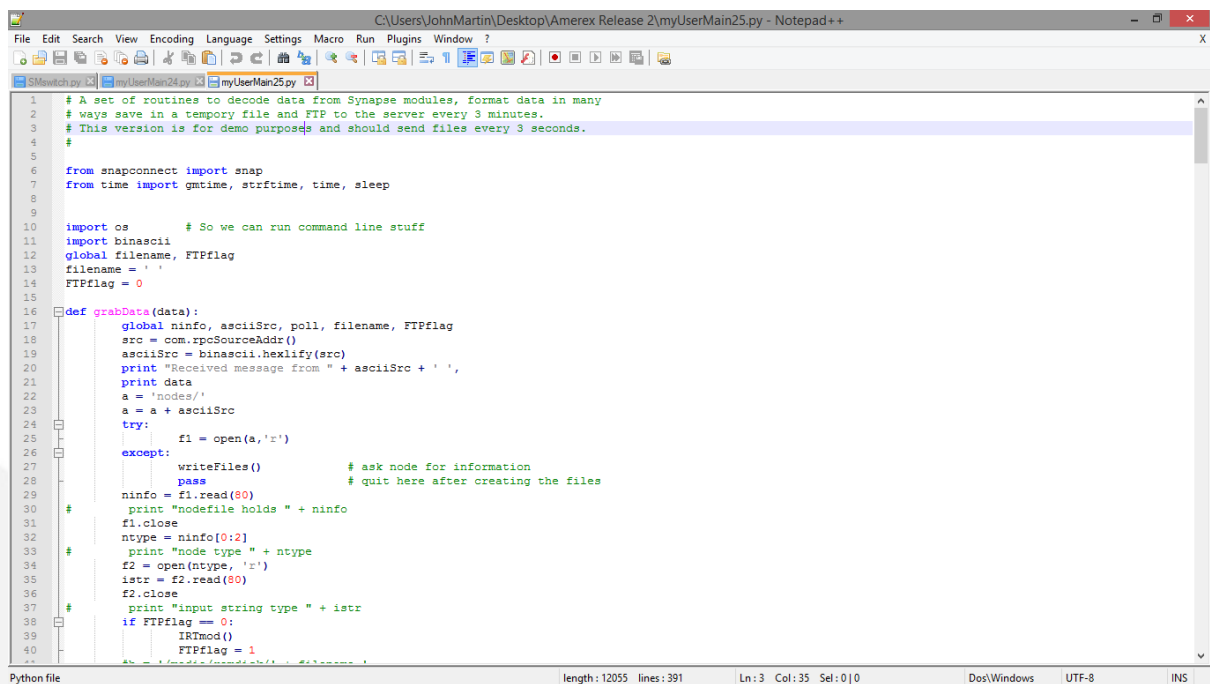*sudo mkdir times*
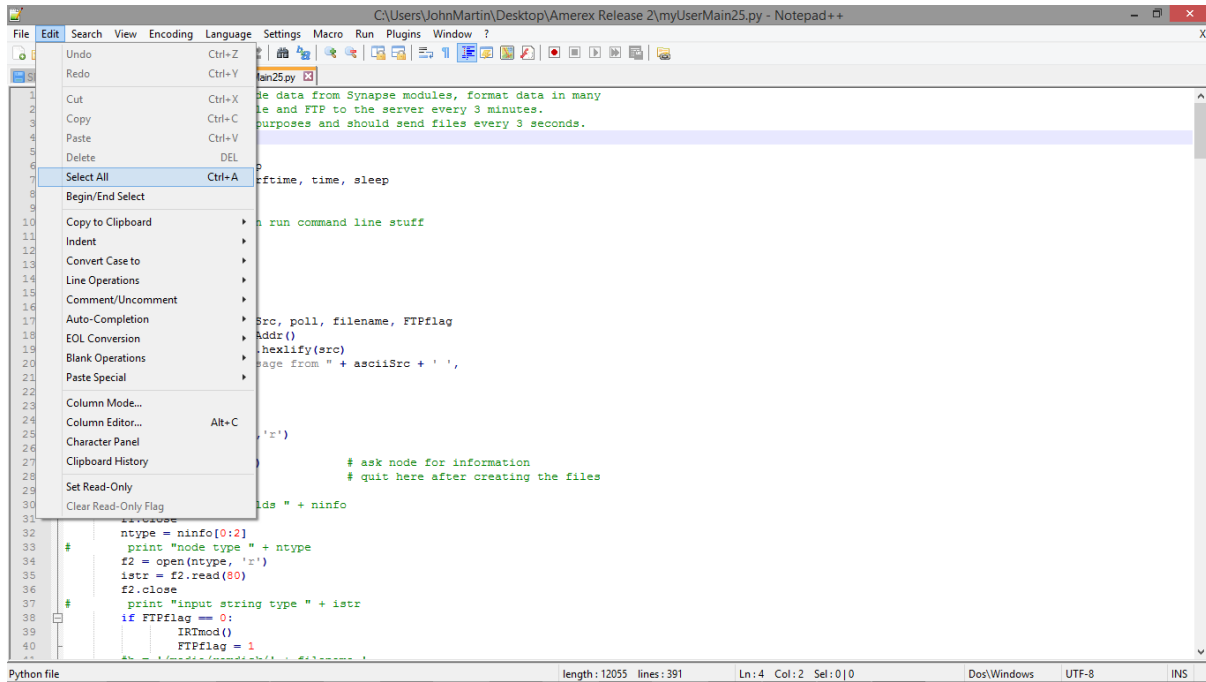
To install the main program (*myUserMain.py*) and the other files mentioned in the previous section (*Filechecker.py, fileprep.py, maketimes.py*) NotePad++ will be required.

The file *myUserMain.py* should have been copied and saved on your PC/Laptop is connected to the site controller. See Start-up guide for details.

Open Notepad++ and choose *myUserMain.py* see screen shot below

Click on the 'Edit' tab and select 'Select All' All the text within this file will be highlighted.

Select the 'Edit' tab again and click on 'Copy'.

Open 'Tera Term', ensure you are in snap@.......:~ $folder and type in the following;

sudo nano myUserMain.py

This will open the Tera Term editor window.
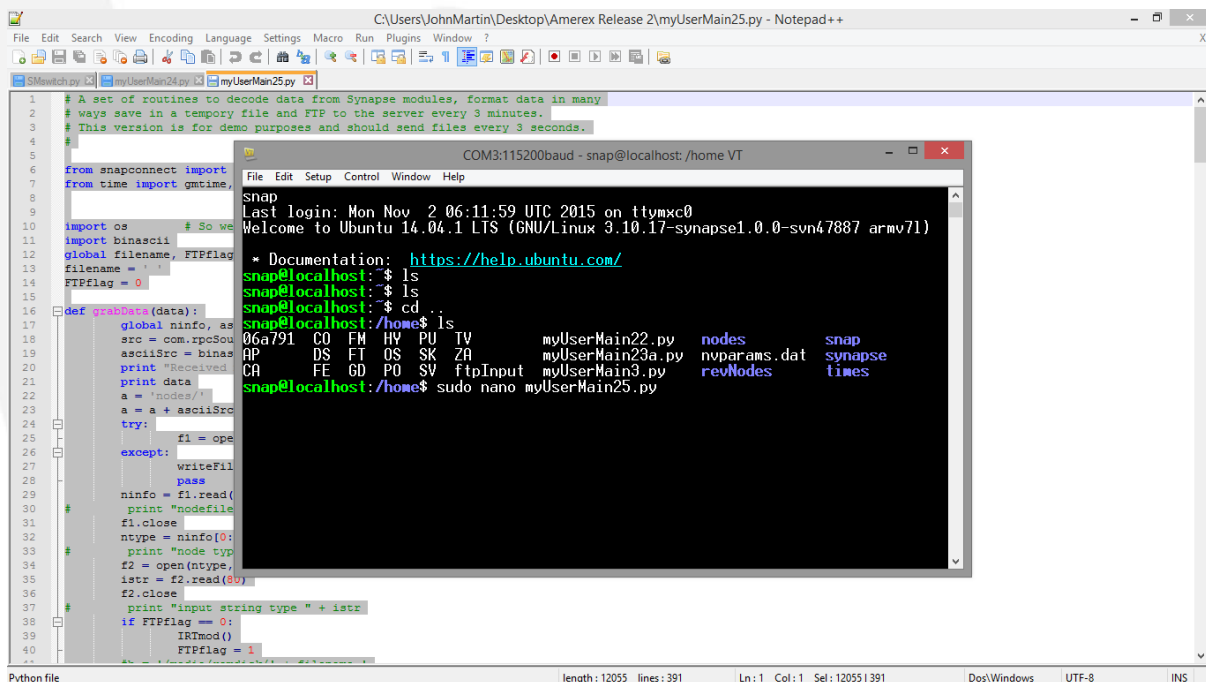
Press enter and the editor window shall appear as shown in the screen shot below.
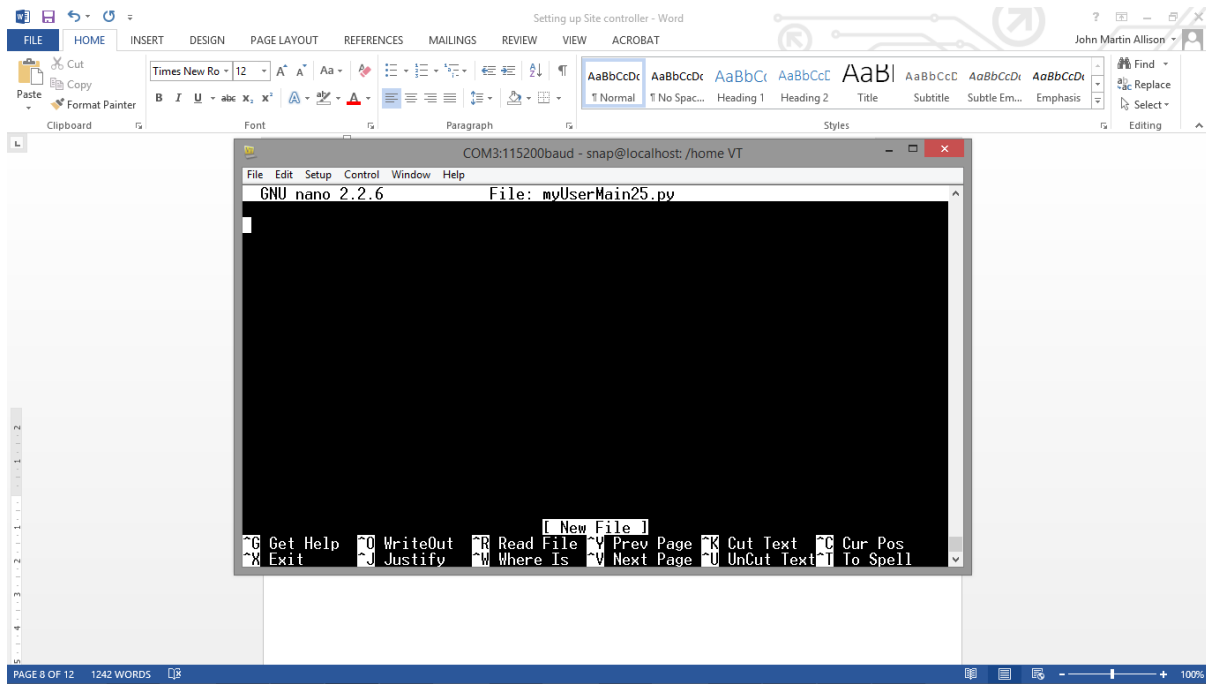
Click the 'Edit' tab and select 'Paste'
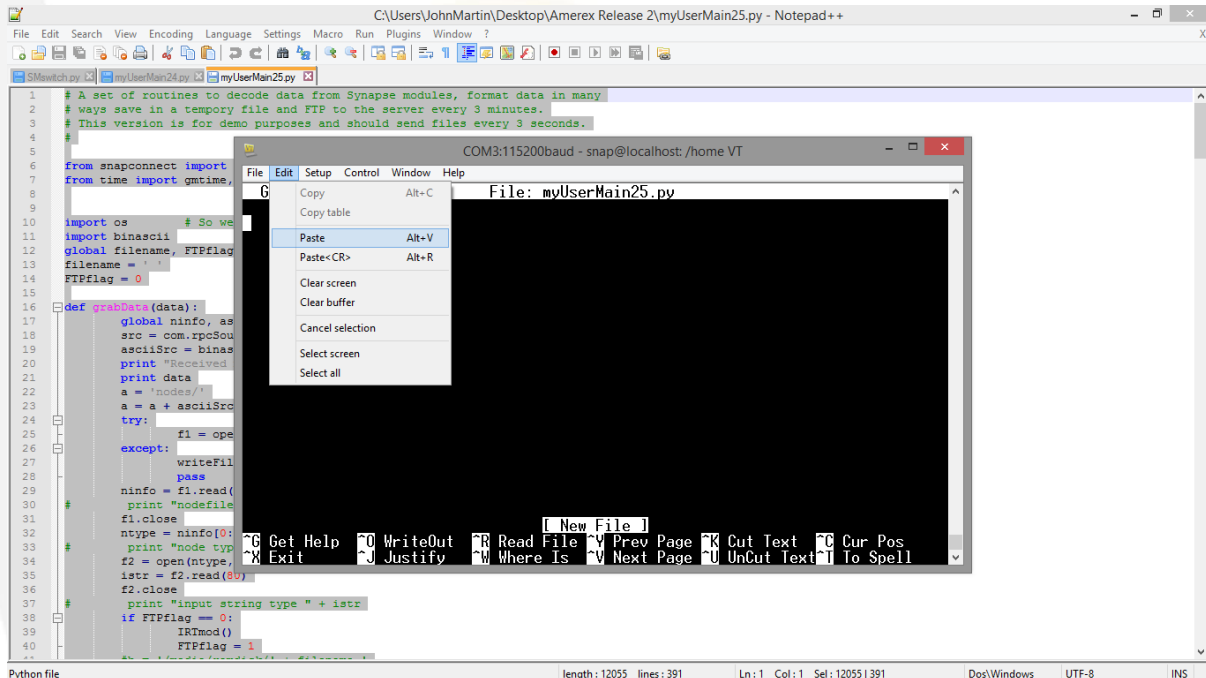
Click 'Paste'. The screen will ask to confirm if you wish to continue, if you are happy to continue, click 'OK'

The file *myUserMain.py* will be copied into the editor window. Ensure all the file has been copied over. Check the last line in the editor window is the same as the last line in the Notepad++.
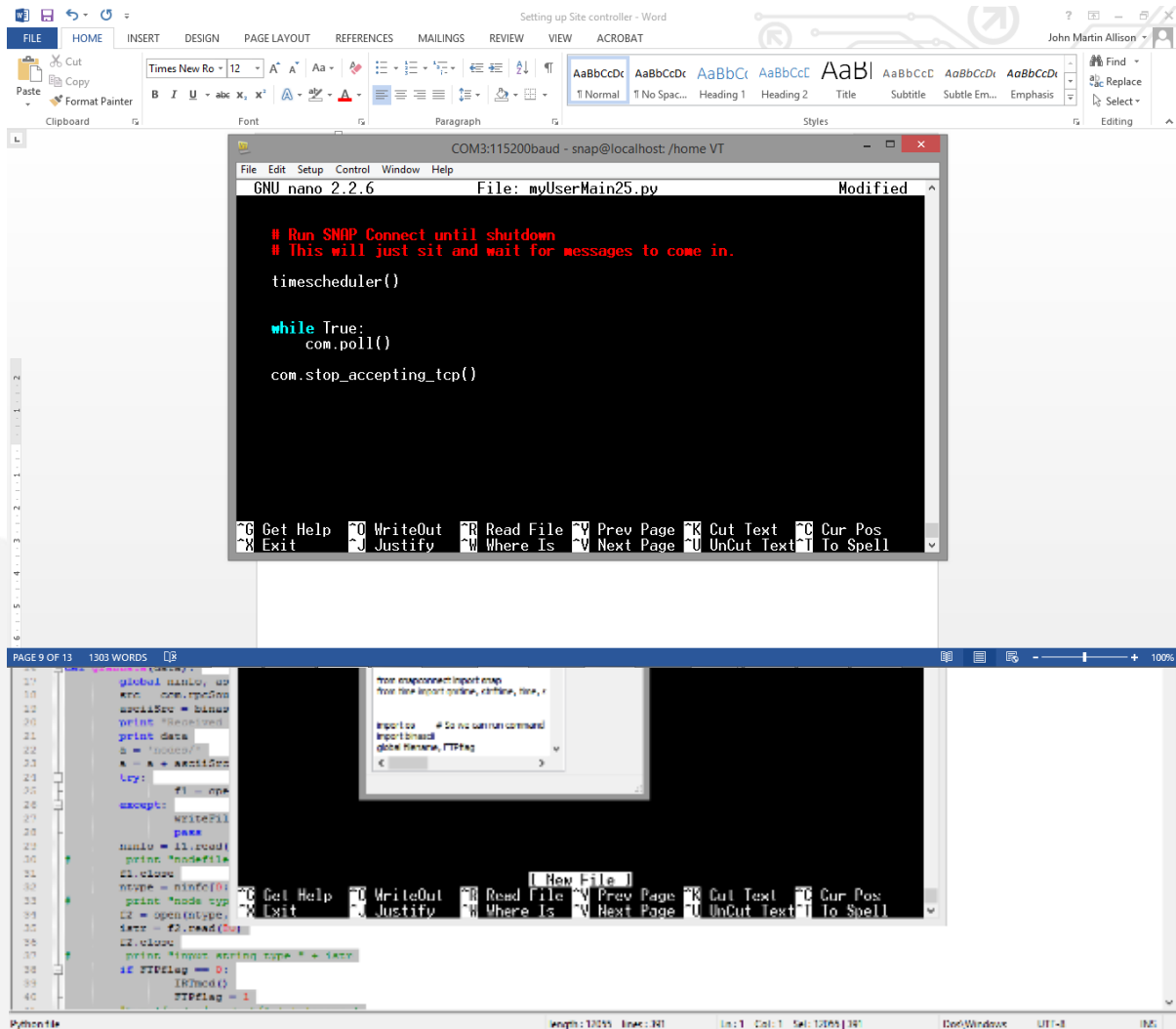
Once the file has been successfully copied over press the CTRL and X keys to save the file to snap@........:~ $ *myUsermain.py*
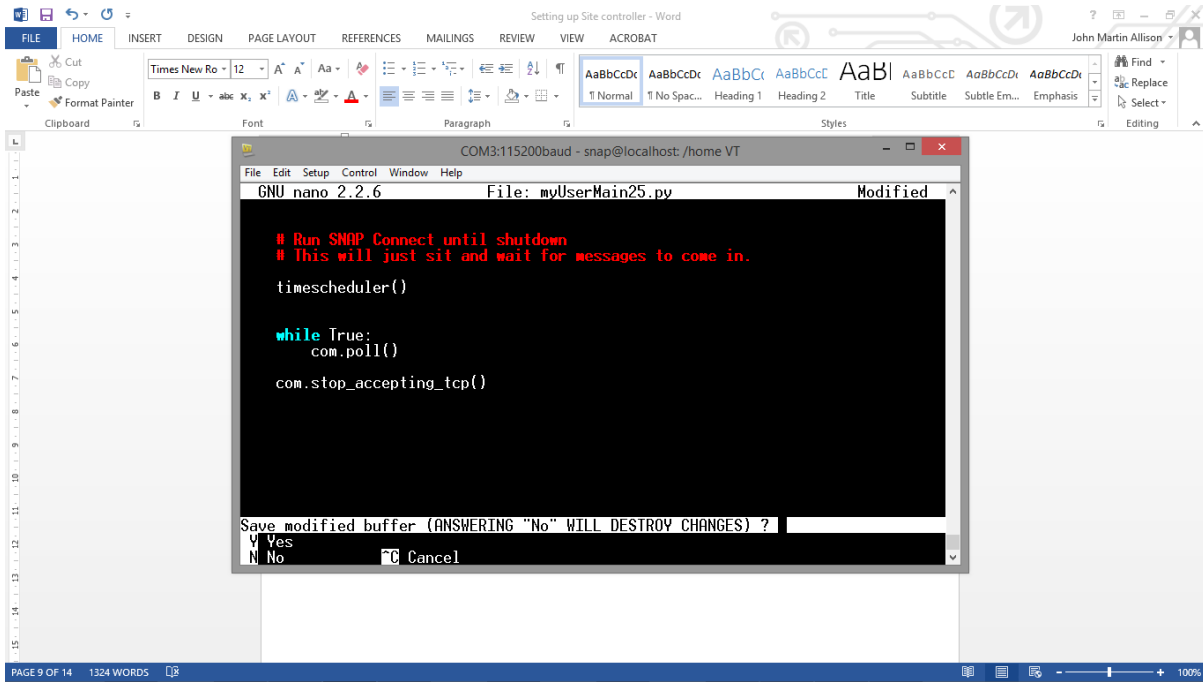
Press the Y key
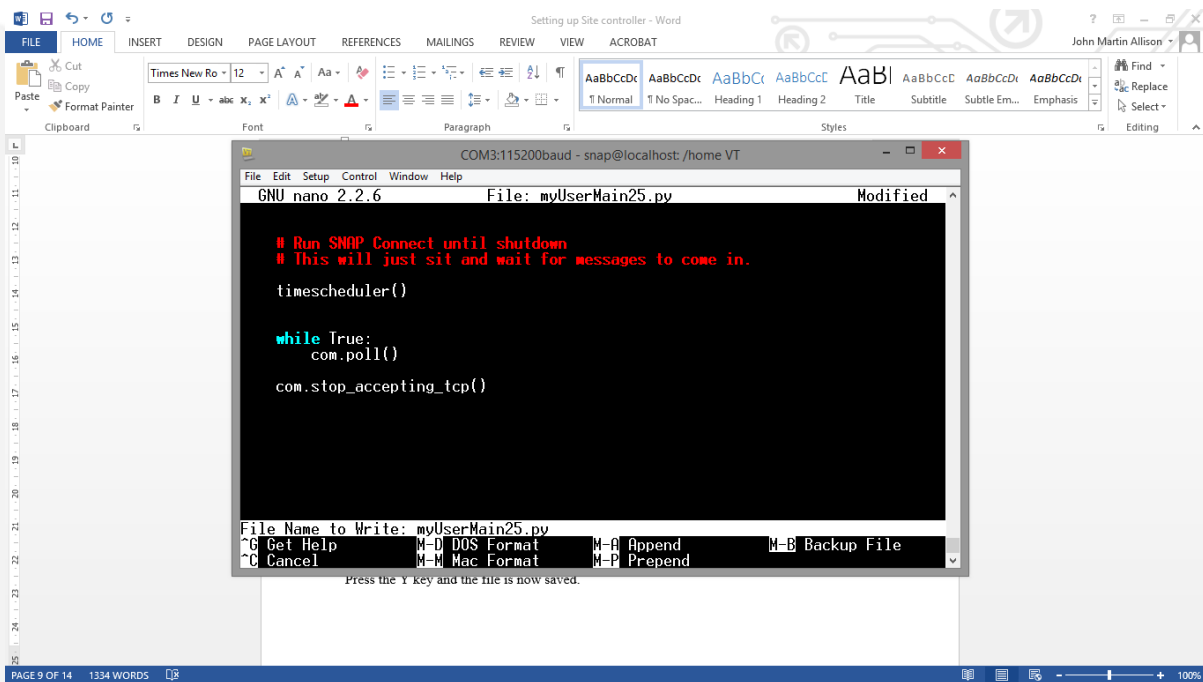
Press the Enter key and the file is now saved.

Check the snap@.........:~ $ folder has saved the file *myUserMain.py* by typing the *ls* command.

Carry out the same procedure for the other three files – *maketimes.py*, *fileprep.py* and *filechecker.py*

Changes to supervisord.conf file

At this point we need to modify the *supervisord.conf* file which is located in the /root/etc/supervisor folder.

This change can be completed with Tera Term.
The changes to the file are highlighted in yellow. We recommend these to be copied and pasted into the file using the procedure described above.

Note – this procedure can also be carried out by WinSCP which is described in a later section.

```
; supervisor config file

[unix_http_server]
file=/var/run/supervisor.sock    ; (the path to the socket file)
chmod=0700                       ; sockef file mode (default 0700)

[supervisord]
logfile = /media/ramdisk/supervisord.log
logfile_maxbytes = 1MB
logfile_backups = 5
logfile=/var/log/supervisor/supervisord.log ; (main log file;default
$CWD/supervisord.log)
pidfile=/var/run/supervisord.pid ; (supervisord pidfile;default
supervisord.pid)
childlogdir=/var/log/supervisor              ; ('AUTO' child log dir,
default $TEMP)

; the below section must remain in the config file for RPC
; (supervisorctl/web interface) to work, additional interfaces may be
; added by defining them in separate rpcinterface: sections
[rpcinterface:supervisor]
supervisor.rpcinterface_factory =
supervisor.rpcinterface:make_main_rpcinterface

[supervisorctl]
serverurl=unix:///var/run/supervisor.sock ; use a unix:// URL  for a unix
socket

; The [include] section can just contain the "files" setting.  This
; setting can list multiple files (separated by whitespace or
; newlines).  It can also contain wildcards.  The filenames are
; interpreted as relative to this file.  Included files *cannot*
; include files themselves.

[include]
files = /etc/supervisor/conf.d/*.conf
```

```
[program:myUserMain]
command=/usr/bin/python /home/snap/myUserMain.py
autorestart=true
stdout_logfile=/media/ramdisk/print.log
stdout_logfile_maxbytes = 1MB
stdout_logfile_backups = 5
stderr_logfile=/media/ramdisk/error.log
stderr_logfile_maxbytes = 1MB
stderr_logfile_backups = 5
```

Whichever route you wish to take the supervisor program must be stopped prior to any changes to the system and restated after the changes have been completed.

Changes to interfaces file

The site controller must have a fixed IP address. If the network allows the IP port to be a dedicated fixed IP address and will always be dedicated then this procedure will not be required, if not, it is recommended this procedure should be followed.

The interfaces file is in the root/etc/network, by using Tera Term and modify the file as below:

Note – Use the IP address and other information of your site controller not the IP address used in the example below

```
# interfaces(5) file used by ifup(8) and ifdown(8)
# Include files from /etc/network/interfaces.d:
#source-directory /etc/network/interfaces.d

allow-hotplug eth0
iface eth0 inet dhcp

#iface eth0 inet dhcp
iface eth0 inet static
    address 172.16.12.248                  *** address of the E20
    netmask 255.255.0.0                    **** this is standard, by standard the first
3 digits are your network the last digit is standard.
    network 172.16.0.0                     **** this is you home network start address,
this is standard
    broadcast 172.16.255.255               **** this is you home network end address,
this is standard
    gateway 172.16.1.1                     **** this is you home network gateway
address this is standard
    dns-nameservers 172.16.1.14

#auto wlan0
iface wlan0 inet dhcp
    wpa-conf /etc/wpa_supplicant.conf
    wpa-driver wext
```
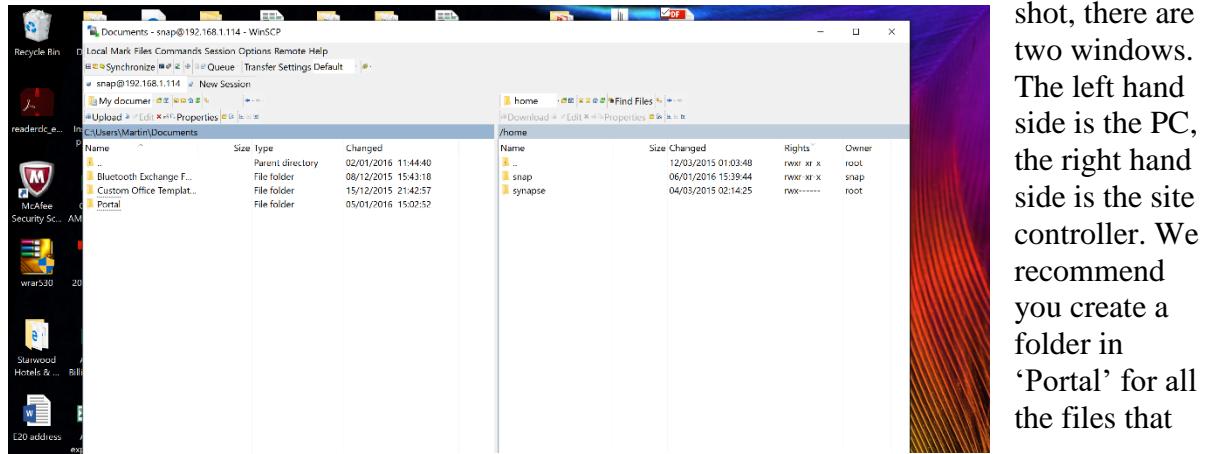
The site controller has now been setup and you can move to the next stage. Please go to the **Configuring the Site Controller** section

4.2 Drag and Drop Method

Using WinSCP to edit the site controller. Once the PC has logged into WinSCP, as previously described, the default screen will appear as indicated below. From the screen

shot, there are two windows. The left hand side is the PC, the right hand side is the site controller. We recommend you create a folder in 'Portal' for all the files that

will be transferred to the site controller. This also acts as a back-up for all the files on the site controller in case any changes are made at a later date.
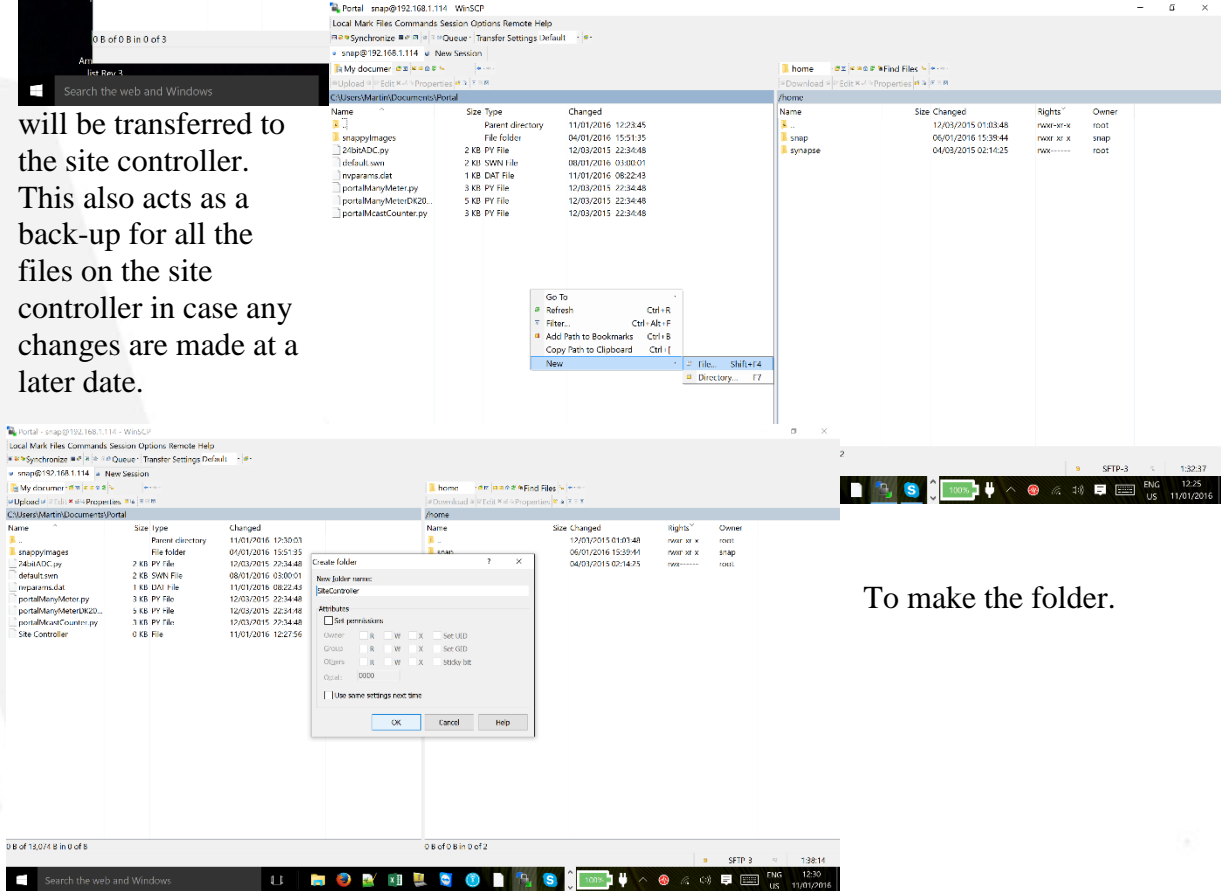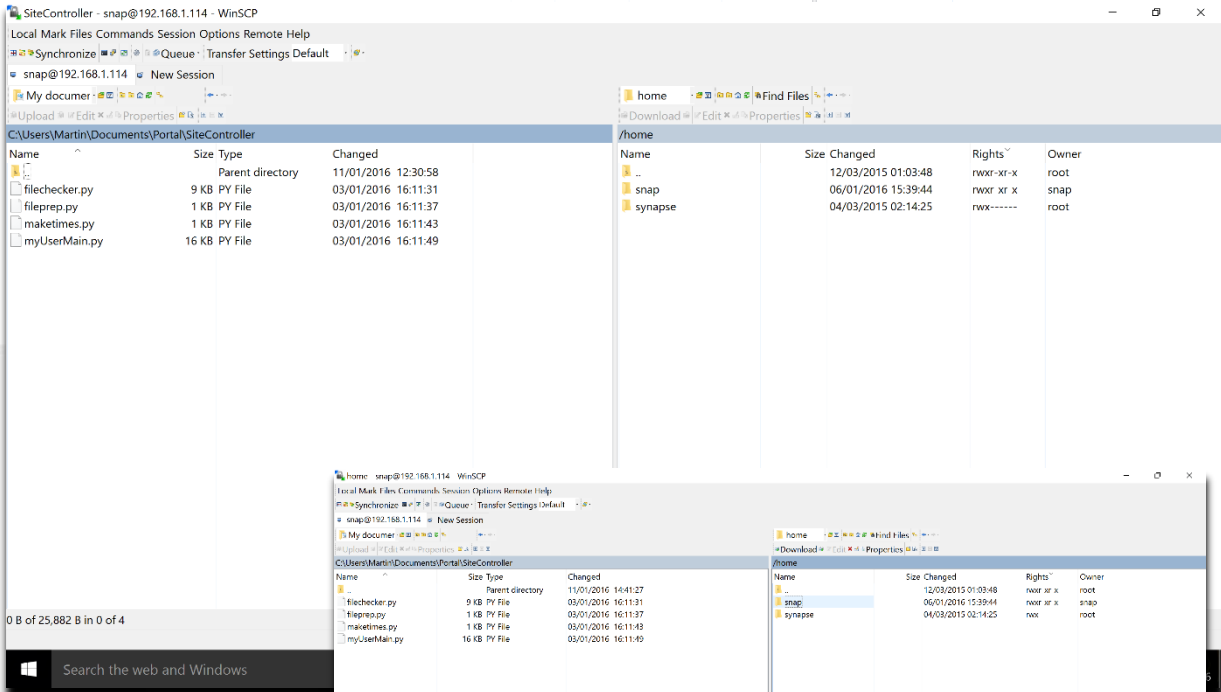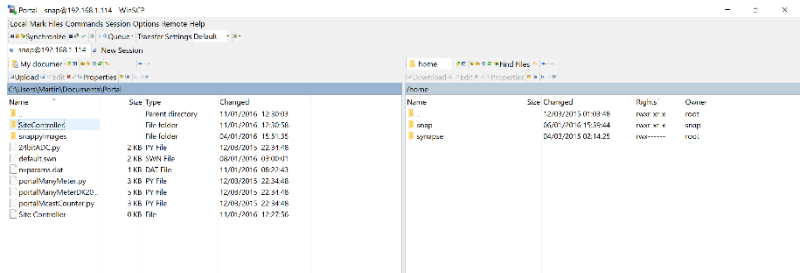

To make the folder.

Double click on 'Portal' folder and then right mouse click below the last file name. Click on 'New' and select 'Directory'.

Enter the folder name (for example 'SiteController') and click OK.

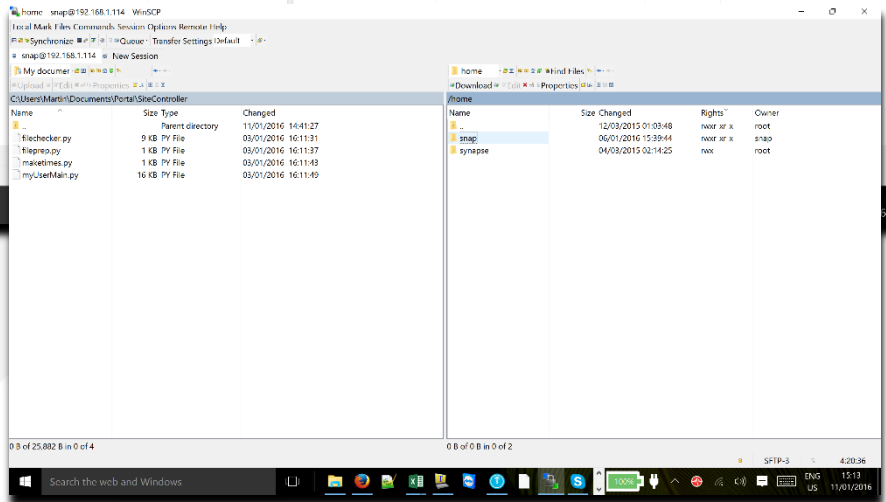The new Directory name will appear in the left hand side window.

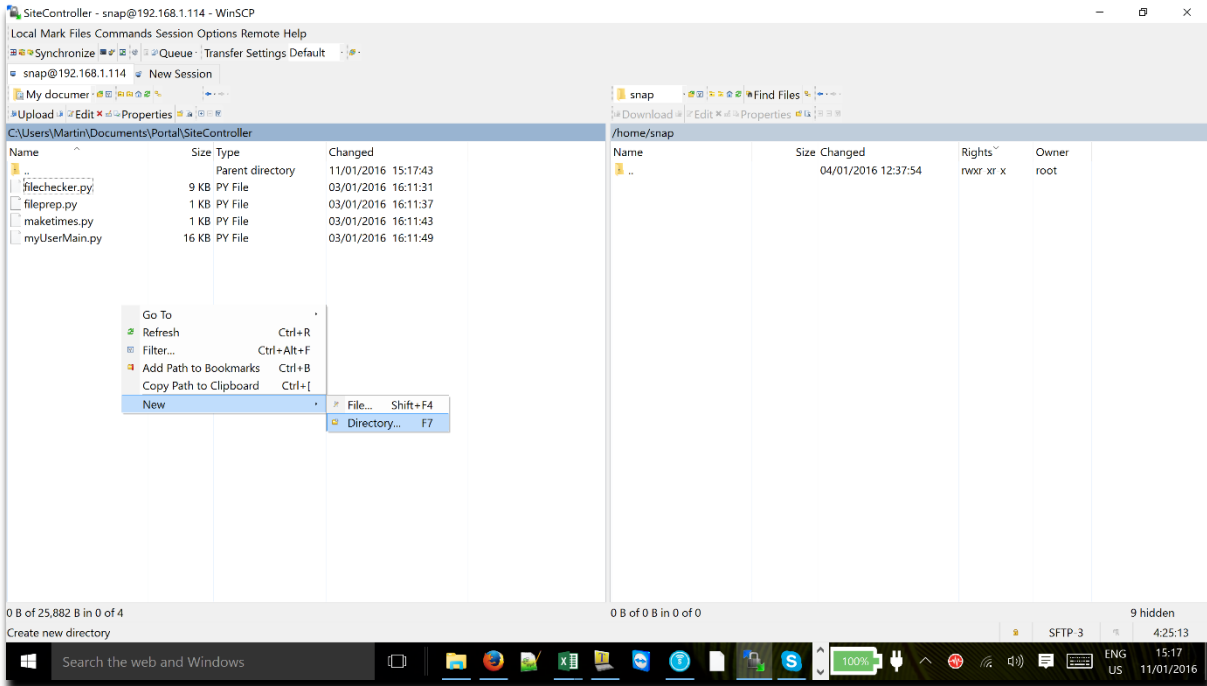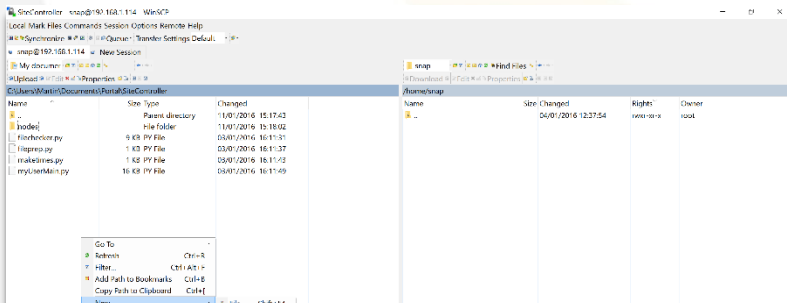Copy the uploaded files from the AMEREX-Integrated

web site to the

.....documents\Portal\snappyImages\SiteController folder as per above screen shot.

Highlight and double click on the 'snap' folder.

In the left hand window click right hand mouse key, select 'New' and then 'Directory'.
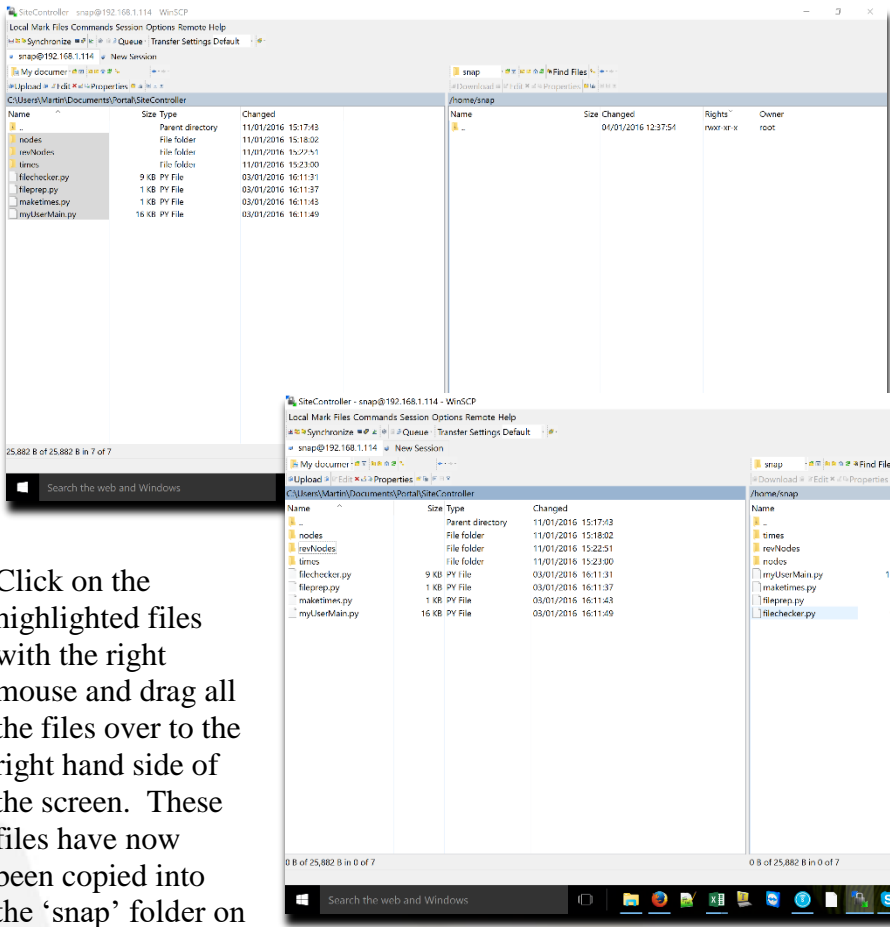Create a folder called 'nodes'.

Carry out the same procedure for the folders 'revNodes' and 'times'.

The windows should show three folders: 'nodes',

'revNodes' and 'times' with four files called *filechecker.py*, *fileprep.py*, *maketimes.py* and *myUserMain.py*
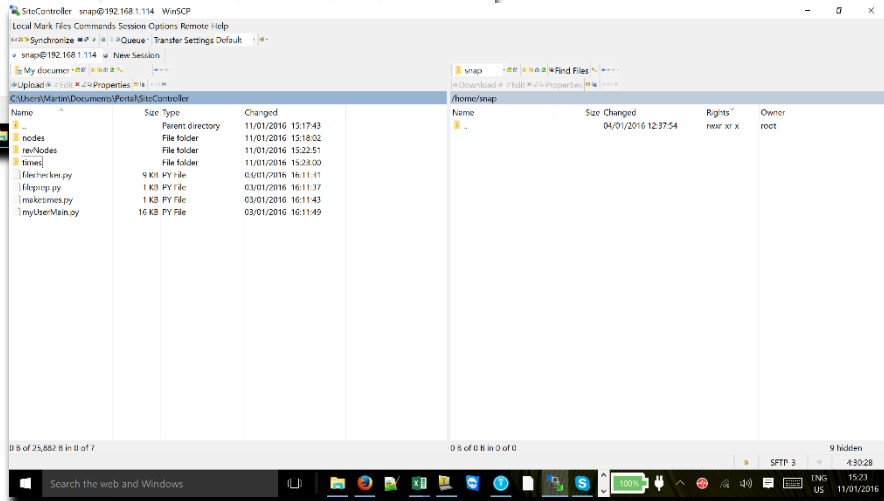
Click on and highlight 'nodes' folder or whichever file or folder is first on the list (not the double dot folder). Press CTRL A and all the folders and files will be selected.

Click on the highlighted files with the right mouse and drag all the files over to the right hand side of the screen. These files have now been copied into the 'snap' folder on the site controller.

Changes to supervisord.conf file

At this point we need to modify the supervisord.conf file which is located in the /root/etc/supervisor folder.

This change can be completed by WinSCP.
The changes to the file are highlighted in yellow. We recommend these to copied and pasted into the file.

Find the *supervisord.conf* file which is in root/etc/supervisor folder, copy *supervisord.conf* file from the site controller window to the PC window.

Open the file by double clicking on the highlighted *supervisord.conf* and add in the lines which are highlighted. Once completed, save the file and copy it from the PC window to the root/etc/supervisor folder.

```
; supervisor config file

[unix_http_server]
file=/var/run/supervisor.sock    ; (the path to the socket file)
chmod=0700                        ; sockef file mode (default 0700)

[supervisord]
logfile = /media/ramdisk/supervisord.log
logfile_maxbytes = 1MB
logfile_backups = 5
logfile=/var/log/supervisor/supervisord.log ; (main log file;default
$CWD/supervisord.log)
pidfile=/var/run/supervisord.pid ; (supervisord pidfile;default
supervisord.pid)
childlogdir=/var/log/supervisor              ; ('AUTO' child log dir,
default $TEMP)

; the below section must remain in the config file for RPC
; (supervisorctl/web interface) to work, additional interfaces may be
; added by defining them in separate rpcinterface: sections
[rpcinterface:supervisor]
supervisor.rpcinterface_factory =
supervisor.rpcinterface:make_main_rpcinterface

[supervisorctl]
serverurl=unix:///var/run/supervisor.sock ; use a unix:// URL  for a unix
socket

; The [include] section can just contain the "files" setting.  This
; setting can list multiple files (separated by whitespace or
; newlines).  It can also contain wildcards.  The filenames are
; interpreted as relative to this file.  Included files *cannot*
; include files themselves.

[include]
files = /etc/supervisor/conf.d/*.conf

[program:myUserMain]
command=/usr/bin/python /home/snap/myUserMain.py
autorestart=true
stdout_logfile=/media/ramdisk/print.log
stdout_logfile_maxbytes = 1MB
stdout_logfile_backups = 5
stderr_logfile=/media/ramdisk/error.log
stderr_logfile_maxbytes = 1MB
stderr_logfile_backups = 5
```

Whichever route you wish to take the supervisor program must be stopped prior to any
changes to the system and restated after the changes have been completed.

Changes to interfaces file

The site controller must have a fixed IP address. If the network allows the IP port to be a dedicated fixed IP address and will always be dedicated then this procedure will not be required, if not, it is recommended this procedure should be followed.

This change can be completed by WinSCP. We recommend this file to be copied and pasted into the saved file.

Find the *interfaces* file which is in root/etc/network folder, copy *interfaces* file from the site controller window to the PC window.

Open the file by double clicking on the highlighted *interfaces* file and add in the lines and copy the following lines over the existing file. Once completed, save the file and copy it from the PC window to the root/etc/network folder.

Note – Use the IP address and other information of your site controller not the IP address used in the example below

```
# interfaces(5) file used by ifup(8) and ifdown(8)
# Include files from /etc/network/interfaces.d:
#source-directory /etc/network/interfaces.d

allow-hotplug eth0
iface eth0 inet dhcp

#iface eth0 inet dhcp
iface eth0 inet static
    address 172.16.12.248                  *** address of the E20
    netmask 255.255.0.0                    **** this is standard, by standard the first
3 digits are your network the last digit is standard.
    network 172.16.0.0                     **** this is you home network start address,
this is standard
    broadcast 172.16.255.255               **** this is you home network end address,
this is standard
    gateway 172.16.1.1                     **** this is you home network gateway
address this is standard
    dns-nameservers 172.16.1.14

#auto wlan0
iface wlan0 inet dhcp
    wpa-conf /etc/wpa_supplicant.conf
    wpa-driver wext
```
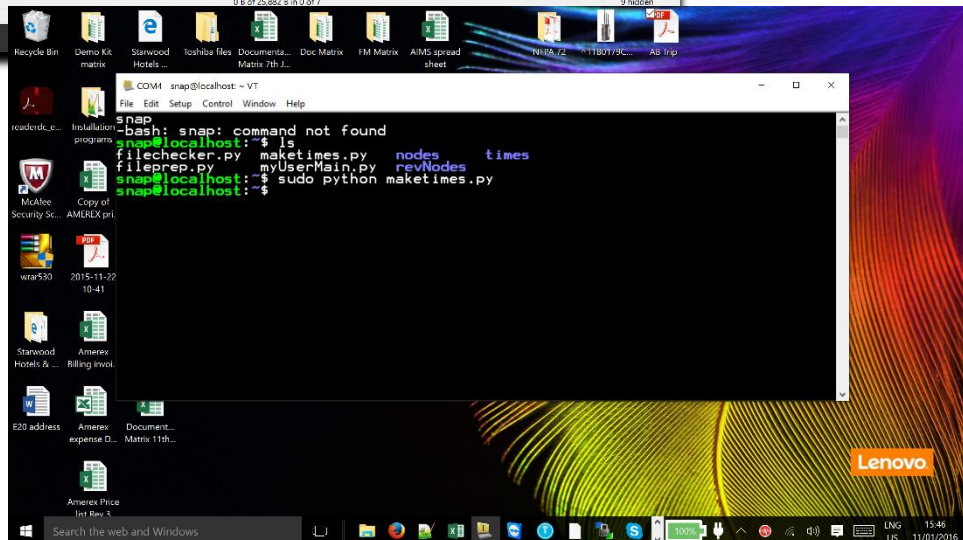
Configuring the Site Controller
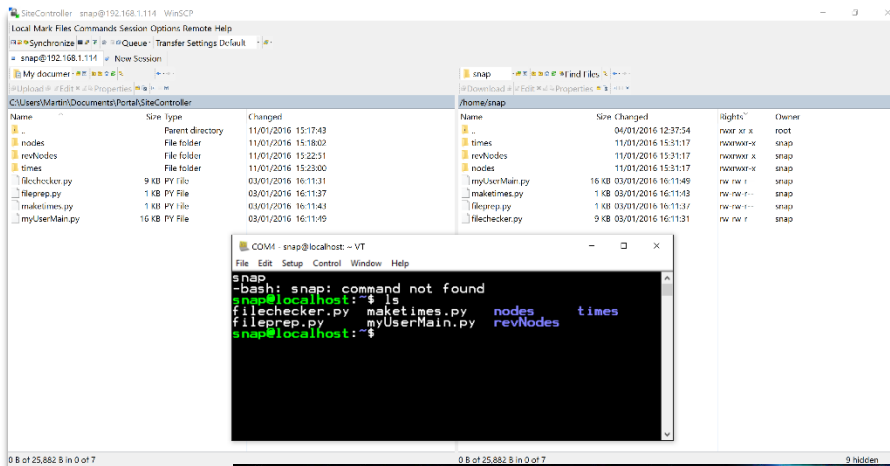
Log into the site controller using Tera Term and type *ls* after the 'snap@........:~. With the *ls* command you can see the files have been transferred from your PC to the site controller.

Log on to the site controller via Tera Term, we can now run the following programs – *maketimes.py, fileprep.py* and *filechecker.py*.

Type the following in Tera Term editor window, *sudo python maketimes.py* and press enter. At this point you may be requested to enter the password you have chosen.

COM4 - snap@localhost: ~/times VT

File Edit Setup Control Window Help

```
filechecker.py    maketimes.py    nodes      times
fileprep.py       myUserMain.py   revNodes
snap@localhost:~$ sudo python maketimes.py
snap@localhost:~$ cd times
snap@localhost:~/times$ ls
```

Type *cd times*, press enter and then type *ls* – this will show a list of numbers which have now populated the folder 'times'.

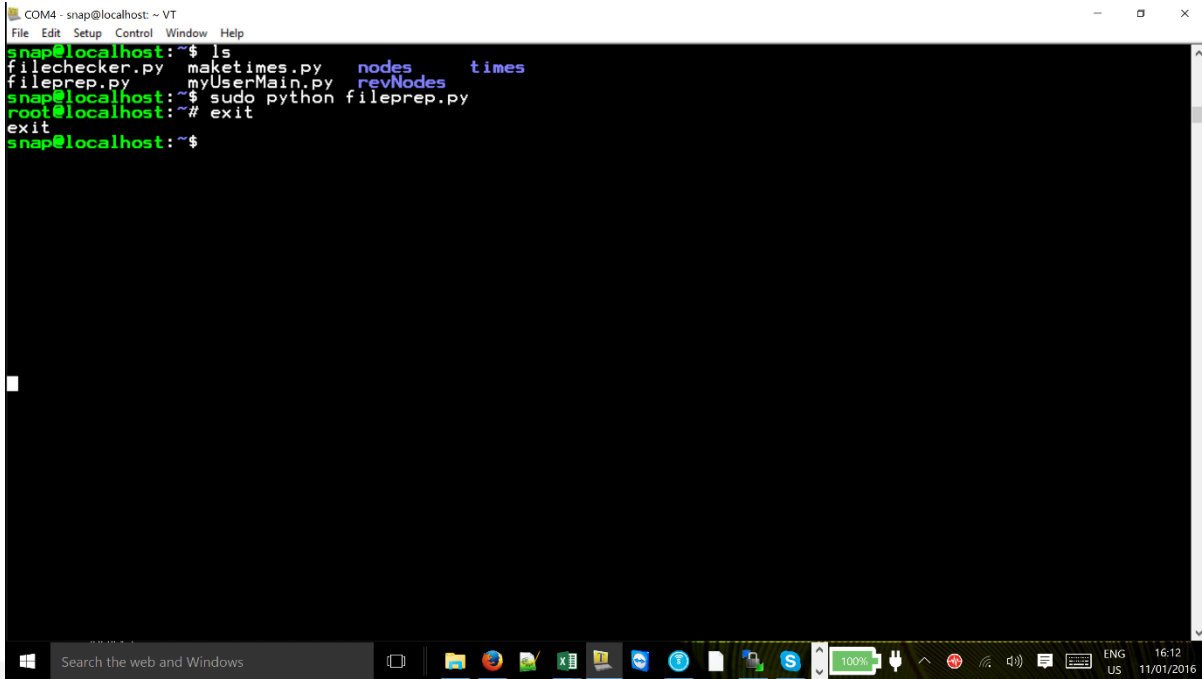Now type *cd ..* and you will return to the main 'snap' folder.

If at any time you wish to return to the snap folder without going through the cd command, enter *cd ~* and this will return you to the snap folder.

Once back into the 'snap' folder, type *ls*, this shows the files and folders that are held in the snap folder.

Carry out the same procedure for *fileprep.py* and *filechecker.py* in that order.

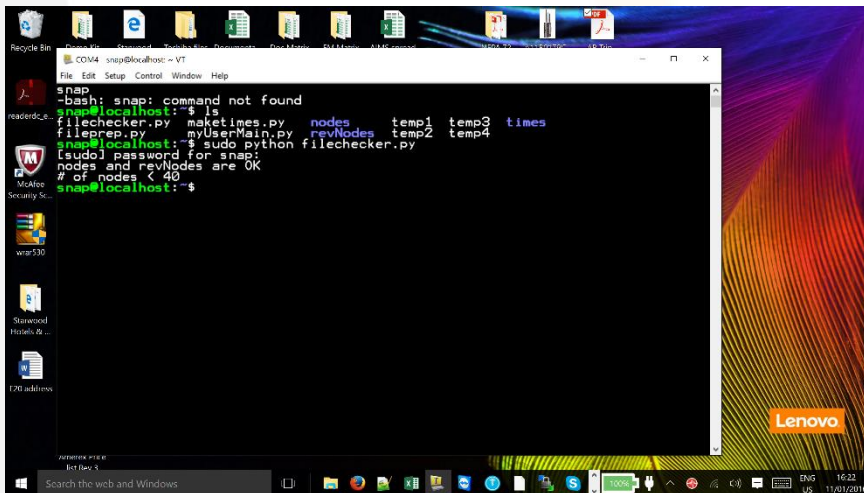Type *sudo python fileprep.py* and press enter.

This program creates temporary files '*temp1 .....etc* '. This program is running a "shell program" and therefore requires to be stopped. You will have noticed the *fileprep.py* file has changed the folder to root@localhost:~$. Type *exit* and you will return to the 'snap' folder.

Now after snap@localhost:~ $ type *sudo python filechecker.py*

This file checks to see if there is any node information in 'nodes' and 'revNodes'. These folders must at all times be equal and if not an error will occur. As we have not entered and node information into the site controller we receive an 'OK' from the system.

We recommend *filechecker.py* is run after loading the node information as described in the new node procedure manual.

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Restarting Supervisor

Again, the supervisor routine must be stopped and restarted before and after any changes are made to the site controller systems

The site controller is now ready to be populated with the new nodes.

Restart the supervisor program by typing in the Tera Term editor window the following;

sudo /etc/supervisor restart

Please refer to the manual 'Procedure for new node to be entered onto the network' for updating and automatically populating the site controller with the field node information.