

Level 3 Infrastructure Technician Apprenticeship 9648-503

Code No. INFTEC08

Synoptic Project

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Article I. TASK 1: Produce the planning document required to implement and test the required upgrades.

Section 1.01 Introduction – My Goal

In this planning section of the document I will be covering the scope and requirements of the scenario I have been set. The scenario requires me to setup and deploy NAS in a test network environment with the following requirements:

- A safe environment to build and test my plan.
- The NAS is to have 4 Network File Shares, One for each user for each Workstation.
 - o Each user should have bespoke read, write, and file creation permissions for their own share.
- Static IP Addresses on each PC so they connect to the network with the same Address every time.
- Router with DHCP Disabled so random people cannot join network, new devices are manually enrolled with static IP addresses.
- 4 Workstations with 4 individual users which access their own network share on the NAS.
- Replacement ability for Workstation-4 for another Workstation, with all their documents stored on the NAS prior to replacing the machine. The replacement machine should perform identically to the Workstation it replaced, with settings such as the username credentials transferred.
- Thorough testing to ensure the configuration of the test environment is correct and functioning accordingly as per my test planning document, meaning NAS file writing, reading, and copying works across all machines as expected. Network connectivity is tested and verified using diagnostic tools/commands.
- The WORKGROUP will be **CGCTRAILB** across all workstations and the NAS. This is so devices on the same WORKGROUP can communicate with each other e.g. Workstations on the same WORKGROUP as the NAS will be able to mount the shares from the NAS, but other Workstations on a different WORKGROUP cannot.
- Wireless LAN tested on mobile devices to ensure Wi-Fi works for the deployment for future devices. These devices will also connect through static IP addresses.

The hardware I have available for this project is specified in Section 1.03, along with the features & roles of the assets in the final deployment in TASK 2.

Section 1.02 Deadlines

This project is scoped to be completed in 21 hours or under over a period of 7 days as per the agreed project timeframe. I will have this Synoptic Project submitted by 15th October 2020 by 13:00. Below are my daily timeframes to complete the work

DAY 1: Monday 12th October 2020: Start Project Planning, build format of headings for each section; TASK 1, 2 and 3. This is so I can build a fully scoped plan for the week in my head and on the document. Majority of TASK 1 is to be finished today if not all.




DAY 2: Tuesday 13th October 2020: Finalise planning phase/TASK by going over every part of the plan and ensuring each base of the setup is covered before proceeding to TASK 2. Start deployment of plan in TASK 1.




DAY 3: Wednesday 14th October 2020: Practical engagement day where I proceed with the mass amount of TASK 2, aim for completion of deployment of TASK 2, test everything works. Then troubleshoot the issue generated by the invigilator for TASK 3. Notes are to be finished for this before DAY 4.

DAY 4: Thursday 15th October 2020: Deadline delivery day of project, to be analysed for required amendments to entire document before submission at 13:00.

Section 1.03 Hardware Available

As shown in this table with pictures, you will see the full hardware list as well as the configurations they will be in.

ITEM NAME	QTY	ITEM CATEGORY	FEATURES & ROLE IN DEPLOYMENT
Desktop Tower PC 	4	Computer Hardware	<ul style="list-style-type: none"> 4 Main Workstations – ALL THE SAME SPECS <p>WORKGROUP: CGCTAILB</p> <p>USERS / PASSWORDS:</p> <ul style="list-style-type: none"> Workstation-1: User1 / x3GN3sE Workstation-2: User2 / p6PG78p Workstation-3: User3 / 76RRMg5 Workstation-4: User4 / Q5bbAa6 <p>SPECS:</p> <ul style="list-style-type: none"> CPU: Intel i3 Processor RAM: 4GB RAM STORAGE: 500GB HDD 3.5-inch HDD internal NETWORK: Gigabit Ethernet Port OS: Windows 10 Pro x64 <p>SOFTWARE:</p> <ul style="list-style-type: none"> Malwarebytes Antivirus Datto RMM – Remote access to systems Software deployed via RMM: <ul style="list-style-type: none"> Microsoft Office 365 Google Chrome
Android Tablet	1	Computer Hardware	Used to test Wireless LAN with a statically assigned IP Address – MAC Address: D80B9AC5F41C
Laptop – WORKSTATION-5 	1	Computer Hardware	<ul style="list-style-type: none"> 1 REPLACEMENT WORKSTATION <p>WORKGROUP: CGCTAILB</p> <p>USERS / PASSWORDS:</p> <ul style="list-style-type: none"> Workstation-5: User4 / Q5bbAa6 <p>REPLACEMENT PC</p> <p>SPECS:</p> <ul style="list-style-type: none"> CPU: Intel i5 Processor RAM: 8GB RAM STORAGE: 500GB HDD 3.5-inch HDD internal NETWORK: Gigabit Ethernet Port + Wi-Fi OS: Windows 10 Pro x64 <p>SOFTWARE:</p> <ul style="list-style-type: none"> SAME AS WORKSTATIONS
Computer Keyboard	1	Computer Accessories	Controlling Computers Manually if RMM breaks
Computer Mouse	1	Computer Accessories	Controlling Computers Manually if RMM breaks
Computer Monitor	1	Computer Accessories	Viewing the computer screen
VGA Cable	2	Computer Accessories	1x for monitor to Workstation connection 1x Spare cable in the event the other one breaks
Kettle Lead UK Power 5A Fuse	8	Power Cabling	4x Workstations – included 1x NETGEAR Switch Power Supply - included 3x Spare
DrayTek 2830n Wireless Router + PSU 	1	Network Hardware	<p>PORT 1: Network Switch</p> <p>PORT 2: SPARE LAPTOP for network configuration</p> <p>PORT 3: EMPTY</p> <p>PORT 4: Buffalo NAS</p> <p>WAN1: Empty</p> <p>WAN2: Ethernet Cable to CISCO Router Leased Line – Routed IP</p>

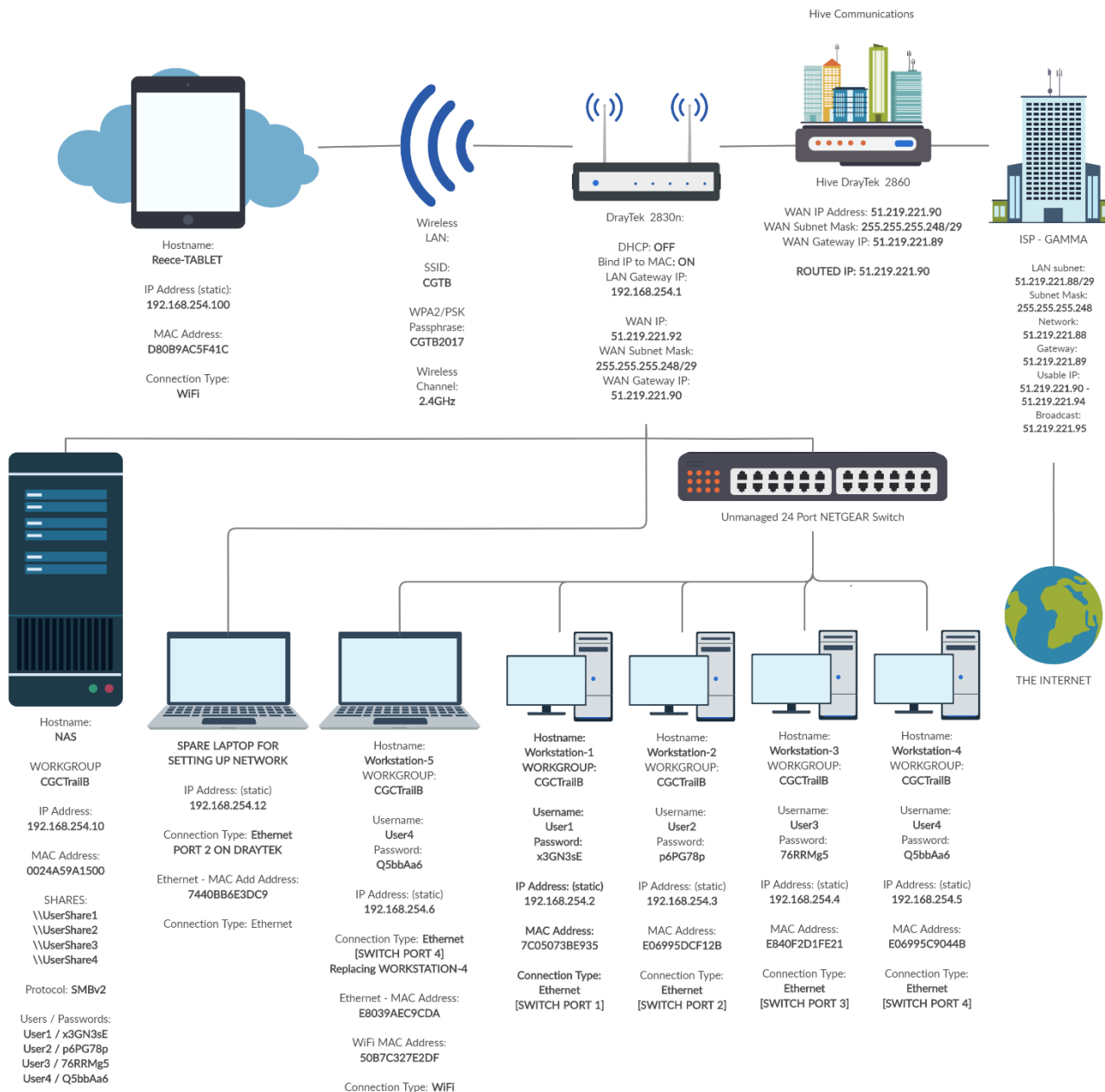
Buffalo LS-WXL500 2-Bay NAS (test hardware)  	1	Storage Hardware	Network Attached Storage device to host network stored data shares for people to access. STORAGE AVAILABLE: 1TB RAID1 Array (2x 1TB 3.5-inch HDD) WORKGROUP: CGCTRAILB SHARES: <ul style="list-style-type: none"> - UserShare1 - User1 access only - UserShare2 - User2 access only - UserShare3 - User3 access only - UserShare4 - User4 access only USERS / PASSWORDS <ul style="list-style-type: none"> - User1 / x3GN3sE - User2 / p6PG78p - User3 / 76RRMg5 - User4 / Q5bbAa6
1TB 3.5 Inch SATA HDD	2	Storage Hardware	2x Hard Drives in RAID1 for 1 Disk Redundancy
Ethernet Cable – 2m	10	Network Accessories	1x Workstation-1 to Switch 1x Workstation-2 to Switch 1x Workstation-3 to Switch 1x Workstation-4 to Switch 1x SPARE Laptop to PORT 2 2830n 6x Spare Ethernet Cables
Ethernet Cable – 0.5m	4	Network Accessories	1x Connect Router to Switch 1x Connect Buffalo to Router 2x Spare Ethernet Cables
NETGEAR 24 port Unmanaged Switch 	1	Network Hardware	PORT 1: Workstation-1 / User1 PORT 2: Workstation-2 / User2 PORT 3: Workstation-3 / User3 PORT 4: Workstation-4 / User4 PORT 24: Connection to Router P1
Antistatic wristband	1	Tools	This will be used to protect any components I need to touch, modify, in this case it will be used for the installation of the NAS HDD's.
54 Driver screwdriver Toolkit	1	Tools	This will allow me to open hardware such as computers should I need to. I do not believe I will need this in accordance with my current planning.
Laptop – SPARE Windows 10 Pro x64 Office laptop	1	Computer Hardware	Used for configuring the network and setting up router locally, connected to PORT 2 of the 2830n WORKGROUP: WORKGROUP - Default SOFTWARE: Advanced IP Scanner IP ADDRESS: 192.168.254.12 MAC ADDRESS: 7440BB6E3DC9

- *I only had access to 1 monitor for this project, so I swapped the screen to each computer, along with the keyboard and mouse when I set up each computer. After the Workstation is added to our remote management platform I no longer needed to monitor, hence why the PC towers are in a row and each of my desktop towers are in a row as shown in later photos.*
- *Additionally, my workspace for this project has 1 long desk, 2 mains plug sockets with a 4-gang extension lead in each socket.*

Section 1.04 Deliverables

What I intend to deliver in this document is the following setup as shown in the below network topology.

(a) Full Network Topology



Notes to take from the topology diagram:

- I will not have access to more than 1 monitor for this test deployment, so I will have installed Datto RMM to allow me to Splashtop Remote desktop into the machines using another computer over the internet. This will be shown in TASK 2 when I take photographic evidence of the hardware's physical configuration.
- The Hive DrayTek uses a routed IP Address from our Cisco 100mb Leased Line, through our Hive DrayTek, to provide my router with internet with a spare public IP Address.

As shown in the network topology diagram, you can see the full extent of the in-depth programming of this configuration. Each aspect is elaborated on below.

(b) Network – DrayTek 2830n & Network Switch

As per the topology diagram, the DrayTek 2830n will be using a routed IP from our DrayTek 2860 which is connected to our 100mb leased line. This routed IP Address will be the WAN IP of the 2830n, in this case, the WAN IP will be **51.219.221.92**. IP routing is the process of routing additional IP/remaining IP addresses through the router to other devices on a deeper level in the network to use. In this case I am using one on a router.

I will be configuring the router with the SPARE laptop as per the hardware available list, this will be done via Ethernet cable to PORT 2 of the 2830n.

The IP Address of the laptop will be 192.168.254.12 and the MAC Address is: 7440BB6E3DC9

THE AVAILABLE BROADBAND SPEEDS WILL BE LESS THAN THE AVAILABLE 100MB AS OTHER PEOPLE ARE USING THE LEASED LINE AT THE TIME OF THIS PROJECT.

(i) Router Configuration

- Username: admin (default) / Password: Pa33w0rd

(ii) Port Configuration

The 6 front ports of the DrayTek will be connected as follows:

- ADSL/DSL (WAN1): EMPTY
- LAN Port 1: connected to the NETGEAR 24 port unmanaged switch to switch port 24
- LAN Port 2: connected to the SPARE Laptop used for configuring the network.
- LAN Port 3: EMPTY
- LAN Port 4: connected to the Buffalo via 0.5m Ethernet RJ45 Cat5e cable
- WAN2: The 2830n will have this IP routed to it via a LAN port on our main network to the WAN2 Port of the 2830n.

VLANs will be disabled by default.

(iii) WAN2 Configuration

Static or Dynamic IP Address connection format: This provides the router with access to the internet.

- IP Address: 51.219.221.92
- Subnet Mask: 255.255.255.248 / 29
- Gateway IP Address: 51.219.221.90 – Hive WAN IP, routed.
- MTU: 1500
- Primary DNS: 8.8.8.8 – Google Primary DNS
- Secondary DNS: 8.8.8.8 – Google Secondary DNS

(iv) Wireless LAN configuration:

- SSID: CGTB
- Wireless Security Passphrase: CGTB2017
- Encryption Type: WPA2/PSK
- LAN: 1

(v) LAN 1 Configuration

- DHCP: Disabled – after I have swapped subnets to .254 when adjusting the LAN settings
- Bind IP to MAC: Enabled – **NAS, Workstations and wireless devices are bound by their MAC Address after I have swapped subnets to .254 when adjusting the LAN settings**
- Default Gateway: 192.168.254.1
- HTTP Management Port: 80 / HTTPS Management Port: 443
- Subnet Mask: 255.255.255.0



(c) Workstations / Users

As shown by the topology diagram, the workstations will be connected via an unmanaged NETGEAR 24 port network switch which allows a wired, dedicated cable connection for the workstations, giving them a better performance on the network over a wireless connection.

(i) System, User, Network Configuration:

	HOSTNAME	USER	PASSWORD	WORKGROUP	IP Address [IPv4]	MAC Address	SWITCH PORT
1	WORKSTATION-1	User1	x3GN3sE	CGCTAILB	192.168.254.2	7C05073BE935	1
2	WORKSTATION-2	User2	p6PG78p	CGCTAILB	192.168.254.3	E06995DCF12B	2
3	WORKSTATION-3	User3	76RRMg5	CGCTAILB	192.168.254.4	E840F2D1FE21	3
4	WORKSTATION-4	User4	Q5bbAa6	CGCTAILB	192.168.254.5	E06995C9044B	4
5	WORKSTATION-5 Data moved from Workstation-4	User4	Q5bbAa6	CGCTAILB	ETHERNET: 192.168.254.6 WI-FI: 192.168.254.7	ETHERNET: E8039AEC9CDA WI-FI: 50B7C327E2DF	4 – When WORKSTATION-4 removed, port 5 for configuring

- The Subnet Mask will be: 255.255.255.0
- The Default Gateway will be: 192.168.254.1
- The Primary DNS Server will be: 8.8.8.8 (Google)
- The Secondary DNS Server will be: 8.8.4.4 (Google)

(ii) 4x Workstation System Specifications:

- HOSTNAME: Workstation-X ('X' being the number)
- CPU: Intel i3 Processor
- RAM: 4GB
- HDD: 500GB
- NETWORKING: Gigabit Ethernet Port
- OS: Windows 10 Pro x64
- USER: USERX ('X' being the number)



(iii) Applications Installed:

- Malwarebytes Antivirus Endpoint Protection – Managed AV solution
- Datto RMM – Remote access to systems - **this also pushes managed updates to the system to keep it up to date. The below software is pushed via software management policy using RMM**
 - o Microsoft Office 365
 - o Google Chrome – Web browser

The network shares will be mapped in Windows Explorer as network drives with the drive letter **Z:**

All the systems will be on the latest version of Windows (Build 1909) for maximum security.

Each system will have its IP Address statically bound to ensure their IP Address they connect via doesn't change, this is good practise so workstations can be logged by their internal IP Address should any issues arise and the exact device can be troubleshooted to resolve possible connectivity issues.

Workstation-5 will be replacing Workstation-4 in the form of

- Data will be backed up to the **UserShare4** NAS folder from **Workstation-4**
- **Workstation-5** will have a new user '**User4**' made with the same password from **Workstation4's User4**
- RMM and Antivirus will be pre-installed to **Workstation-5** for quickness
- The **UserShare4** Network folder will be mapped to Workstation and data shown as accessible to finish
- **Workstation-5** will be connected to the LAN with a static IP Address in PORT 4 of the switch.

(d) NAS – Network Attached Storage (Buffalo)

As shown in the topology diagram, the NAS will be connected to the DrayTek 2830n via LAN Port 4, this is because if the switch was to stop working at any point, then the router will keep the Buffalo active on the LAN, meaning any wirelessly connected devices can still connect to the Buffalo should they be connected with a static IP address.

(i) NAS System Configuration

- Hostname: NAS
- Workgroup: CGCTRAILB
- IP Address: 192.168.254.10
- Subnet Mask: 255.255.255.0
- Default Gateway: 192.168.254.1
- MAC Address: 0024A59A1500
- **Admin Username: admin**
- **Admin Password: btN9Kq7**

(ii) Drive Configuration

- Disk Setup: RAID 1
- RAID 1 Storage Capacity: 1TB
- Drive Total: 2x 1TB 3.5 Inch HDD
- Redundancy disk total: 1 Disk



RAID 1 is the process where 1 drive is used to mirror the data from the other drive that is installed, this gives a total of 1 disk redundancy, meaning if the RAID was to break due to one drive failure, an identical replacement drive can be installed in place of the faulty drive to allow the RAID to rebuild. While the RAID is being rebuilt if the power goes then all data is lost. Additionally, if the second drive fails before the RAID is rebuilt, then all the data is lost.

(iii) User Configuration

USER	PASSWORD	PRIMARY GROUP
User1	x3GN3sE	hdusers
User2	p6PG78p	hdusers
User3	76RRMg5	hdusers
User4	Q5bbAa6	hdusers

(iv) Share Folder Configuration

SHARE NAME	Volume	Shared Folder Attributes	Recycle Bin	Access Restrictions	Shared Folder Support	Permissions
UserShare1	Array1	Read & Write	Enable	User1	Windows (SMB)	Read & edit
UserShare2	Array1	Read & Write	Enable	User2	Windows (SMB)	Read & edit
UserShare3	Array1	Read & Write	Enable	User3	Windows (SMB)	Read & edit
UserShare4	Array1	Read & Write	Enable	User4	Windows (SMB)	Read & edit

- Read Only allows files to be read only with no write permissions
- Read & Write allows users to read, create and modify files
- SMB on this Buffalo is using SMBv2, this is because SMBv1 is insecure and riddled with vulnerabilities that people can breach, it has been depreciated in all major systems that use the protocol, more on this here: <https://techcommunity.microsoft.com/t5/storage-at-microsoft/stop-using-smb1/ba-p/425858>
- 'Apple' (AFP) has been disabled for this setup as I have no apple devices.

As you can tell from the above table, the shares will be delegated to specific users and will not be accessible by any other user than the user it was intended for, as their credentials will not get past the Access restrictions on the NAS.

Section 1.05 Tasks Required for TASK 2

In this section I will clarify the tasks I will be doing and why I am doing them in this order

1) Prepare hardware

- a. **Health and safety precautions** – Ensuring the work environment is safe to use and non-hazardous.
- b. **Lay out the hardware neatly on a table** – Item count on core hardware to check my inventory for the project is all there.
- c. **Label Workstations** – Place numeric values on each Workstation to indicate which system it is.
- d. **Collect list of MAC addresses** – collecting a list of the MAC addresses to easily add them to the Bind IP to MAC list on the router for later step

2) Assemble Hardware

- a. **Workstations** – Plug in the workstations next to each other in numerical order to make working on them easier to manage visually. Plugging in the workstations to LAN and power
- b. **Monitor & Keyboard & Mouse** – Laying them out in front of the workstations to allow manual configuration on the systems before I add the RMM software
- c. **Router** – Plugging the router to the switch, also plugging in the NAS and the WAN2 cable
- d. **Switch** – Plugging in the power cable as all major network cables were connected to it in previous steps.
- e. **NAS** – Setting down the NAS and plugging in the hard drives to the NAS.
- f. **Power Cabling** – Checking the power to all the systems to ensure the environment is powered before switching on the mains.

3) Router / Network Configuration

- a. **Router Configuration** – Connect to the router and start setup of administrator login details to secure the router to not be the default credentials, using spare laptop.
- b. **NAS Static IP Configuration** – I set this now as the user interface of the NAS is via the web, so I need to set it's IP Address to what it will be once I change the LAN subnet and configuration. This is when I connect the SPARE laptop to PORT 2 of the DrayTek so I can configure the hardware
- c. **LAN Configuration** – Setup the subnet the network resides on to match my planning, disable DHCP to setup static IP's for devices, this is done after the subnet has changed to .254, Bind IP to MAC for the devices to ensure they definitely get the IP addresses they are supposed to get as per the planning. Only enable Bind IP to MAC when subnet has changes
- d. **Spare Laptop Static IP Configuration** – the laptop will also lose its IP Address from DHCP when DHCP is disabled, I will set up the laptop to get a static IP so it stays connected when DHCP is disabled.
- e. **Disable DHCP & Enable Bind IP to MAC**
- f. **Wireless LAN Configuration** – Setting up the Wi-Fi that the wireless clients will connect to along with the security passphrase that they need to connect to the network.
- g. **WAN Configuration** - I configure this last to ensure that the outside internet can only see my router when I know I have configured it to be secure.

4) NAS Configuration

- a. **Hostname Configuration**
- b. **Admin login Configuration**
- c. **WORKGROUP Configuration**
- d. **Drive Configuration** – Setting up the RAID array of the installed drives.
- e. **User Configuration** – Creating the 4 users with passwords that the Workstation users will use to connect to the network shares.
- f. **Share Folder Configuration** – Creating the network folder shares that each user will access and assigning them the correct permissions and configuration settings.

5) Workstation Configuration

- a. **Connecting the Monitor, keyboard, and mouse to the system**
- b. **Configuring WORKGROUP & Hostname**
- c. **Configuring network connectivity** – Programming in static IP to Ethernet adapter on Workstation to ensure the workstations connect to the network.
- d. **Testing internet connectivity**
 - i. IPCONFIG /ALL
 - ii. Broadband Speed Test
 - iii. PING NAS / 192.168.254.10
- e. **Installing RMM and Antivirus** – RMM Allows remote access to computers without the need of the monitor
 - i. Datto RMM – Remote Monitoring & Management – remote access to the workstations without the need for physical interaction with the machine using the monitor and keyboard
 - ii. Malwarebytes Endpoint Protection Antivirus
- f. **Creating Users** – Creating the user on the Workstation with their assigned password (that matches the NAS credential for the user)
- g. **Mounting Network Folder Share to Workstation**
- h. **Copying test files to NAS Share**
- i. **Checking files on NAS Share**
- j. **Deleting files from Workstation**
- k. **Reading files from NAS Share**
- l. **Copying files from NAS Share**
- m. **Repeat process for each machine.**

6) Testing & Diagnostics

- a. **Hardware analysis – Switch, Router, Ethernet cables** – Checking all items are plugged in and working
- b. **Testing Wi-Fi from Tablet**
- c. **PING** – From router to the NAS, from each Workstation to the Router and the NAS
- d. **Tracert** - From router to the NAS, from each Workstation to the Router and the NAS
- e. **Download speed test** – Speedtest from each Workstation
- f. **Workstation Network Configuration** – ipconfig /all from each machine

7) Replace WORKSTATION-4 for Workstation5

- a. **Backup of Workstation-4 Data** – Copy and paste documents to NAS share, check its there
- b. **Restoration of Data & Settings from Workstation-4 to Workstation-5** – Rebuilding the user on WORKSTATION-5
- c. **Testing if files are present as well as settings**
 - i. Files
 - ii. Settings e.g. Username
 - iii. Mapped Drives
- d. **Swapping WORKSTATION-4 Over**

8) Final Notes

9) Handover to Practical Observation Officer to review

Section 1.06 Costs

For this to be deployed onto the main network, the costs will be as follows:

Hardware	Qty	Unit Price [exVAT]	Sub Total [exVAT]	Unit Price [incVAT]	Sub Total [inc VAT]
DrayTek 2830n	1	£250.00	£250.00	£300.00	
Buffalo 2 Bay NAS	1	£176.00	£176.00	£211.20	
Workstation: i3 Processor, 4GB RAM, 500GB HDD	4	£400.00	£1,600.00	£480.00	
Workstation Laptop: i5 Processor, 8GB RAM, 500GB 1TB HDD	2	£65.00	£130.00	£78.00	
Android Tablet	1	£100.00	£100.00	£120.00	
Ethernet cable - 2M	10	£6.00	£60.00	£7.20	
Ethernet cable - 0.5M	2	£3.00	£6.00	£3.60	
Antistatic Wristband	1	£2.00	£2.00	£2.40	
54 Driver Screwdriver kit	1	£16.00	£16.00	£19.20	
Kettle Lead UK Power 5A Fuse	3	£5.00	£15.00	£6.00	
Computer Monitor	1	£95.00	£95.00	£114.00	
Computer Keyboard	1	£10.00	£10.00	£12.00	
VGA Cable	2	£6.00	£12.00	£7.20	
Computer Mouse	1	£10.00	£10.00	£12.00	
NETGEAR 24 Port Unmanaged Switch	1	£136.00	£136.00	£163.20	
Sub Total					£3,141.60
Engineering	Qty	Unit Price [exVAT]	Sub Total [exVAT]	Unit Price [incVAT]	Sub Total [inc VAT]
Labour to install NAS into Network (Hourly Rate) - Configuring to work on Main network - Creating network shares - Creating users - Assigning share access to users	1	£75.00	£75.00	£90.00	
Computer Setup with NAS Shares (Hourly Rate)	2.5	£75.00	£187.50	£90.00	
Router Configuration (LAN, WAN, IP MAC Binding) (Hourly Rate)	1.5	£75.00	£112.50	£90.00	
Backup and Restore Workstation Data (Hourly Rate)	2.5	£75.00	£187.50	£90.00	
Testing the network works	1	£75.00	£75.00	£90.00	
Sub Total					£765.00

**One Off
Total**

£3,906.60

inc VAT

The next stage is deployment of the proposed setup.

Article II. TASK 2: Install and configure the required resources

Following the planning from TASK 1, in this task I will be proceeding with the practical measures of implementing the above plan with my steps and motions logged and noted below

Section 2.01 Prepare hardware

This section will see me prepare the hardware and required assets/items for assembly

(a) Health and safety precautions

Before I properly started, I made sure I had the necessary safety precautions in place to ensure the work environment was safe. I did the following to ensure the project table was safe and ready:

- Checked the area around electrical sockets was not wet
- Ensured no loose or frayed cabling was present
- Checked there was enough plug sockets/extension leads available for me
- Placed anti-static wristband on my wrist and grounded myself to the desk.

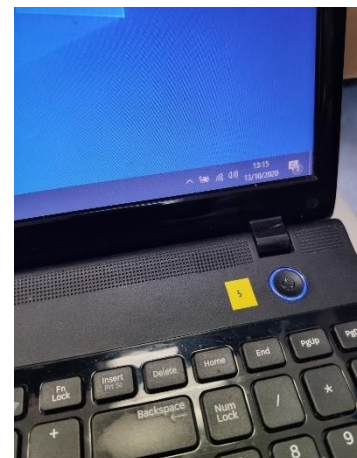


(b) Lay out the hardware neatly on a table

As shown in the photograph, here is the hardware laid out on the table that I will be installing *excluding accessories like cables:

(c) Label Workstations

Using our label maker, I have printed numbers 1, 2, 3, 4, and 5. These labels are applied to each Workstation and made visible on the front of the machine:



Now if I encounter any issues down the line, I can identify the culprit machine by its Workstation number.

(d) Collect list of MAC addresses

As collected in my planning phase of the project, I have the full list of MAC Addresses, this is referenced below.

DEVICE NAME	IP ADDRESS	MAC ADDRESS	CONNECTION METHOD
WORKSTATION-1	192.168.254.2	7C05073BE935	ETHERNET
WORKSTATION-2	192.168.254.3	E06995DCF12B	ETHERNET
WORKSTATION-3	192.168.254.4	E840F2D1FE21	ETHERNET
WORKSTATION-4	192.168.254.5	E06995C9044B	ETHERNET
WORKSTATION-5	192.168.254.6	E8039AEC9CDA	ETHERNET
WORKSTATION-5	192.168.254.7	50B7C327E2DF	Wi-Fi
NAS	192.168.254.10	0024A59A1500	ETHERNET
SPARE LAPTOP	192.168.254.12	7440BB6E3DC9	ETHERNET
TABLET	192.168.254.100	D80B9AC5F41C	Wi-Fi

(i) Collecting Windows Workstation MAC Addresses

I collected the Workstation addresses from typing 'ipconfig /all' on each system in a command prompt to get the IP Address and the MAC Address for the system, I then noted it down in an excel spreadsheet and then copied the finished items to the above table.

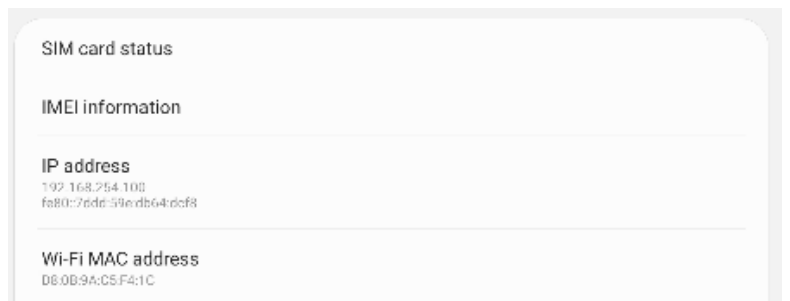
```

Ethernet adapter Ethernet:

Connection-specific DNS Suffix . . . : 
Description . . . . . : Realtek PCIe GBE Family Controller
Physical Address. . . . . : 74-40-BB-6E-3D-C9
DHCP Enabled. . . . . : No
Autoconfiguration Enabled . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::299e:26be:e2ab:e8ba%13(Preferred)
IPv4 Address. . . . . : 192.168.1.12
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.1.1
DHCPv6 IAID . . . . . : 276054203
DHCPv6 Client DUID. . . . . : 00-01-00-01-22-C7-7E-85-54-48-10-C3-27-A0
DNS Servers . . . . . : 8.8.8.8
                        8.8.4.4
NetBIOS over Tcpip. . . . . : Enabled
  
```

(ii) Collecting Android Tablet Wi-Fi MAC Address

I collected the Tablet MAC Address by opening **Settings > About Tablet > Status > Wi-Fi MAC Address** and copying the value present.



(iii) Collect NAS Ethernet MAC Address

This is located on the base of the unit, as shown in this screenshot:



Section 2.02 Assemble Hardware

(a) Workstations

As shown in the photo below the workstations were laid next to each other in numeric order, stood up with their numbers facing front ways so I could easily identify them by looking at the machines.

I plugged in the network cable into the back of the computers according to their port on the switch as per the planning. E.g. Port 1 switch is for WORKSTATION-1

Following this, I plugged in the kettle lead to the back of each system to ensure they were all powered when I turned on the mains.

WORKSTATION-1 is the first machine I am going to be configuring so I setup the monitor cables and keyboard/mouse as per the next step to be connected to this system first.

(b) Monitor & Keyboard & Mouse

I plugged these aspects into the back of WORKSTATION-1 to begin with as that was the first Workstation I was going to set up. The keyboard and mouse and monitor would be moved between workstations to configure each one to connect to the network and install RMM before I could remotely access them and perform the project from one system.

(c) Router

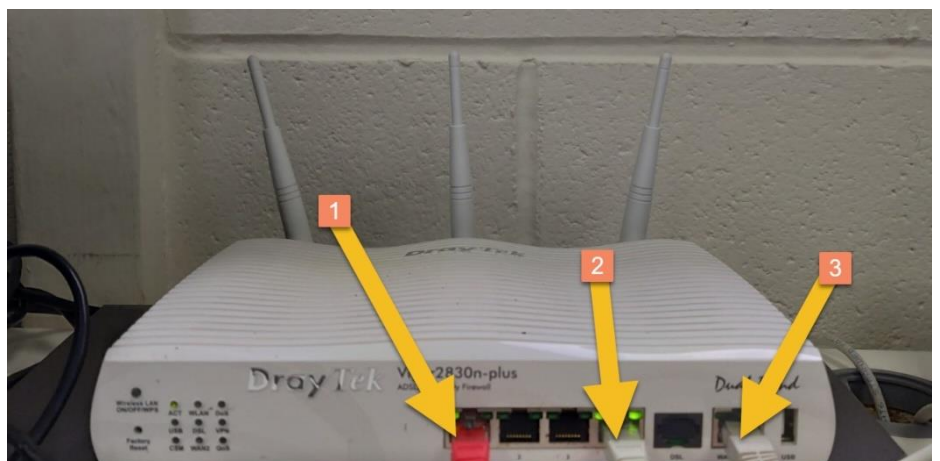
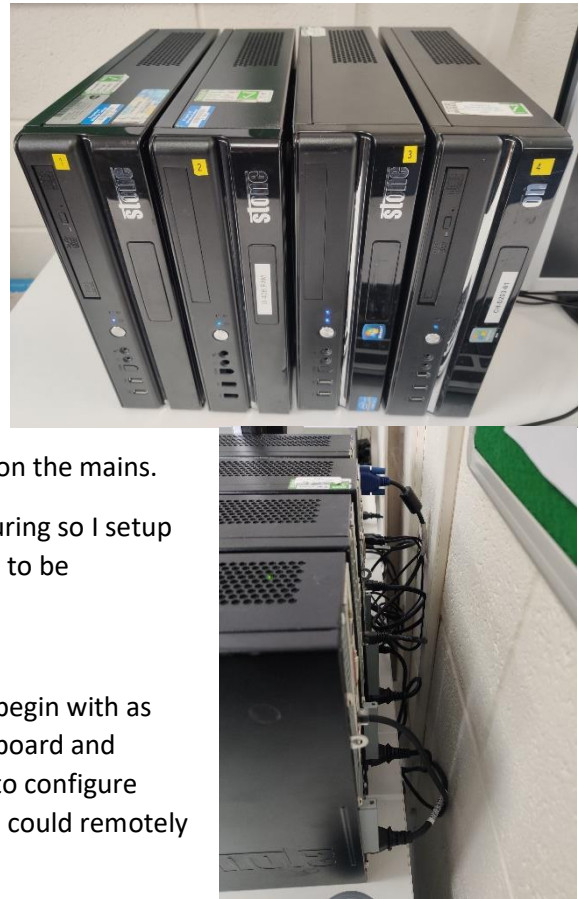
In this step I connected the power cable to the router with the switch set to on, but the mains were switched off, this way when the mains were turned on the router would turn on also.

[1] LAN PORT 1: Following This, I connected the red Ethernet 0.5m cable to Port 24 on the NETGEAR 24 Port unmanaged switch and then Port 1 on the 2830n, this gives us enough capacity on the switch to run Ethernet cabling for the 4 workstations.

[2] LAN PORT 4: I plugged in the other grey 0.5m Ethernet cable into the NAS, and then the other end into LAN Port 4 on the 2830n. The reason for this is so the NAS is still connected to the network in the event the switch was to go offline. If all my workstations also had Wi-Fi, this would mean they could still connect to the NAS should their Ethernet connectivity become compromised.

[3] WAN PORT: I connected the Ethernet cable coming from the Hive Router running the Leased Line to the WAN2 Port on the DrayTek 2830n. The Hive Router was passing through the routed IP I was going to configure later the 2830n router, to allow the 2830n to get internet using an available Public IP on our leased line.

Here is the final photo of the configuration, before I plug in the testing laptop into Port 3:



(d) Switch

Following the progress of the other steps, the only remaining item to plug into the switch was the kettle lead power cable which would then be powered when I turned on the mains. Without this cable, the switch would not work, and the workstations would not be able to communicate with the router through Ethernet.

(e) NAS

After plugging in the Ethernet cable in the earlier step, I now need to plug in the hard drives into the NAS, so they are ready to be formatted and configured into a RAID 1 Array. To do this, I take the front of the NAS unit off as shown below. Then I slot in the 3.5-inch 1TB Hard Disk Drives (HDD's) with the SATA and Power ports in the same orientation as shown below.

Please note, I wore anti-static wristband while fitting the drives as shown below, this is in accordance with safety requirements while handling computer components or exposed computer circuitry such as the boards found on the hard drives.



When the drive clicks into place, the drive is then successfully mounted.

I then plugged in the power to the NAS, so I plugged in the power and routed it to the 4-gang way socket ready to be turned on. I left the power button on the back of the NAS set to ON, meaning the NAS would come on when powered. The final step is to power all the project.

(f) Power Cabling

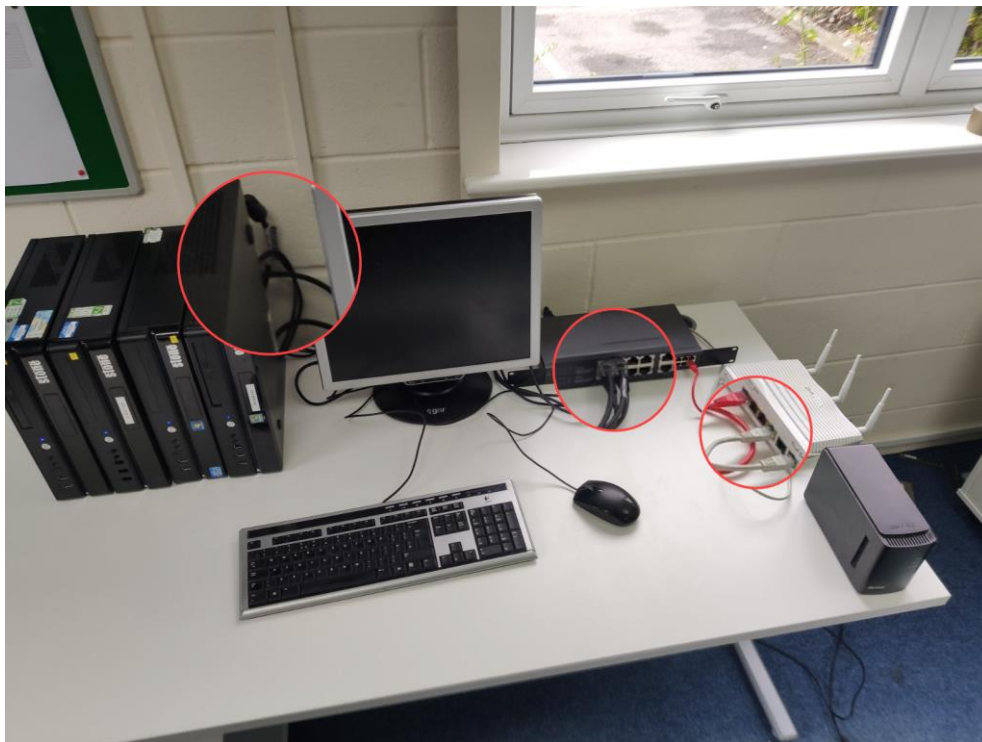
As shown by the photos, I have plugged in each of the devices and labelled them accordingly in their own 4-gang extension plug:



- LEFT: Monitor, Switch, DrayTek and NAS PSU mains sockets into the 4-gang way socket
- RIGHT: Workstations 1 – 4 Kettle lead mains plugs into the 4-gang way socket

I ensured I plugged all these devices in with the switch at the mains set to off. When all the devices were plugged in and secured, I then proceeded to turn them all on one by one to give them all time to warm up and be ready to be configured.

Here is the finished cabling for the project setup:



The final step is to turn on the mains to the 8 items, I turn this on and then the router, NAS, Switch and monitor automatically power on, the workstations need to be powered on manually with the provided power switch on each unit.

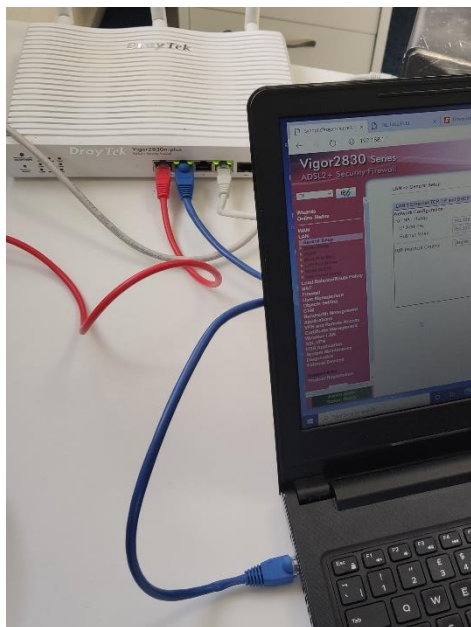
Section 2.03 Router / Network Configuration

Now the project is powered it is now ready to be configured and setup to perform the required function. The steps below detail the setup and configuration of the 2830n connecting to the internet, the LAN, and the Wireless LAN connectivity.

(a) Router Configuration

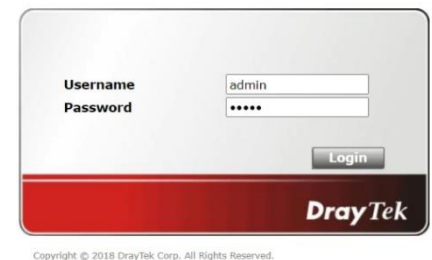
By default, the router is configured to have its admin portal used on the default gateway IP of **http://192.168.1.1:80**. To configure and change that to what I require, I need to, I connect the SPARE laptop with an Ethernet cable to LAN Port 2 on the 2830n. This then gives my laptop an IP via DHCP, in this case it is 192.168.1.12. I shall be changing this laptop to 192.168.254.12 anyway so this makes it easier to set later.

```
Ethernet adapter Ethernet:
Connection-specific DNS Suffix . : 
Description . . . . . : Realtek PCIe GBE Family Controller
Physical Address. . . . . : 74-40-BB-6E-3D-C9
DHCP Enabled. . . . . : No
Autoconfiguration Enabled . . . . : Yes
Link-local IPv6 Address . . . . : fe80::299e:26be:e2ab:e8ba%13(Preferred)
IPv4 Address. . . . . : 192.168.1.12
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.1.1
DHCPv6 IAID . . . . . : 276054203
DHCPv6 Client DUID. . . . . : 00-01-00-01-22-C7-7E-85-54-48-10-C3-27-A0
DNS Servers . . . . . : 8.8.8.8
                        8.8.4.4
NetBIOS over Tcpip. . . . . : Enabled
```



Once I am on the login screen for the DrayTek 2830n, I login with the default credentials of 'admin' and 'admin' which gets me to the login dashboard.

Once on there I need to change the default admin password so only I can manage this router, the reason I do this is because it maximises security and means no one can access the router management except me.



To change the admin password, I go to:

System Maintenance > Admin Setting from the main menu.

This brings me to the below screen, where I enter the default 'admin' password into the **Old Password** field, then enter my personalised admin password in the next two fields, I then click **OK** to save my changes, this then reboots the router to enforce the new password making it personal to me.

The password is set to: **Pa33w0rd**

System Maintenance >> Admin Setting

Administrator Password

Old Password	<input type="text"/>	
New Password	<input type="text"/>	(Max. 23 characters allowed)
Confirm Password	<input type="text"/>	(Max. 23 characters allowed)

Note: Password can contain only a-z A-Z 0-9 , ; . " < > * + = \ | ? @ # ^ ! ()

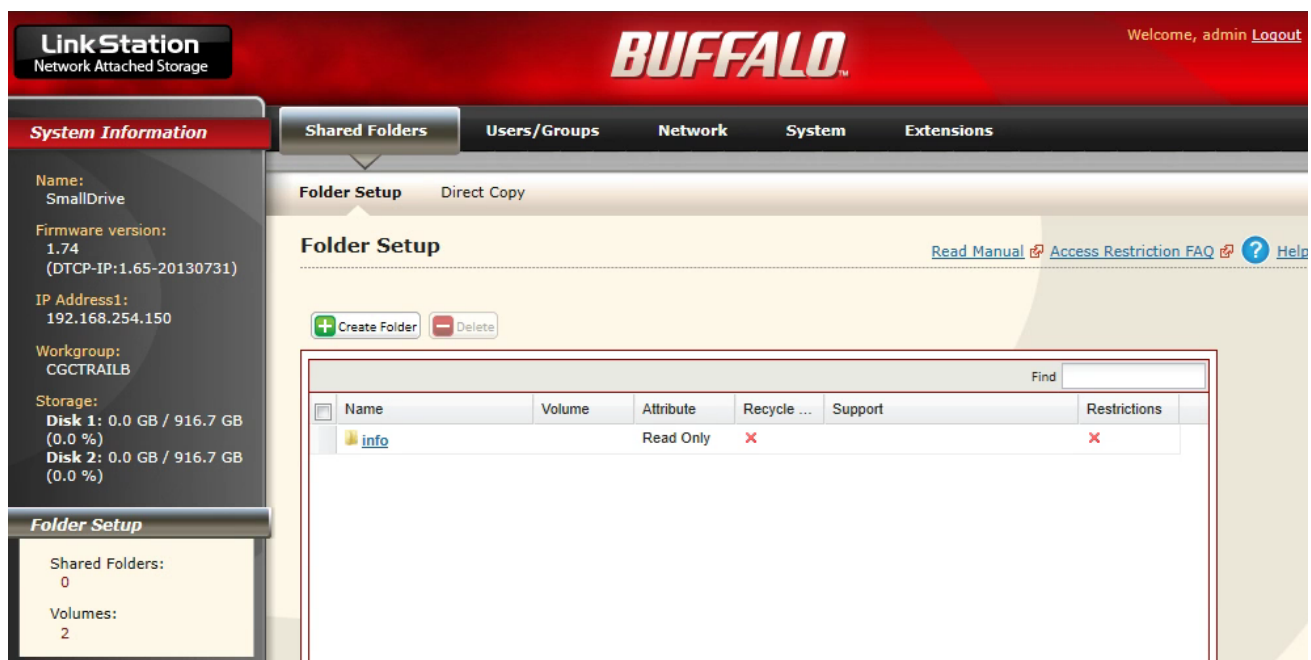
After the reboot I now log into the router with the new password but the same username.

(b) NAS Static IP Configuration

In the step after this I will be disabling DHCP and making only static IP addresses connect to the network that I configure. Due to this, I need to pre-configure the static IP Address of the NAS to what it will be once I reconfigure the LAN to the .254 subnet, this is so the NAS will be picked up after I change the LAN settings.

To login to the NAS, I first need to see the IP it is on as per what DHCP IP Address it was provided, to do this I run Advanced IP Scanner to get the port the NAS administrator webserver is running on. In this instance the IP Address was **192.168.1.150**.

After logging in with the default credentials 'admin' and 'password'. I am greeted with the dashboard:

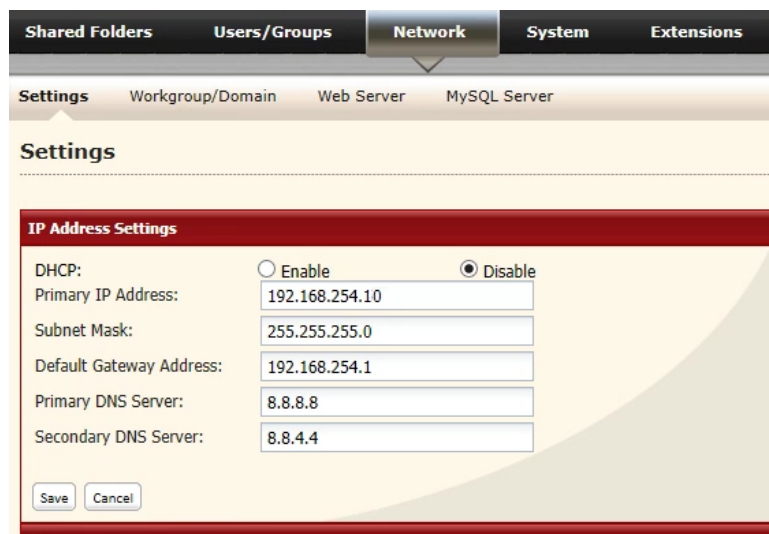


To change the network settings to set a static IP Address, I go to **Network > Settings > IP Address Settings > Modify Settings** to alter the static IP Address settings. I set them to the following, as per the plan:

IP ADDRESS: **192.168.254.10**

After setting them I press save, naturally I lose connection now as the static IP is on another subnet, which I will move to later in the Router LAN configuration.

For now, the NAS can be left as it is until I configure the remainder of it in the NAS Configuration section.



(c) LAN Configuration

Firstly, I need to bind the required addresses from our MAC Address list to the router, to do this I go to **LAN > Bind IP to MAC** and then add the addresses per the table from the planning, this is shown in the picture below.

LAN >> Bind IP to MAC**Bind IP to MAC**

☐ Enable
 ☒ Disable
 ☐ Strict Bind

ARP Table		IP Bind List	
IP Address	Mac Address	Index	IP Address
192.168.254.2	7C-05-07-3B-E9-35	1	192.168.254.2
192.168.254.3	E0-69-95-DC-F1-2B	2	192.168.254.3
192.168.254.4	E8-40-F2-D1-FE-21	3	192.168.254.4
192.168.254.5	E0-69-95-C9-04-4B	4	192.168.254.5
192.168.254.6	E8-03-9A-EC-9C-DA	5	192.168.254.6
192.168.254.7	50-B7-C3-27-E2-DF	6	192.168.254.7
192.168.254.10	00-24-A5-9A-15-00	7	192.168.254.10
192.168.254.12	74-40-BB-6E-3D-C9	8	192.168.254.12
		9	192.168.254.100

Add or Update
 IP Address:
 Mac Address: : : : : :
 Comment:
☐ Show Comment

You can see I have left the setting disabled for now, this is because I do not need the systems to be enforced to use those IP Addresses yet. I can enable Bind IP MAC on step E once the laptop has a statically assigned IP on the .254 subnet. If I were to enable this beforehand then I would lose access to the router as the bound IP addresses are not on the same network as the current broadcasting DHCP on the .1 subnet.

Following adding these, I click OK to save my changes.

As the NAS is now prepared for the new subnet on the LAN configuration as per the planning, and the IP addresses for the machines are bound in the Bind IP to MAC list, I am ready to reconfigure the main LAN settings, to do this I go to **LAN > General Setup > Details Page [LAN 1]**

After I have opened the LAN setup screen, I change the LAN settings from this:

LAN 1 Ethernet TCP / IP and DHCP Setup	LAN 1 IPv6 Setup
Network Configuration For NAT Usage IP Address: <input type="text" value="192.168.1.1"/> Subnet Mask: <input type="text" value="255.255.255.0"/> RIP Protocol Control: <input type="text" value="Disable"/>	DHCP Server Configuration <input checked="" type="radio"/> Enable Server <input type="radio"/> Disable Server <input type="checkbox"/> Enable Relay Agent Start IP Address: <input type="text" value="192.168.1.10"/> IP Pool Counts: <input type="text" value="200"/> Gateway IP Address: <input type="text" value="192.168.1.1"/> Lease Time: <input type="text" value="86400"/> (s) <input checked="" type="checkbox"/> Clear DHCP lease for inactive clients periodically
	DNS Server IP Address Primary IP Address: <input type="text" value="8.8.8.8"/> Secondary IP Address: <input type="text" value="8.8.4.4"/>

To this:

LAN >> General Setup

LAN 1 Ethernet TCP / IP and DHCP Setup	LAN 1 IPv6 Setup
Network Configuration For NAT Usage IP Address <input type="text" value="192.168.254.1"/> Subnet Mask <input type="text" value="255.255.255.0"/> <hr/> RIP Protocol Control <input type="text" value="Disable"/>	DHCP Server Configuration <input checked="" type="radio"/> Enable Server <input type="radio"/> Disable Server <input type="checkbox"/> Enable Relay Agent Start IP Address <input type="text" value="192.168.254.10"/> IP Pool Counts <input type="text" value="200"/> Gateway IP Address <input type="text" value="192.168.254.1"/> Lease Time <input type="text" value="86400"/> (s) <input checked="" type="checkbox"/> Clear DHCP lease for inactive clients periodically <hr/> DNS Server IP Address Primary IP Address <input type="text" value="8.8.8.8"/> Secondary IP Address <input type="text" value="8.8.4.4"/>

As you can see it is as per the planning whereby the Gateway IP is 192.168.254.1, the router will now want to reboot as the IP it is accessed on changes subnets from .1, to .254. After the 2830n reboots I can access it via 192.168.254.1 with DHCP still enabled still on the router as per the planning, this is because I will be disabling this once I have set the LAPTOP I am working on to statically connect to the LAN with an IP Address on the .254 subnet.

After I reboot and are into the .254 subnet, all devices now get an IP using DHCP on the 2830n, now the subnet has swapped over, the Bind IP to MAC can be enabled, however I will do this after setting the static IP on the laptop.

As shown by the picture below, I can now access the router by navigating to <http://192.168.254.1/>



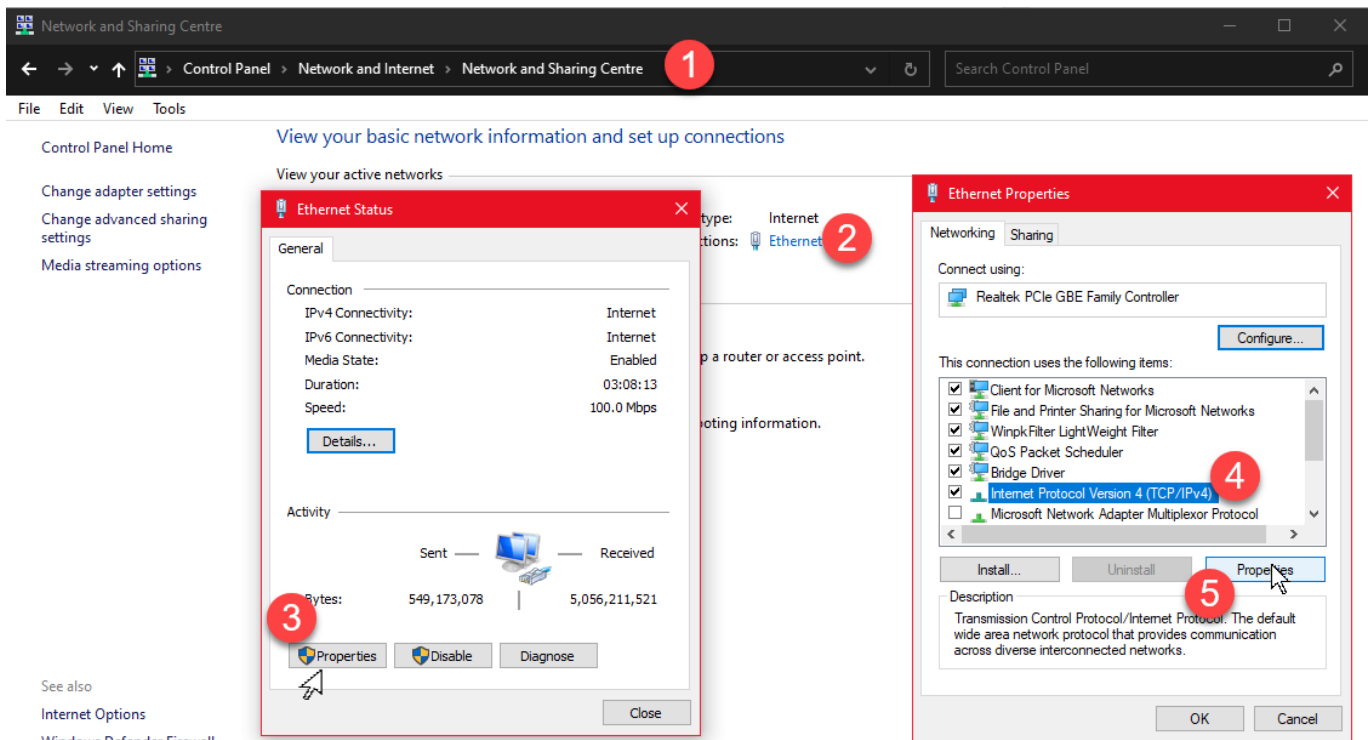
Username

Password

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(d) Spare Laptop Static IP Configuration

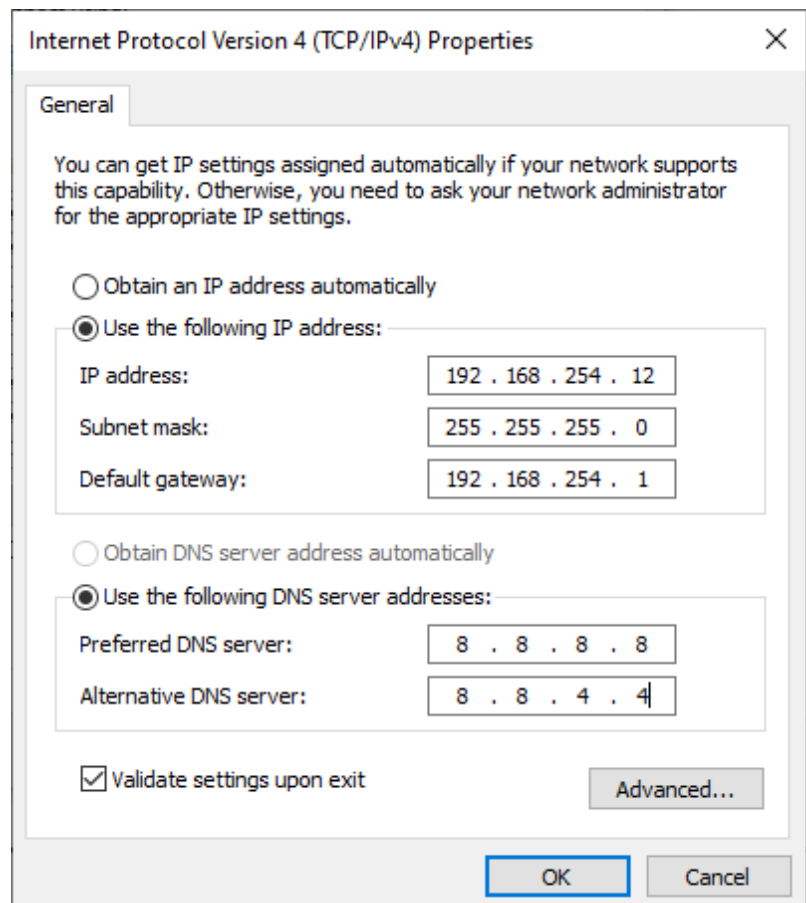
This is the final step before I disable DHCP on the router, I am assigning the laptop a static .254 subnet-based IP Address on the Ethernet adapter as I will need this to connect to the network after DHCP is disabled. To set the static IP Address on the laptop, I need to do the following from the desktop:



Start Menu > Open Control Panel > Network and Internet > Network and Sharing Centre > Select the Ethernet Adapter > Properties > Scroll down to Internet Protocol Version 4 (TCP/IPv4) > Properties

After making the changes required to the IP Address, I ensure to check I validate the settings upon exit, then press **OK** to save the changes.

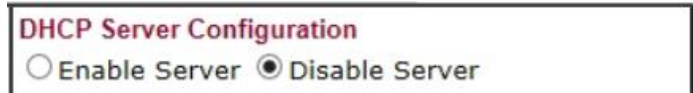
As shown in this screenshot, I have set the static IP of the laptop to 192.168.254.12 in line with the plan and the Bind IP to MAC settings. After clicking OK, the Ethernet adapter will reset and then reconnect to that IP Address specified, this is the same as the one set in the Bind IP to MAC list that we change the status of in the next step.



(e) Disable DHCP & Enable Bind IP to MAC

Following the laptop and NAS being programmed to get static IP addresses that match the Bind IP to MAC table. I can now enable Bind IP to MAC, and Disable DHCP on the 2830n, after doing this, the laptop and NAS will stay connected, this is because they are statically setting themselves an IP on the network, in turn, the DrayTek will let them connect.

To change the LAN 1 DHCP Server activity status, I go to **LAN > General Setup > Details Page > Disable Server** and then press **OK** to save the changes. Now any non-statically set IP addresses will no longer get an IP Address when plugged into the Ethernet ports, neither will devices without a static IP that connect over Wi-Fi.



To Enable Bind IP to MAC I go to **LAN > Bind IP to MAC > Enable** and then press **OK** to save the changes. Now this is enabled, should DHCP ever need to be turned on in the network, devices that are using these existing, statically configured IP addresses, will have them reserved to these MAC addresses, meaning new devices will not get the bound IP addresses in the list.

LAN >> Bind IP to MAC

Bind IP to MAC

☒ **Enable** ☐ **Disable** ☐ **Strict Bind**

(f) Wireless LAN Configuration

Now the LAN has DHCP disabled, when I configure the Wireless LAN broadcasting SSID, only devices that manually join the network by assigning themselves a static IP will now connect, I demonstrate this with the Tablet later in the task. I will now configure the Wireless LAN SSID that is broadcasted wirelessly from the router's wireless antennas over a 2.4GHz frequency.

To change the SSID I go to **Wireless LAN > General Setup** and in SSID 1, I enter **CGTB** as the SSID and leave the Mode and Channel as their default settings. Following this I click **OK** to save and apply the changes. The new SSID appears instead of the default 'DrayTek' SSID which was in SSID 1

Wireless LAN >> General Setup

General Setting (IEEE 802.11)

<input checked="" type="checkbox"/> Enable Wireless LAN	
Mode :	Mixed(11b+11g+11n) ▼
Channel:	Channel 6, 2437MHz ▼
Enable	Hide SSID
1	<input type="checkbox"/>
SSID	
CGTB	

Following this, I change the passphrase/password for the SSID CGTB to '**CGTB2017**'.

I change this by navigating to **Wireless LAN > Security**, then I change the password, set the security to the strongest setting which is **WPA2/PSK**, and click **OK** to save the changes. This is more secure than using the default password on the router because if someone finds the router, they can use the default password to attempt to access the Wi-Fi, if they also knew the subnet the LAN was on.

Wireless LAN >> Security Settings

SSID 1	SSID 2	SSID 3	SSID 4
Mode: WPA2/PSK ▼			
Encryption Mode: TKIP for WPA/AES for WPA2			
Pre-Shared Key(PSK): <input type="password" value="CGTB2017"/>			
Type 8~63 ASCII character or 64 Hexadecimal digits leading by "0x", for example "cfigs01a2..." or "0x655abcd....".			

As shown by the screenshots below, the Tablet successfully connects over the Wi-Fi using a static IP Address of 192.168.254.100. The SSID will not have connection to the internet until WAN2 is configured in the next step, but the device can still connect to the network.

Network name

CGTB

Security

WPA/WPA2-Personal ▼

Password

CGTB2017

IP settings

Static ▼

IP address

192.168.254.100

Gateway

192.168.254.1

Network prefix length

24

DNS 1

8.8.8.8

DNS 2

8.8.4.4

Proxy

None ▼

Metered network

Treat as unmetered

Hidden network

Add a hidden network.

< Status

SIM card status

IMEI information

IP address

192.168.254.100
fe80::7add:59e:db64:dcf8

Wi-Fi MAC address

D8:0B:9A:C5:F4:1C

(g) WAN Configuration

The final part of the router configuration is to set up the WAN2 port which is plugged into the Hive DrayTek using an Ethernet cable. The Hive DrayTek is connected to a 100mb leased line and is setup to allow routed IP's through it that are remaining on the leased line IP range as stated in the planning.

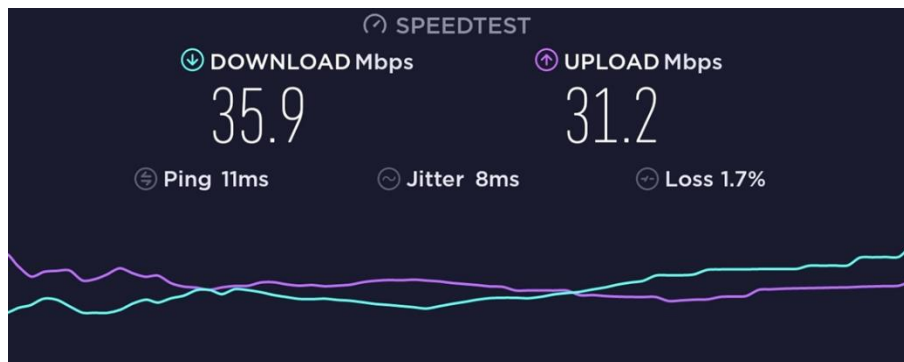
To get to this menu I navigate to **WAN > Internet Access > WAN2 Details Page**. As shown below, I have programmed the WAN2 IP Address configuration to the following as shown in the photo below. Once added I click OK to save the changes, this requires a reboot to fully apply which occurs automatically.

WAN >> Internet Access

WAN 2

PPPoE	Static or Dynamic IP	PPTP/L2TP	IPv6
<input checked="" type="radio"/> Enable <input type="radio"/> Disable			
Keep WAN Connection <input type="checkbox"/> Enable PING to keep alive PING to the IP: <input type="text"/> PING Interval: <input type="text"/> minute(s)			
WAN Connection Detection Mode: <input type="text" value="ARP Detect"/> Ping IP: <input type="text"/> TTL: <input type="text"/>			
MTU <input type="text" value="1500"/> (Max: 1500)			
RIP Protocol <input type="checkbox"/> Enable RIP			
WAN IP Network Settings		WAN IP Alias	
<input type="radio"/> Obtain an IP address automatically			
Router Name: <input type="text"/>			
Domain Name: <input type="text"/>			
<input type="checkbox"/> DHCP Client Identifier *			
Username: <input type="text"/>			
Password: <input type="text"/>			
<input checked="" type="radio"/> Specify an IP address			
IP Address: <input type="text" value="51.219.221.92"/>			
Subnet Mask: <input type="text" value="255.255.255.248"/>			
Gateway IP Address: <input type="text" value="51.219.221.90"/>			
<input checked="" type="radio"/> Default MAC Address <input type="radio"/> Specify a MAC Address MAC Address: <input type="text" value="00"/> · <input type="text" value="1D"/> · <input type="text" value="AA"/> · <input type="text" value="AE"/> · <input type="text" value="E6"/> · <input type="text" value="BA"/>			
DNS Server IP Address Primary IP Address: <input type="text" value="8.8.8.8"/> Secondary IP Address: <input type="text" value="8.8.4.4"/>			

Now the 2830n has rebooted I have tested below the internet is working by pinging Google and performing a download speed test.



Please note the broadband speeds will not hit 100mb as mentioned earlier in the plan as the leased line is currently shared with the office staff and is in use.

With the internet access now available, the router is finished, and I can proceed onto the NAS Configuration.

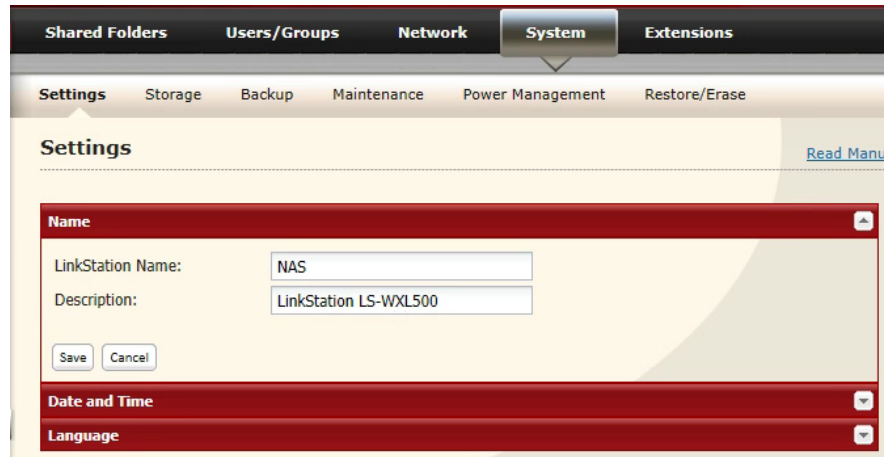
Section 2.04 NAS Configuration

Following setting the static IP Address earlier after configuring the LAN and Bind IP to MAC settings, I now need to configure the remainder of the NAS, this includes the WORKGROUP, admin login details, network folder shares, users, and permissions.

(a) Hostname Configuration

This part consists of logging back into the NAS for the first time since changing its static IP Address to **192.168.254.10**, changing its network hostname, and the admin login password.

Once logged into the NAS on 192.168.254.10, I navigate to **System > Settings > Name**, under this menu I set the LinkStation name to '**NAS**' and click save changes, this then changes the hostname.

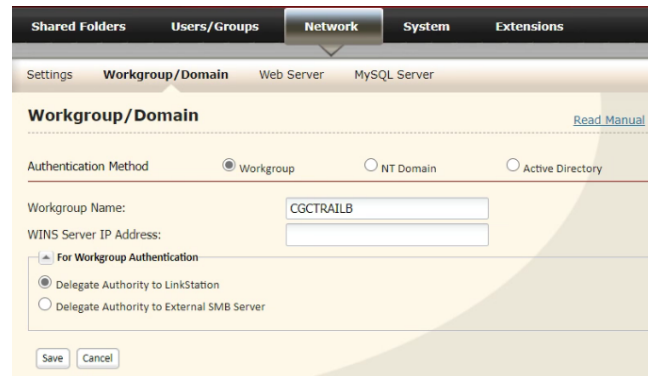


The reason for this is so I can map the network shares in either of the two following ways:

1. Map through IP Address e.g. [\\192.168.254.10\UserShare1](http://192.168.254.10\UserShare1)
2. Map through Hostname e.g. \\NAS\UserShare1
 - a. **NAS** is an easily recognisable hostname relevant to the planning in comparison to 'BUFFALO'

(b) WORKGROUP Configuration

In this step I change the WORKGROUP to '**CGCTRAILB**' so the workstations can see the NAS when they are also configured to the same WORKGROUP. To make this change I go to **Network > Workgroup/Domain > Modify Settings** and then change the WORKGROUP name to '**CGCTRAILB**' as per the plan. Then I press **Save** to apply the changes.



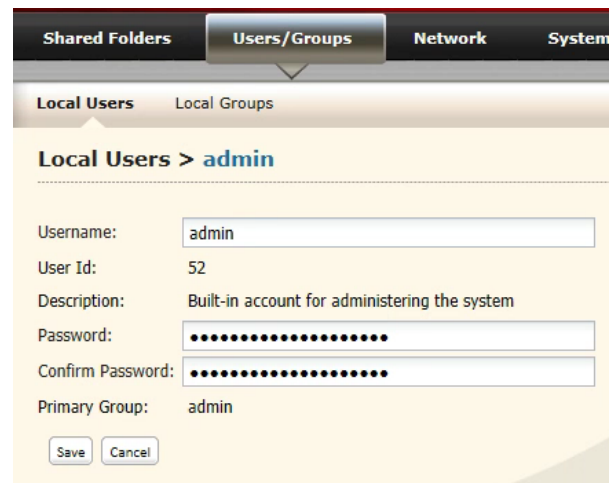
(c) Admin Login Configuration

The next part covers changing the default administrator password of the admin account on the NAS, so it is more secure.

To do so I navigate to **Users/Groups > admin > Click 'Edit'**, I then change the password to **btN9Kq7**

After doing this I click save to apply the change to the user, this will log me out and then I log back in with the new password under the '**admin**' user.

This screenshot is of me reviewing the password for that user, the characters purposely don't match the exact length of the actual password to maximise security for when the user is viewed by another administrative user.



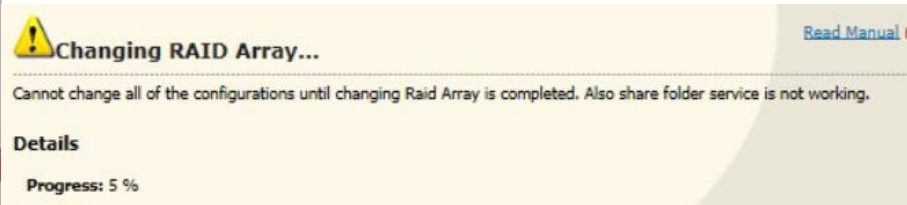
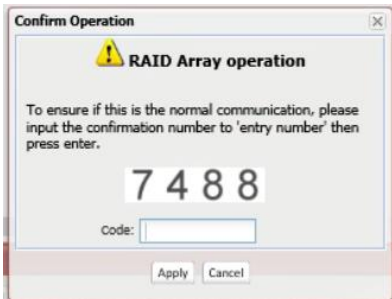
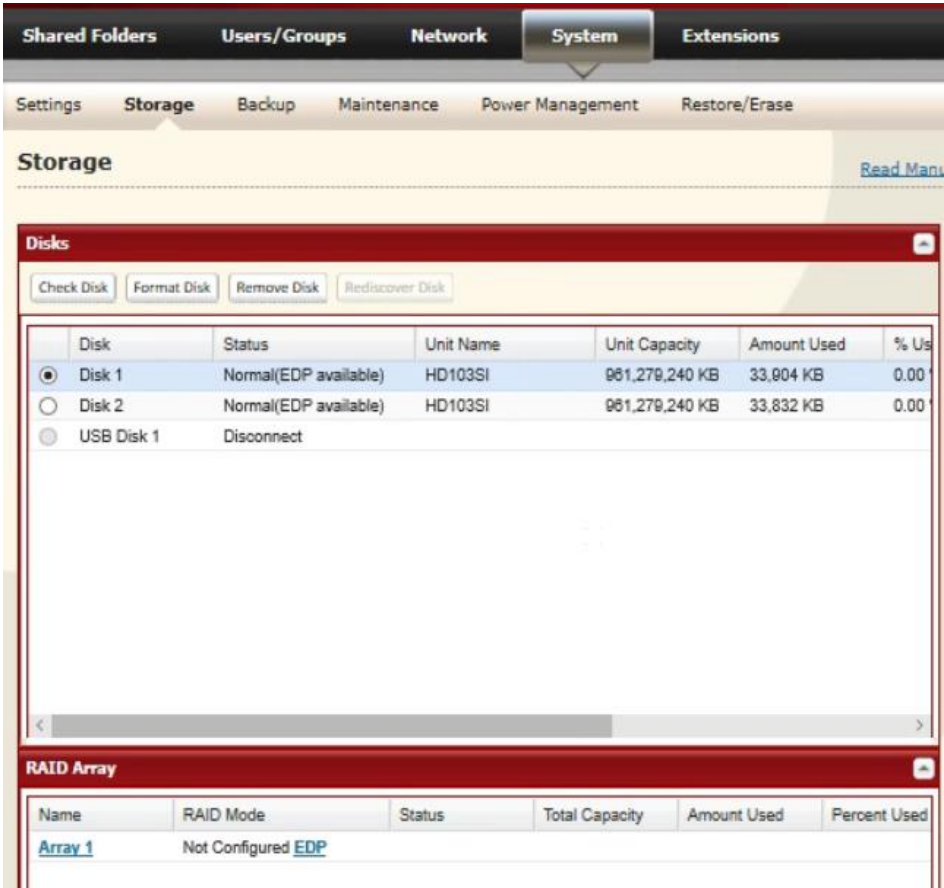
(d) Drive Configuration

As the drives are installed into the NAS, I can now format them into a RAID 1 Array as per the plan, to do this I go to **System > Storage > RAID Array > Array 1**

In this menu I select the 2 available disks and from the dropdown select **RAID1 > Create RAID Array**.

I will be presented with a warning that says the drives will be wiped, this is fine as I know they are empty, so I click **Apply** and I then enter the randomly generated verification code to confirm my decision. This then moves to the **Changing RAID Array** screen where we see the drives being formatted and placed into RAID 1.

Once the progress reaches 100%, the RAID 1 Array is built and now labelled **Array1** when creating folder shares. The Array is now ready to use.



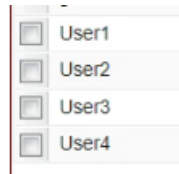
(e) User Configuration

The next step consists of creating the 4 users each Workstation will need. The users are required so they can be assigned permissive read and write access to the selected network shared folder. To make the users I go to **Users/Groups > Local Users > add+** and then enter the required information for each user, below is a screenshot taken from when I created User1 with the following credentials.:

User: **User1**

Password: **x3GN3sE**

Primary Group: **hdusers**



Once this user is created, I click save to save my changes, and now the user can be assigned to shared folder access permissions. I repeated this process for the other 3 users.

(f) Share Folder Configuration

Now I made the shares that the workstations will connect to through the LAN. To make a folder share I do the following, I navigate to **Shared Folders > Create Folder +** and I then fill in the fields to match the requirements from the plan. In this screenshot for **UserShare1** (for **User1**), my requirements are as follows:

Share Name: **UserShare1**

Volume: **Array1**

Shared Folder Attributes: **Read & Write**

Recycle Bin: **Enable**

Shared Folder Support: **Windows**

Folder Mode: **Windows Backup**

Access restrictions: **User1**

Permissions: **Read & Write**

Once I have set these parameters, I can click **Save** and confirm my changes. This folder share is now available and only accessible to User1 as per the planning and programming shown above.

This will be tested in a later step. After repeating this process for every user and for every share specified in the plan, I finish with 4 folder shares names **UserShare1, UserShare2, UserShare3, UserShare4**. I am now ready to move on and configure the workstations.

Name	Volume	Attribute	Recycle	Support	Restrict
info		Read Only	×		×
UserShare1	Array 1	Read & Write	✓	Windows	✓
UserShare2	Array 1	Read & Write	✓	Windows	✓
UserShare3	Array 1	Read & Write	✓	Windows	✓
UserShare4	Array 1	Read & Write	✓	Windows	✓

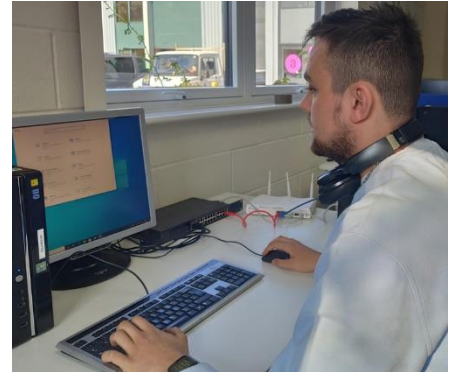
Section 2.05 Workstation Configuration

In this section I will configure each Workstation one by one, this process is repeated for each machine, however in this part I will use **User1** as my example of evidence of configuration, with it connecting to **UserShare1**.

This process is replicated for User2, User3, and User4 for their respective folder shares and workstations.

(a) Connecting the Monitor, keyboard, and mouse to the system

To begin with I connect the monitors VGA cable, keyboard and mouse to the Workstation, turn on the Workstation and get automatically logged into the default user provided on the system, where I will then begin to configure the required users, hostname, WORKGROUP, Ethernet network settings, software, folder share, and then testing file permissions that I set on the NAS to see if they work as expected. Until the User is created, we need Administrator permission to modify the, hostname, WORKGROUP, network adapter configuration and then installation of software.

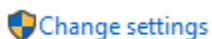


(a) Configuring WORKGROUP & Hostname

Now the Workstation is online, I modify the WORKGROUP and hostname of the computer to ensure it is in line with the planning document. To modify these settings, I navigate to

Start > Control Panel > System & Security > System

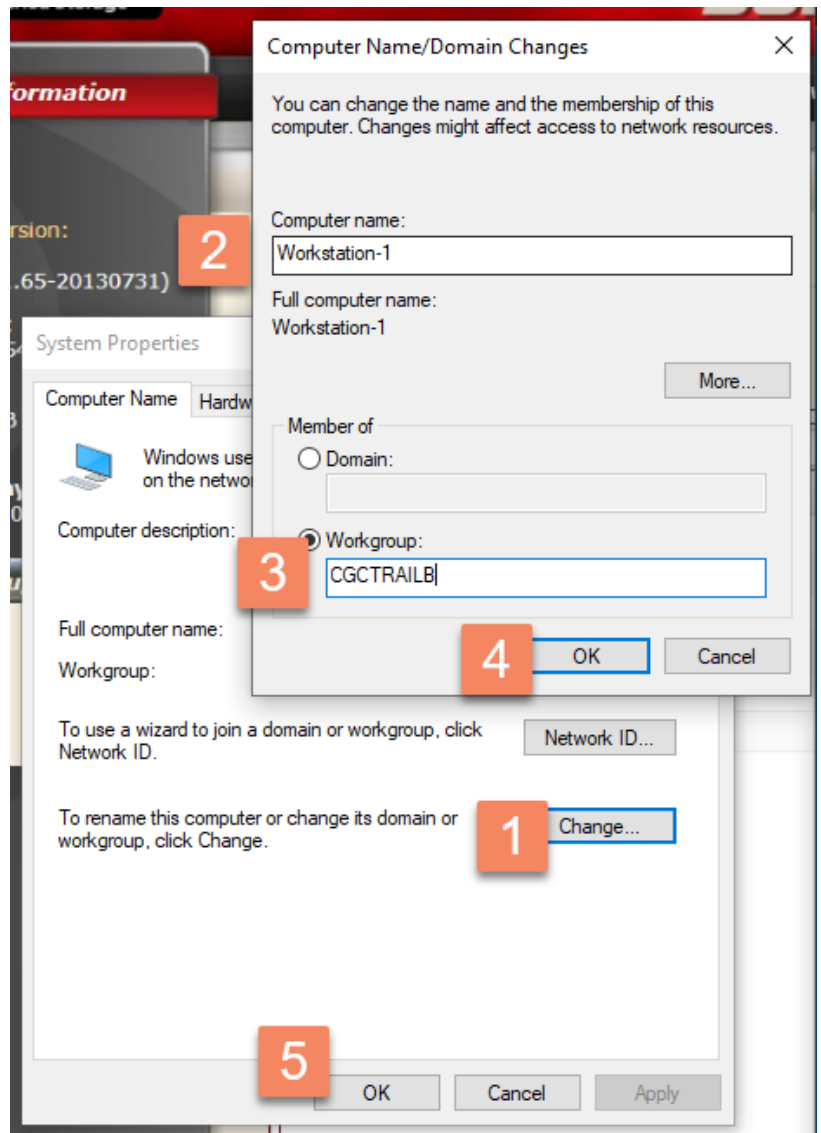
Under **Computer name, domain, and workgroup settings** I click



Then, Under **To rename this computer or change its domain or workgroup, click Change** I click **Change...**

This opens the following screen where I can change the '**Computer Name**' (Hostname) and the **WORKGROUP** the Workstation is connected to.

Once I click **OK**, that applies the changes and requests a reboot, after rebooting, I log back into the user and proceed with the next step.



(b) Configuring network connectivity

Now the Workstation has rebooted, I can configure the static IP Address details on the Ethernet network adapter connected from the Workstation to the network switch. To do this I navigate to the following menu:

Start > Control Panel > Network and Internet > Network and Sharing Centre > Change Adapter Settings

Select the **'Connected' 'Ethernet' Adapter > Properties**

Scroll down to **Internet Protocol Version 4 (TCP/IPv4) > Properties**

I am greeted with this screen where I then select to **Use the following IP Address**, this screen is where I program the static IP Address into each system. As shown here I set the IP Address as per the planning document for the relevant Workstation, and the other entries are set to the following.

Subnet Mask: **255.255.255.0**

Default Gateway: **192.168.254.1**

Preferred DNS Server: **8.8.8.8**

Alternative DNS Server: **8.8.4.4**

Validate settings upon exit: **YES – Ticking this then pressing OK applies the changes instantly which is what we want.**

Once I have filled in the Static IP configuration required for the Workstation, I press **OK** to save and apply my changes instantly.

After a couple seconds the changes are ready to test to see if we have the correct IP Address and if we have internet connectivity.

Internet Protocol Version 4 (TCP/IPv4) Properties

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

☐ Obtain an IP address automatically

☒ Use the following IP address:

IP address: 192 . 168 . 254 . 2

Subnet mask: 255 . 255 . 255 . 0

Default gateway: 192 . 168 . 254 . 1

☐ Obtain DNS server address automatically

☒ Use the following DNS server addresses:

Preferred DNS server: 8 . 8 . 8 . 8

Alternative DNS server: 8 . 8 . 4 . 4

☒ Validate settings upon exit

Advanced...

OK Cancel

(c) Testing internet connectivity

In this section I test the Workstation we just applied a static IP to, to see if it has the correct information and if it can connect to the internet. Below is an '**ipconfig /all**' output to show the connection to the network was successful. Additional tests included a broadband speed test to show the performance of the internet connected through Ethernet to the workstations, and a PING test to the NAS to show connectivity is working before I map the network share.

(i) IPCONFIG /ALL

As shown in the output from the command, you can see all the programming of the static IP is retained and that I programmed in, the example shown is from Workstation-1:

```

C:\Users\User1>IPCONFIG/all

Windows IP Configuration

    Host Name . . . . . : Workstation-1
    Primary Dns Suffix . . . . . :
    Node Type . . . . . : Mixed
    IP Routing Enabled. . . . . : No
    WINS Proxy Enabled. . . . . : No

Ethernet adapter Ethernet:

    Connection-specific DNS Suffix  . :
    Description . . . . . : Intel(R) 82579V Gigabit Network Connection
    Physical Address. . . . . : 7C-05-07-3B-E9-35
    DHCP Enabled. . . . . : No
    Autoconfiguration Enabled . . . . : Yes
    Link-local IPv6 Address . . . . . : fe80::68f0:881:9960:8905%8(Preferred)
    IPv4 Address. . . . . : 192.168.254.2(Preferred)
    Subnet Mask . . . . . : 255.255.255.0
    Default Gateway . . . . . : 192.168.254.1
    DHCPv6 IAID . . . . . : 108791047
    DHCPv6 Client DUID. . . . . : 00-01-00-01-27-0F-F0-B7-7C-05-07-3B-E9-35
    DNS Servers . . . . . : 8.8.8.8
                           8.8.4.4
    NetBIOS over Tcpip. . . . . : Enabled
  
```

(ii) Broadband Speed Test

This broadband speed test through Ethernet on the switch from the Workstation is better than over Wi-Fi, showing the reliability of Ethernet networking over wireless. The PING, download and upload speeds are all higher.



(iii) *PING NAS / 192.168.254.10*

As shown in this screenshot, running **PING NAS** or **PING 192.168.254.10** shows that the NAS is visible and pingable on the network.

```
Microsoft Windows [Version 10.0.19041.508]
(c) 2020 Microsoft Corporation. All rights reserved.

C:\Users\User1>ping 192.168.254.10

Pinging 192.168.254.10 with 32 bytes of data:
Reply from 192.168.254.10: bytes=32 time<1ms TTL=64
Reply from 192.168.254.10: bytes=32 time<1ms TTL=64
Reply from 192.168.254.10: bytes=32 time<1ms TTL=64
Reply from 192.168.254.10: bytes=32 time=2ms TTL=64

Ping statistics for 192.168.254.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 2ms, Average = 0ms

C:\Users\User1>ping NAS

Pinging NAS.local [192.168.254.10] with 32 bytes of data:
Reply from 192.168.254.10: bytes=32 time<1ms TTL=64
Reply from 192.168.254.10: bytes=32 time=2ms TTL=64
Reply from 192.168.254.10: bytes=32 time<1ms TTL=64
Reply from 192.168.254.10: bytes=32 time<1ms TTL=64

Ping statistics for 192.168.254.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 2ms, Average = 0ms

C:\Users\User1>
```

The 4 replies from each test indicate that the connection to the NAS is successful.

Now I know the connection to the network from the Workstation is working, I can move onto installing the software for the workstations.


(d) Installing RMM and Antivirus

Now the Workstation is connected to the internet, I can deploy the RMM and Antivirus software onto the Workstation before I change users to the local user. With a Hive provided USB stick containing the software, I plug it into the Workstation to copy the installer files across for both items of software.

The purpose for both items is to allow remote management without the need for interaction with the Workstation physically.


(i) Datto RMM – Remote Monitoring & Management

This software is just an executable that can be run on the machine which then installs the RMM files for remote

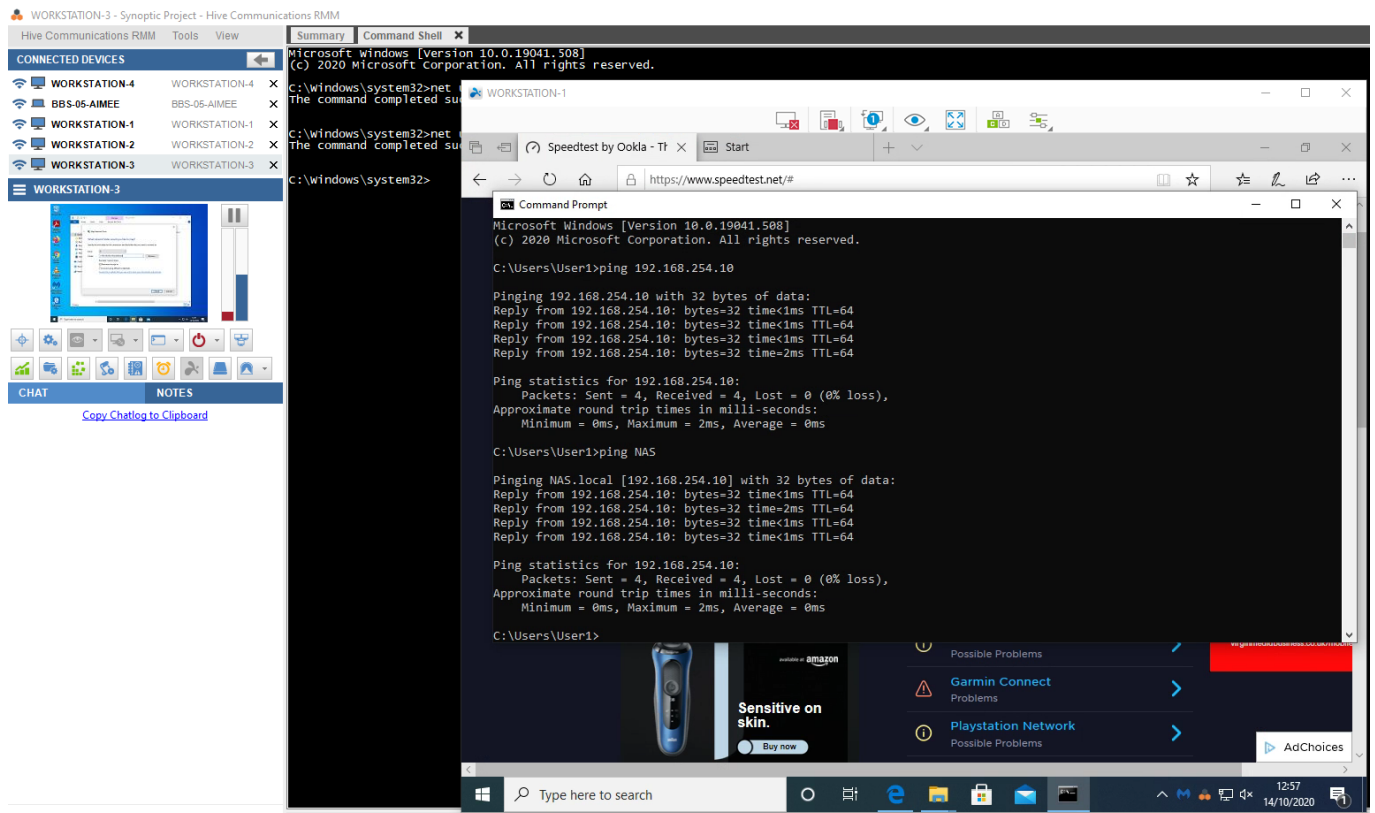
management in the background, after the RMM is installed, this icon appears in the taskbar tray:  indicating RMM is installed and remote access is ready to use. RMM pushes out the software like office 365 and Google Chrome automatically due to its software management policy. This will be shown on the desktop screenshots later on in the testing.

(ii) Malwarebytes Endpoint Protection Antivirus

The same applies to the Malwarebytes endpoint installer, with it being a run in the background executable which

shows this icon on the taskbar tray when it has finished installing 

Now the system is protected and managed I am ready to create the users, but for this part I move back to the system I am writing this document from to access the machines remotely using Datto RMM and Splashtop, as shown in the screenshot below which shows me using WORKSTATION-1 remotely.



As you can see, the Malwarebytes and Datto RMM tray icons are here on the Workstation.

(e) Creating Users

Now I am finished with the items that require administrator level permission to authenticate, I can move onto creating users. To create the users on the Workstation I navigate to

Start > Settings > Accounts > Family & Other users > Add someone else to this PC > I don't have this person's sign-in information > Add a user without a Microsoft account

On this next screen I fill in the user details for the User/Workstation. E.g. For WORKSTATION-1 I would put:

(USERNAME) Who's going to use this PC?: **User1**

(PASSWORD) Make it secure:
x3GN3Se

As Windows enforces the local users to have recovery passwords, we will put the WORKGROUP name **CGCTRAILB** for each security question answer.

When the user credentials fields are filled in, I click **Next** to create the user. I now log out of the default user and log in with the user I just created.

Create a user for this PC

If you want to use a password, choose something that will be easy for you to remember but hard for others to guess.

Who's going to use this PC?

User1

Make it secure.

••••••

••••••

In case you forget your password

What is the name of the city where you were born? ▾

CGCTrailB

What was your first pet's name? ▾

CGCTrailB

What was your childhood nickname? ▾

CGCTrailB

Next

Back

(f) Mounting Network Folder Share to Workstation

Now I have logged into the User, I can map the appropriate UserShare NAS folder to the Workstation user. To do so I navigate to **This PC** in Windows Explorer, Right click on **This PC** and click **Map Network Drive**. The Drive letter Z: is what I will connect through, and the folder path is as follows to connect to the network share:

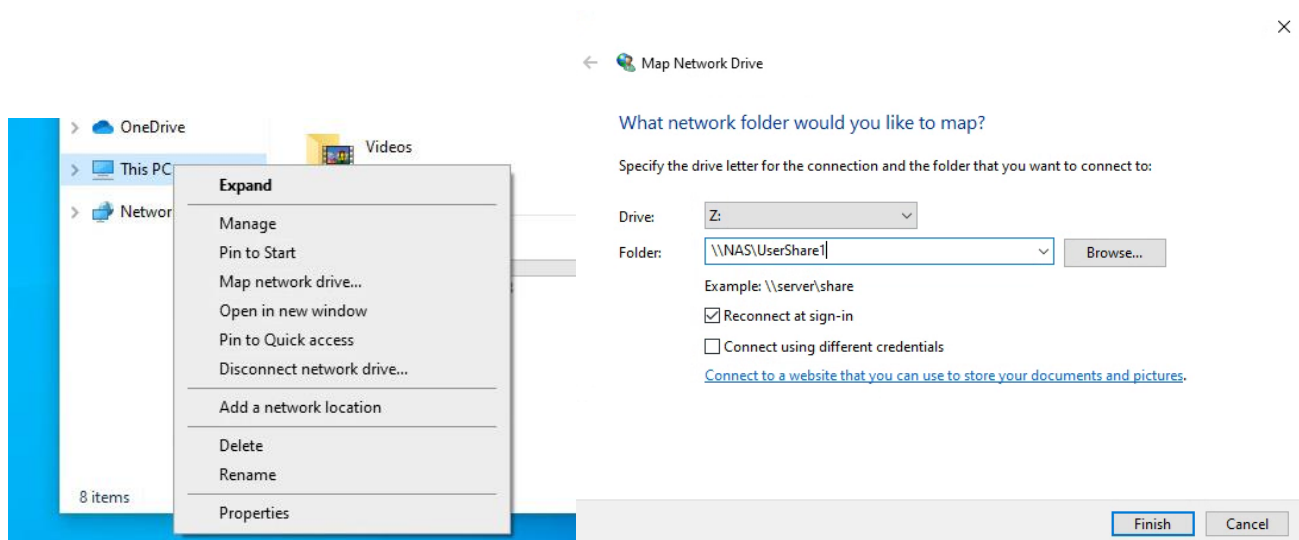
IP ADDRESS : \\192.168.254.10\UserShare* e.g. \\192.168.254.10\UserShare1

OR

HOSTNAME: \\NAS\UserShare* e.g. \\NAS\UserShare1

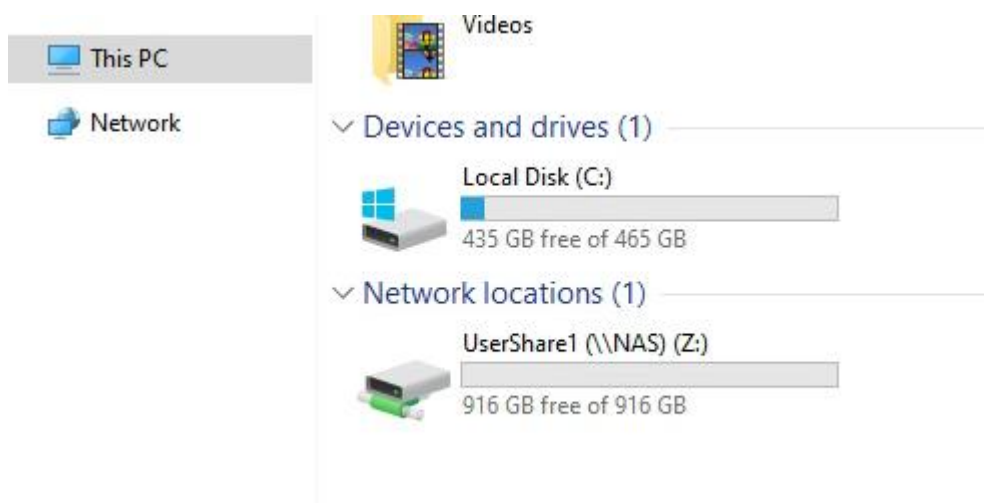
' * ' = Share Number [1, 2, 3, 4]

For continuity, should the IP Address change in future, I will use the HOSTNAME method



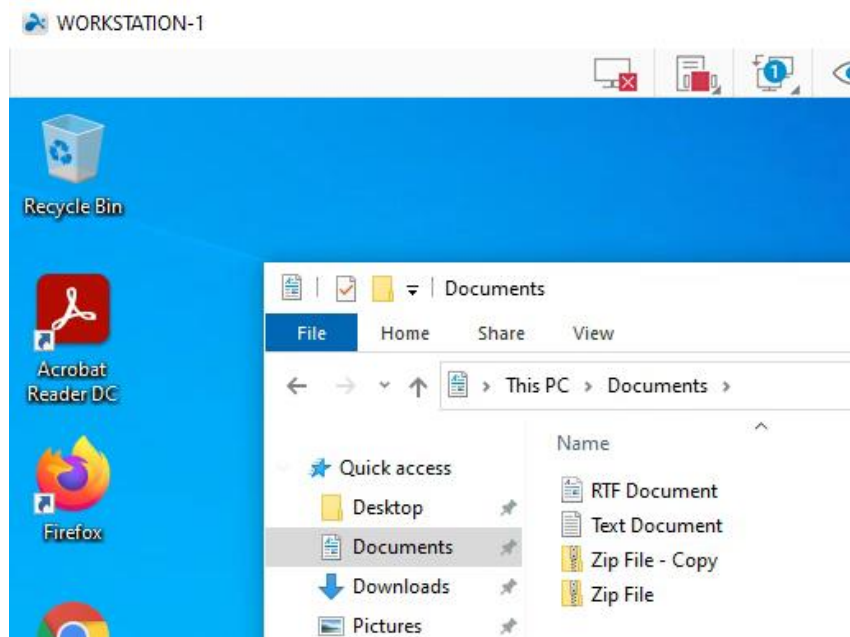
e.g. User1 / Workstation-1 / UserShare1 shown above

As the password is the same as the NAS for the Windows user, I don't need to tick **Connect using different credentials**. So I click **Finish**. This then adds the network folder like so.

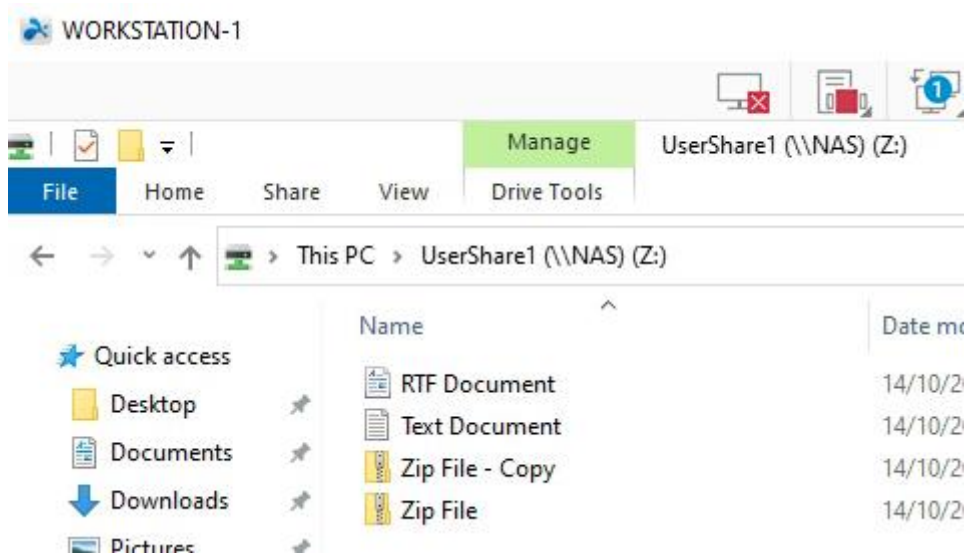


(g) Copying test files to NAS Share

In the Documents folder on the Workstation, I have created 4 test files as shown here:



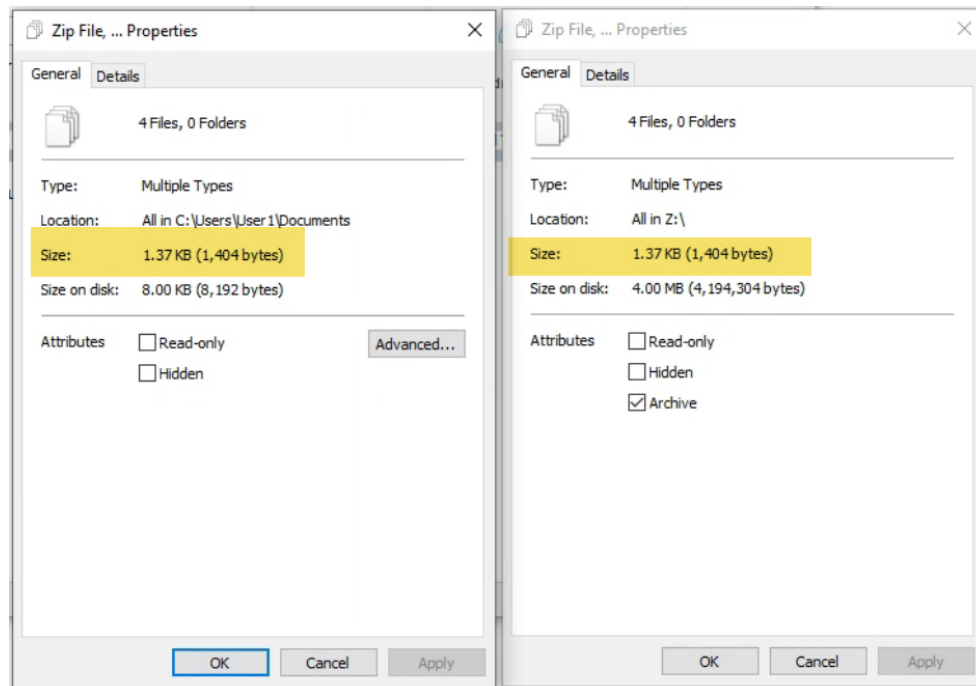
I then copy them to the target, which is the NAS share, to the root of the folder:



This showed the files copied successfully without an issue showing the permissions of reading/writing data were setup correctly.

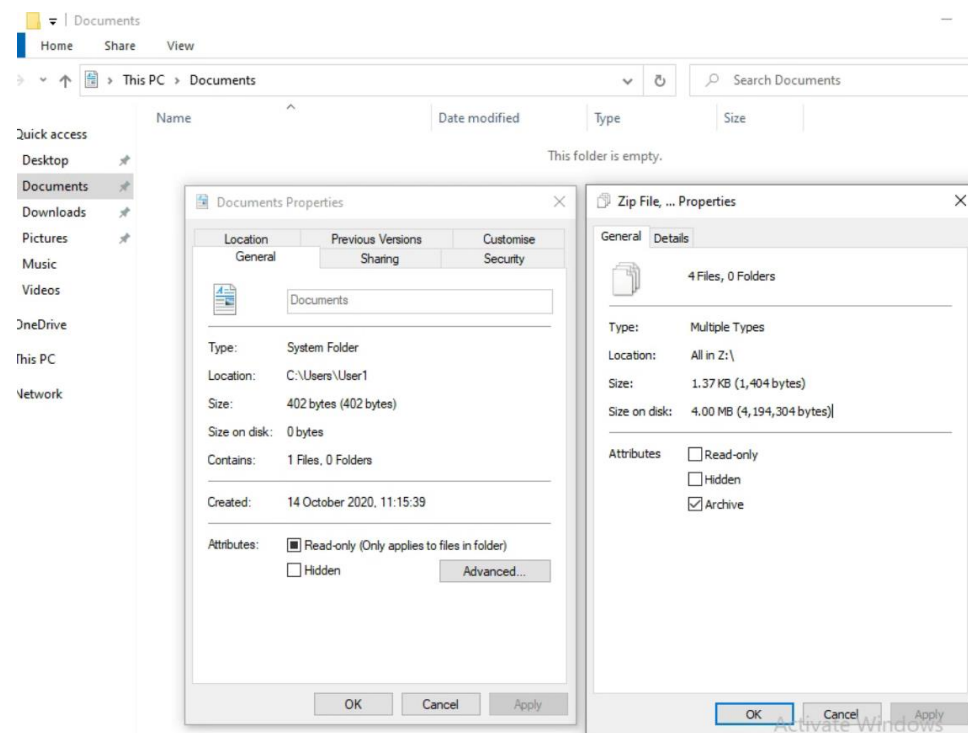
(h) Checking files on NAS Share

As shown in the screenshot below, the files on the NAS and files on the Workstation are the same size indicating they are identical and that the copy was successful:



(i) Deleting files from Workstation

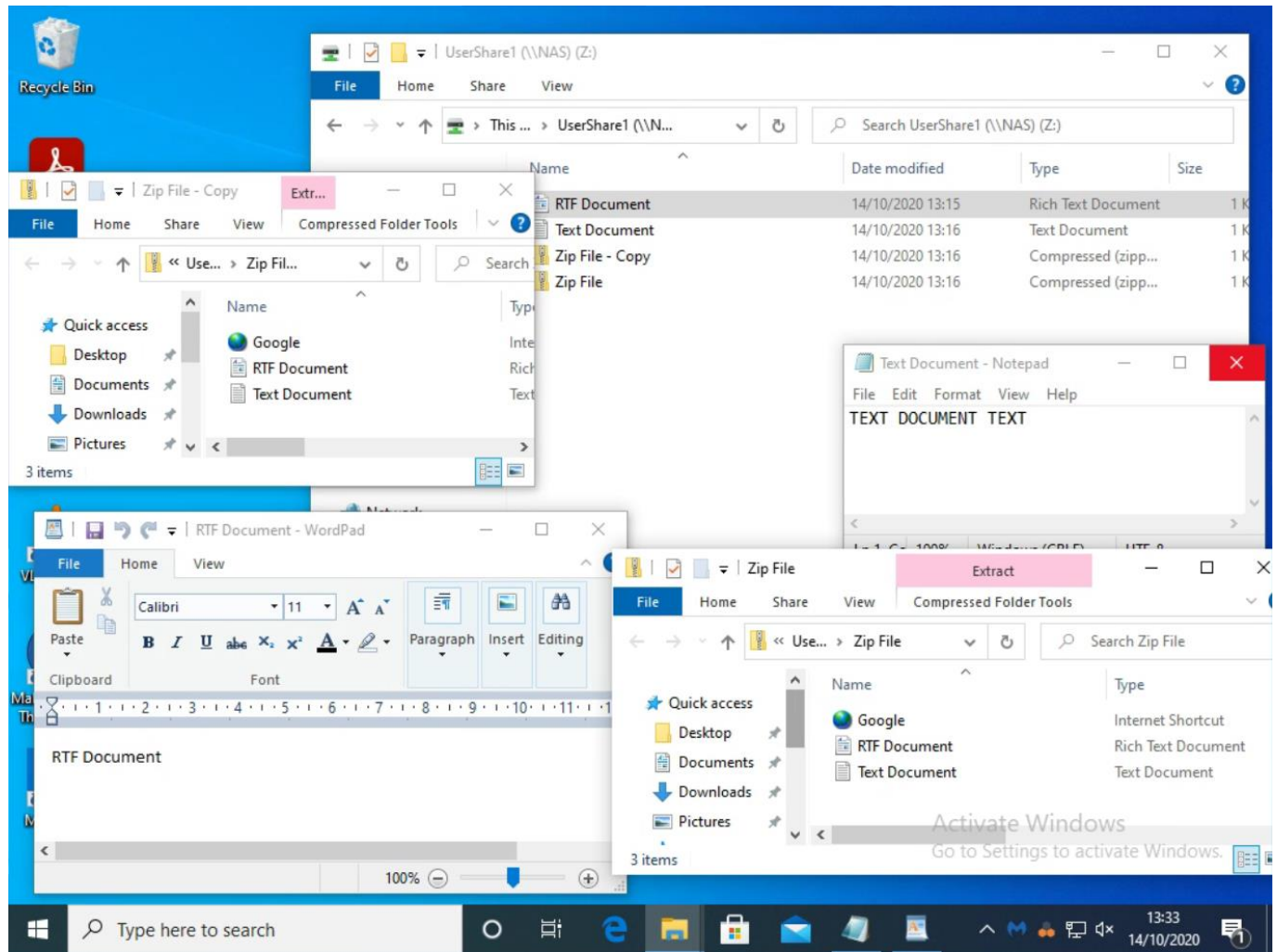
As a proof of concept that the files were going to remain on the NAS (backed up), I deleted the files from the Workstation, to then go and check that they are still on the NAS:



Left: Documents on User1/Workstation-1 / Right: [\\NAS\UserShare1](#) files

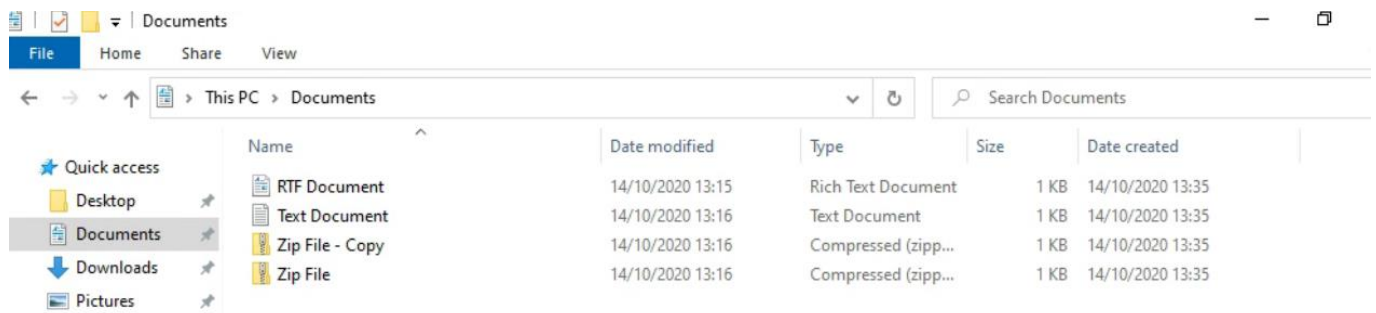
(j) Reading files from NAS Share

As shown by the screenshot, I opened each file from the NAS to show the files were still working and were not corrupted.



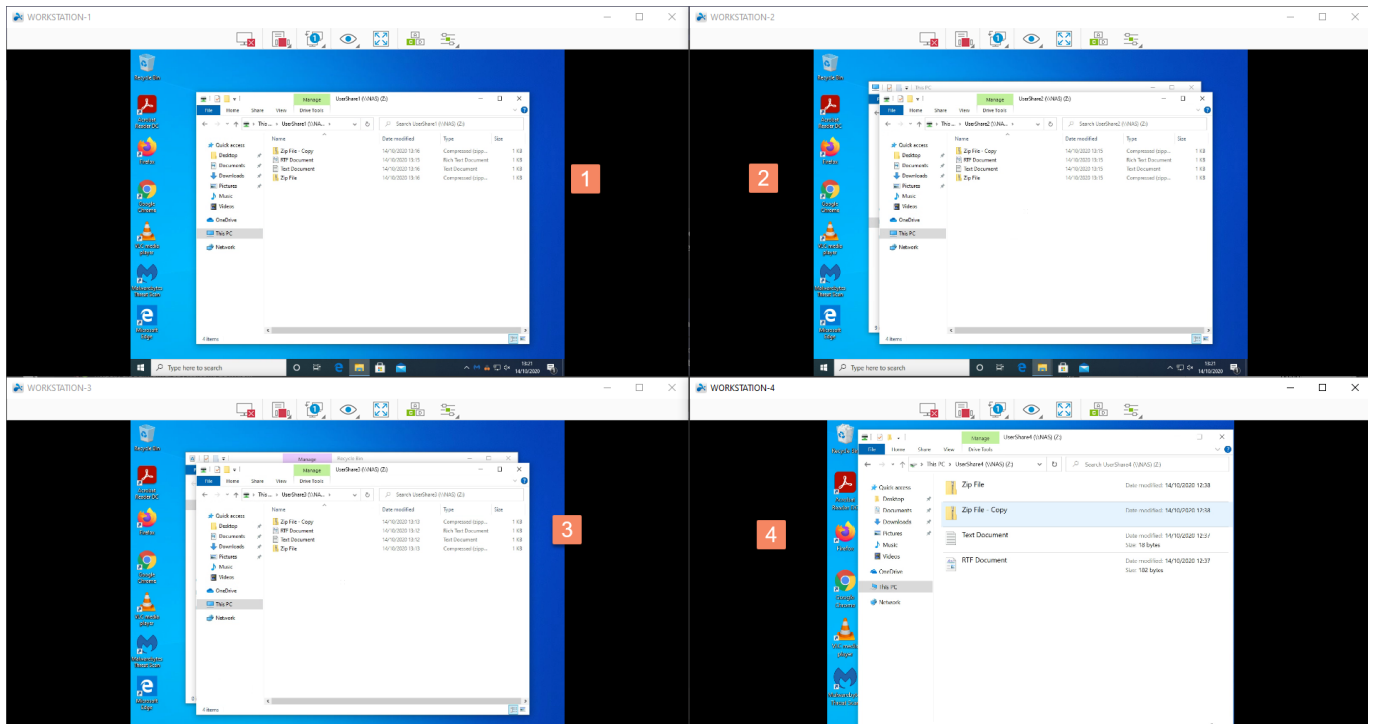
(k) Copying files from NAS Share

As shown in the next screenshot, I copied back the data from the NAS share to the Documents folder where the files were originally. The **Date Created** date/time being newer than the modified date/time shows the files were copied and created on the local user later than they were last edited.



(I) Repeat process for each machine.

As shown in this screenshot, here is all 4 machines on screen with the NAS shares mounted and the data copied across:



This shows that the data was copied successfully and backed up without fail to the NAS showing competency of data being backed up to the NAS.

As mentioned at the start of the Workstation setup, this whole process was repeated and tested on each individual Workstation, the screenshots above followed the process of WORKSTATION-1's configuration.

Section 2.06 Testing & Diagnostics

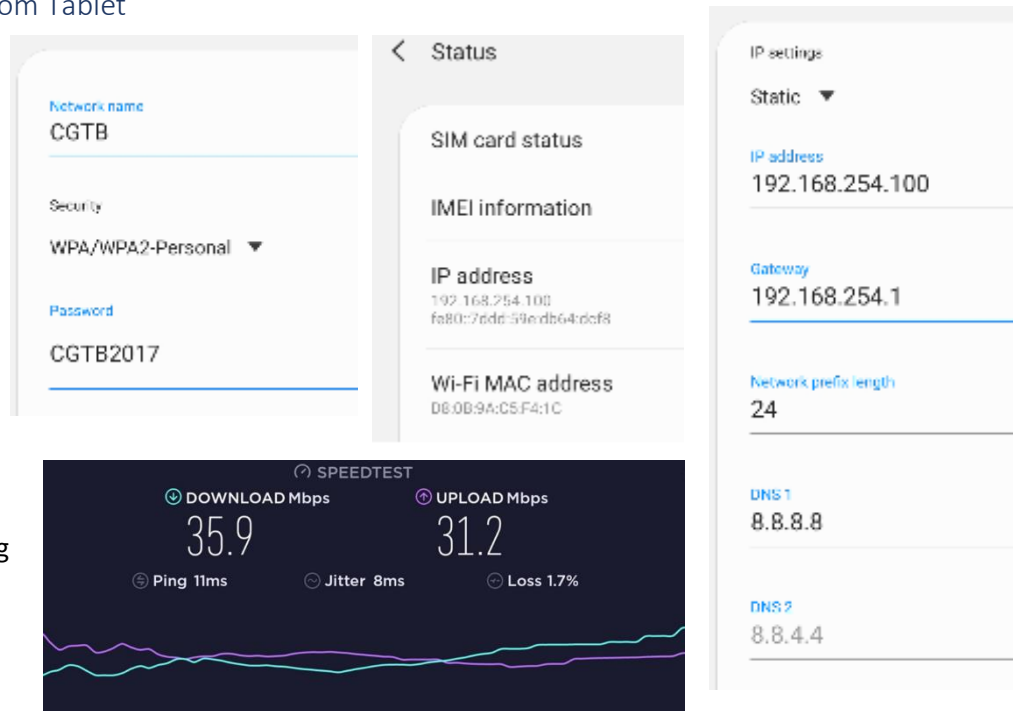
Proof of the systems working is key to finalising the success of this deployment, hence why I have the below evidence to show which shows zero issues in my configuration.

(a) Hardware analysis – Switch, Router, Ethernet cables

I physically checked each Ethernet cable was fitted correctly on both sides to make sure connectivity was working at layer 1 and 2 of the OSI model. This is shown by the photograph here.

(b) Testing Wi-Fi from Tablet

The wireless network connectivity of my configuration is shown by the Tablet I had connecting to the setup with the IP Address 192.168.254.100. Below are the configuration settings of the device, along with its wireless download and upload speed test result, proving the device is connected successfully to the internet as well as the network I set up.



(c) PING

It is key to test connectivity of devices using PING as it can detect latency or connectivity issues in a network by using small packets of data to test the response time of a connection. The below table shows the results of PING test from the router and from the devices to each other. The PING tool uses 32-byte ICMP packets to get a response.

Time it takes for the packet of data to come back to the source of the PING is known as the latency and this is measured in milliseconds ms.

Ping Source Name	Ping Source IP	Connection Type	Ping Target Name	Ping Target IP	Packets Sent (Bytes)	Ping Attempts	(%) Packet Loss	Average Milli-seconds response (ms)
DrayTek 2830n	192.168.254.1	Ethernet	Workstation-1	192.168.254.2	32	5	0%	3
DrayTek 2830n	192.168.254.1	Ethernet	Workstation-2	192.168.254.3	32	5	0%	3
DrayTek 2830n	192.168.254.1	Ethernet	Workstation-3	192.168.254.4	32	5	0%	3
DrayTek 2830n	192.168.254.1	Ethernet	Workstation-4	192.168.254.5	32	5	0%	3
DrayTek 2830n	192.168.254.1	Ethernet	NAS	192.168.254.10	32	5	0%	10
DrayTek 2830n	192.168.254.1	Wi-Fi	TABLET	192.168.254.100	32	5	0%	38
Workstation-1	192.168.254.2	Ethernet	DrayTek 2830n	192.168.254.1	32	4	0%	1
Workstation-2	192.168.254.3	Ethernet	DrayTek 2830n	192.168.254.1	32	4	0%	1
Workstation-3	192.168.254.4	Ethernet	DrayTek 2830n	192.168.254.1	32	4	0%	1
Workstation-4	192.168.254.5	Ethernet	DrayTek 2830n	192.168.254.1	32	4	0%	1
Workstation-1	192.168.254.2	Ethernet	NAS	192.168.254.10	32	4	0%	1
Workstation-2	192.168.254.3	Ethernet	NAS	192.168.254.10	32	4	0%	1
Workstation-3	192.168.254.4	Ethernet	NAS	192.168.254.10	32	4	0%	1
Workstation-4	192.168.254.5	Ethernet	NAS	192.168.254.10	32	4	0%	1

On the DrayTek, the **PING Diagnostics** is located under **Diagnostics** and allows the router to PING as per the programmed test requirement as shown in this photo:

Diagnostics >> Ping Diagnosis

Ping Diagnosis

☒ IPV4 ☐ IPV6

Note: If you want to ping a LAN PC or you don't want to specify which WAN to ping through, please select "Auto".

Ping through:

Ping to: IP Address:

Result | [Clear](#) |

```
Pinging 192.168.254.100 with 64 bytes of Data through LAN
Receive reply from 192.168.254.100, time=60ms
Receive reply from 192.168.254.100, time=10ms
Receive reply from 192.168.254.100, time=10ms
Receive reply from 192.168.254.100, time=10ms
Receive reply from 192.168.254.100, time=100ms
Packets: Sent = 5, Received = 5, Lost = 0 (0% loss)
```

On the workstations, PING is done from command prompt as shown earlier in the document.

A '**PING -t**' can be used to run a constant PING on an Address to check its ongoing latency.

(d) Tracert

This tool can be used to verify the route on the network that traffic passes through. It shows the quantity of hops through a network that are required before the router is located. E.G. if I wanted to verify that a Workstation could speak to the NAS, I would run the following in an elevated command prompt on the Workstation:

tracert NAS / or / tracert 192.168.254.10

to which I would get the following output:

```
C:\Users\User1>tracert 192.168.254.10

Tracing route to NAS [192.168.254.10]
over a maximum of 30 hops:

  1    <1 ms    <1 ms    <1 ms    NAS [192.168.254.10]

Trace complete.
```

As the NAS is in the same network as the Workstation there is only 1 hop, this will be the same across all workstations and they all got the same result as the screenshot above.

(e) Download speed test

Below is a table of the speed test from all the workstations and the tablet to show network performance to the internet. Each test was run standalone and not simultaneously.

Device name	Connection Type	Download (mbps)	Upload (mbps)	Latency (ms)
TABLET	Wi-Fi	35.9	31.2	11
Workstation-1	Ethernet	66.07	66.09	6
Workstation-2	Ethernet	65.78	65.8	6
Workstation-3	Ethernet	66.58	66.6	6
Workstation-4	Ethernet	65.98	66.02	6

Wireless speeds are naturally slower than Ethernet due to the fact the signal degrades through airwaves, distance, and obstacles.

(f) Workstation Network Configuration

As shown below, to clarify the complete network diagnostic information for each Workstation, see the IPCONFIG screenshots from all 4 workstations.

Workstation-1 <pre> C:\Windows\system32>ipconfig /all Windows IP Configuration Host Name : workstation-1 Primary Dns Suffix : Node Type : Mixed IP Routing Enabled. : No WINS Proxy Enabled. : No Ethernet adapter Ethernet: Connection-specific DNS Suffix . : Description : Intel(R) 82579V Gigabit Network Connection Physical Address. : 7C-05-07-3B-E9-35 DHCP Enabled. : No Autoconfiguration Enabled : Yes Link-local IPv6 Address : fe80::68f0:881:9960:8905%8(Preferred) IPv4 Address. : 192.168.254.2(Preferred) Subnet Mask : 255.255.255.0 Default Gateway : 192.168.254.1 DHCPv6 IAID : 108791047 DHCPv6 Client DUID. : 00-01-00-01-27-0F-F0-B7-7C-05-07-3B-E9-35 DNS Servers : 8.8.8.8 8.8.4.4 NetBIOS over Tcpip. : Enabled </pre>	Workstation-2 <pre> C:\windows\system32>ipconfig /all Windows IP Configuration Host Name : workstation-2 Primary Dns Suffix : Node Type : Mixed IP Routing Enabled. : No WINS Proxy Enabled. : No Ethernet adapter Ethernet: Connection-specific DNS Suffix . : Description : Intel(R) 82579V Gigabit Network Connection Physical Address. : E0-69-95-DC-F1-2B DHCP Enabled. : No Autoconfiguration Enabled : Yes Link-local IPv6 Address : fe80::f1dc:b0ee:e63e:ff7d%3(Preferred) IPv4 Address. : 192.168.254.3(Preferred) Subnet Mask : 255.255.255.0 Default Gateway : 192.168.254.1 DHCPv6 IAID : 115370389 DHCPv6 Client DUID. : 00-01-00-01-27-0F-4B-3B-E0-69-95-DC-F1-2B DNS Servers : 8.8.8.8 8.8.4.4 NetBIOS over Tcpip. : Enabled </pre>
Workstation-3 <pre> C:\windows\system32>ipconfig /all Windows IP Configuration Host Name : workstation-3 Primary Dns Suffix : Node Type : Mixed IP Routing Enabled. : No WINS Proxy Enabled. : No Ethernet adapter Ethernet: Connection-specific DNS Suffix . : Description : Intel(R) 82579V Gigabit Network Connection Physical Address. : E8-40-F2-D1-FE-21 DHCP Enabled. : No Autoconfiguration Enabled : Yes Link-local IPv6 Address : fe80::e84e:5127:7ec7:ab9b%13(Preferred) IPv4 Address. : 192.168.254.4(Preferred) Subnet Mask : 255.255.255.0 Default Gateway : 192.168.254.1 DHCPv6 IAID : 115884274 DHCPv6 Client DUID. : 00-01-00-01-27-0F-51-CB-E8-40-F2-D1-FE-21 DNS Servers : 8.8.8.8 8.8.4.4 NetBIOS over Tcpip. : Enabled </pre>	Workstation-4 <pre> C:\windows\system32>ipconfig /all Windows IP Configuration Host Name : workstation-4 Primary Dns Suffix : Node Type : Mixed IP Routing Enabled. : No WINS Proxy Enabled. : No Ethernet adapter Ethernet: Connection-specific DNS Suffix . : Description : Intel(R) 82579V Gigabit Network Connection Physical Address. : E0-69-95-C9-04-4B DHCP Enabled. : No Autoconfiguration Enabled : Yes Link-local IPv6 Address : fe80::dcee:b58c:d356:851e%15(Preferred) IPv4 Address. : 192.168.254.5(Preferred) Subnet Mask : 255.255.255.0 Default Gateway : 192.168.254.1 DHCPv6 IAID : 266365333 DHCPv6 Client DUID. : 00-01-00-01-27-0F-7B-8C-E0-69-95-C9-04-4B DNS Servers : 8.8.8.8 8.8.4.4 NetBIOS over Tcpip. : Enabled </pre>

This shows the correct IP Configuration for all machines, additionally please see the advanced IP scan below to see the full device list on the network as of right now.

- **BBS-05-AIMEE**
(192.168.254.12) is SPARE laptop, I have not changed the hostname on it as it is not being deployed onto the network.

This completes the testing and diagnostics of the network to show the connectivity is faultless and that devices work as per the planning document.

Status	IP	Name	Manufacturer	MAC address	Comments
>	192.168.254.1	192.168.254.1	DrayTek Corp.	00:1D:AA:AE:E6:B8	
>	192.168.254.2	Workstation-1	PEGATRON CORPORA...	7C:05:07:3B:E9:35	
>	192.168.254.3	192.168.254.3	PEGATRON CORPORA...	E0:69:95:DC:F1:2B	
>	192.168.254.4	192.168.254.4	PEGATRON CORPORA...	E8:40:F2:D1:FE:21	
>	192.168.254.5	Workstation-4	PEGATRON CORPORA...	E0:69:95:C9:04:4B	
>	192.168.254.10	NAS	BUFFALO.INC	00:24:A5:9A:15:00	
>	192.168.254.12	BBS-05-Aimee	Hon Hai Precision Ind...	74:40:BB:6E:3D:C9	
>	192.168.254.100	192.168.254.1...		D8:0B:9A:C5:F4:1C	

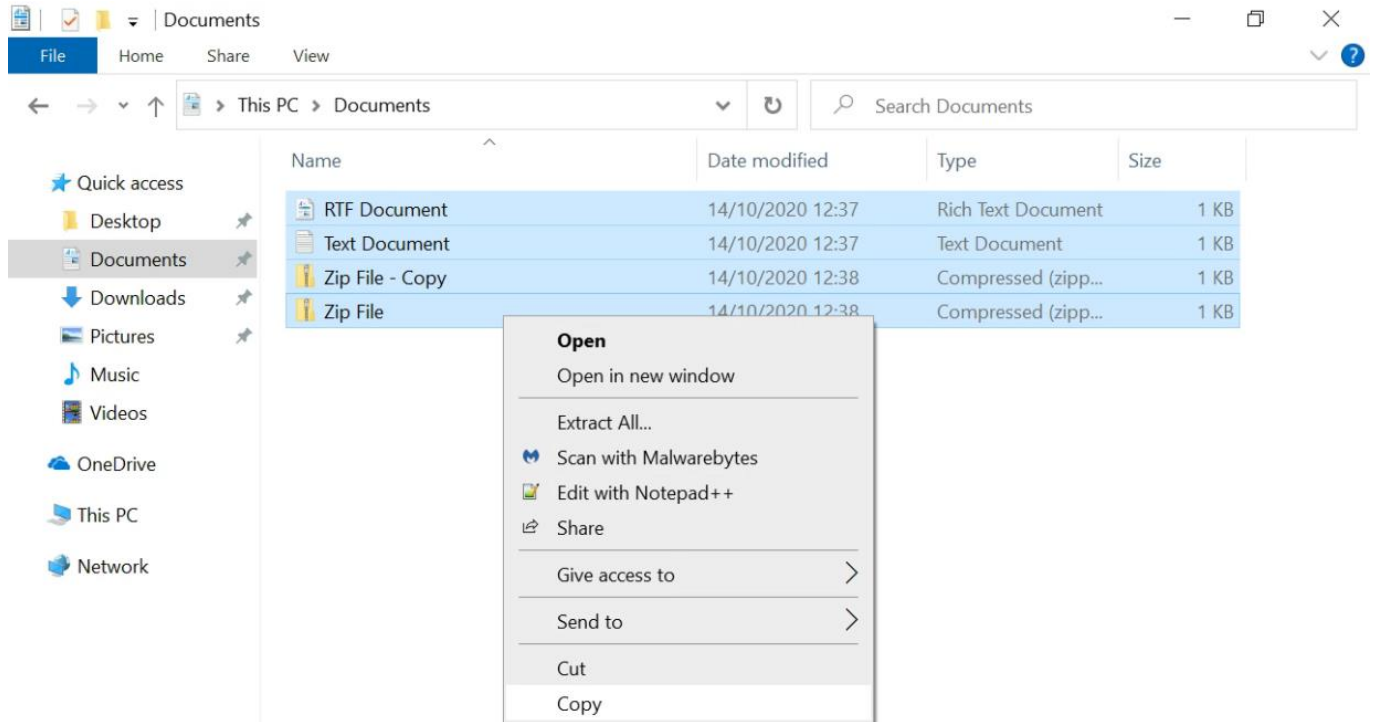
8 alive, 0 dead, 246 unknown

Section 2.07 Replace WORKSTATION-4 for Workstation5

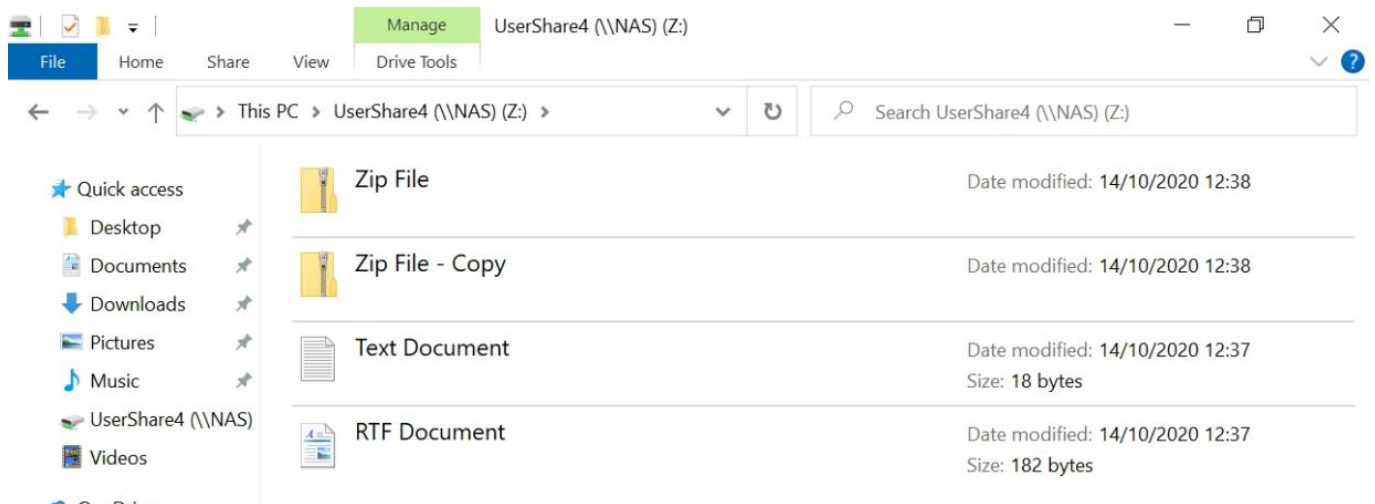
In this step I will back up the data of Workstation-4 to the NAS to later be restored to a new Workstation, Workstation-5, I will manually rebuild the user on the new machine and deploy to replace Workstation-4 when I am sure the system is ready.

(a) Backup of Workstation-4 Data NAS

To begin backing up the Workstation, I navigate on Workstation-4 to Documents folder of Workstation-4 and I select all the data in the folder, after this I right click on the items and select **Copy**:



Following this, I navigate to the NAS share **UserShare4** and **Paste** the contents of the documents folder:



This shows the data has been copied to UserShare4 successfully. With the data now on the NAS I can proceed with the setup of Workstation-5 to get it prepared to have data restored.

(b) Restoration of Data & Settings from Workstation-4 to Workstation-5

Now the data is backed up I need to build the User profile and system configuration of the replacement Workstation. This machine had Windows 10 Pro x64 installed already and required the following to be ready to perform the swap to the new Workstation, Workstation-5. This Workstation already had Datto RMM and Malwarebytes preinstalled.

(i) *Make User4 user and matching password to WORKSTATION-4/NAS*

On WORKSTATION-5 I create the new user with the following credentials

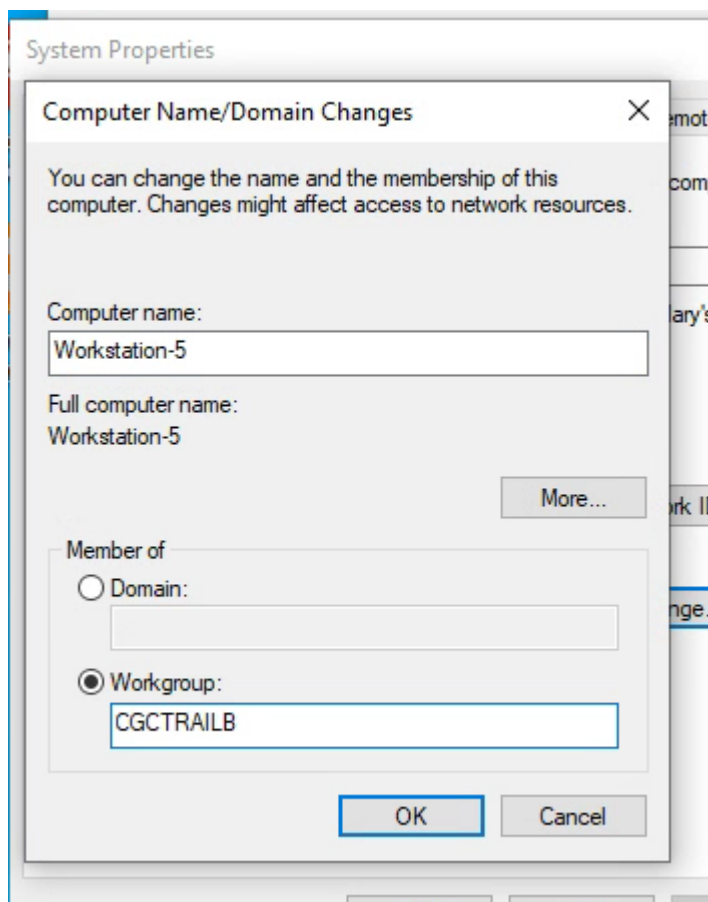
Username: **User4**

Password: **Q5bbAa6**

I do this as I did when creating the other users on the other workstations, in **Settings > Accounts > Family & Other users > Add someone else to this PC**

(ii) *Change hostname WORKSTATION-5 to and WORKGROUP to CGCTRAILB*

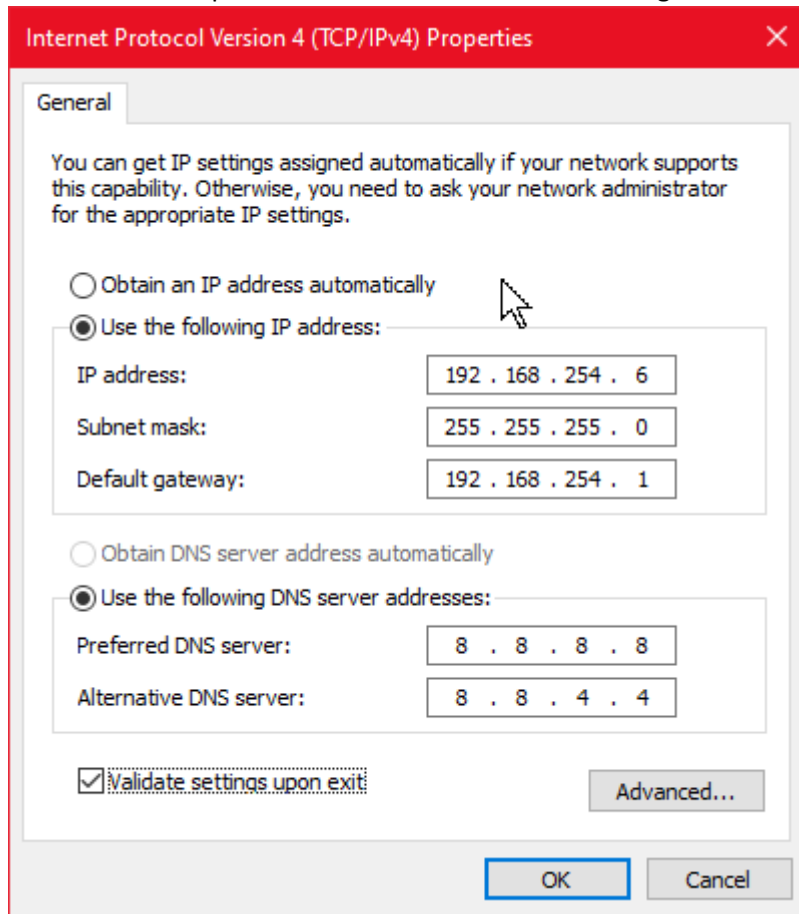
Following the same process as mentioned previously for the other workstations, I changed the hostname and WORKGROUP to the following:



This will require a reboot, so when prompted I select to reboot now. After the reboot, the Hostname and WORKGROUP are set to the above.

(iii) *Configure static IP Address for Workstation*

Now the Workstation needs to be set to connect to the static IP Address as per the plan. As per the planning, I set the **Ethernet** adapters static IP Address to the following and then click OK to validate my changes:



Internet Protocol Version 4 (TCP/IPv4) Properties

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

☐ Obtain an IP address automatically

☒ Use the following IP address:

IP address: 192 . 168 . 254 . 6

Subnet mask: 255 . 255 . 255 . 0

Default gateway: 192 . 168 . 254 . 1

☐ Obtain DNS server address automatically

☒ Use the following DNS server addresses:

Preferred DNS server: 8 . 8 . 8 . 8

Alternative DNS server: 8 . 8 . 4 . 4

☒ Validate settings upon exit

Advanced...

OK Cancel

Following this upon running **ipconfig /all**, I have the above IP Address set statically on **Workstation-5**. Additionally, the Workstation is now connected to the internet and the same WORKGROUP as the other workstations.

```
Windows IP Configuration

Host Name . . . . . : Workstation-5
Primary Dns Suffix . . . . . :
Node Type . . . . . : Mixed
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No

Ethernet adapter Ethernet:

Connection-specific DNS Suffix . :
Description . . . . . : Realtek PCIe GbE Family Controller
Physical Address. . . . . : E8-03-9A-EC-9C-DA
DHCP Enabled. . . . . : No
Autoconfiguration Enabled . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::711d:bf45:d3c0:5b7d%13(Preferred)
IPv4 Address. . . . . : 192.168.254.6(Preferred)
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.254.1
DHCPv6 IAID . . . . . : 132645786
DHCPv6 Client DUID. . . . . : 00-01-00-01-25-28-DA-BA-E8-03-9A-EC-9C-DA
DNS Servers . . . . . : 8.8.8.8
                        8.8.4.4
NetBIOS over Tcpip. . . . . : Enabled
```

(iv) Mapped NAS UserShare4 to Z: with User4 credentials

As per the programming set on Workstation-4, I mapped the same **UserShare4** NAS share so the system has the same NAS share as the previous Workstation, this share is mapped to **Z:**

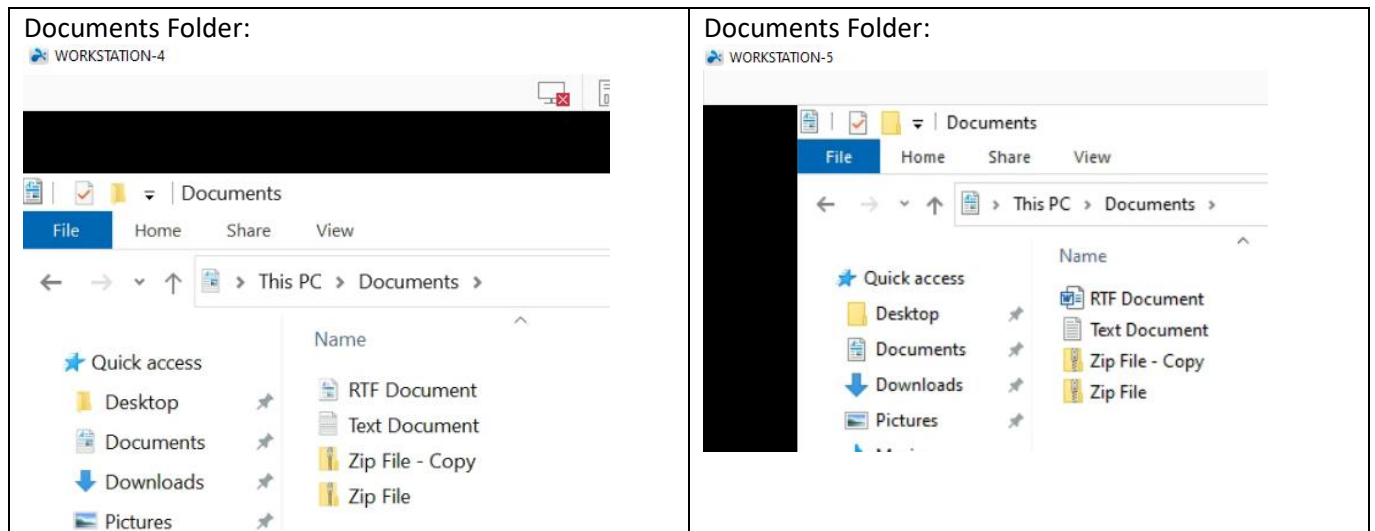
As the password of the user on Workstation-5 was the same as Workstation-4, I automatically map the share without credential verification as I have the same credentials which Windows cross references and recognises. So, it lets me map the **UserShare5** NAS share without asking me to enter a password.

(c) Testing if files are present as well as settings

It is key to identify I have successfully copied all key aspects from Workstation-4 identically before I swap the Workstation machines over, hence the checklist below.

(i) Files

As shown in the below screenshot, the files on both workstations ability to access files is identical as they both now access the same mapped **UserShare4** folder, this screenshot below shows the Documents on both workstations once I copied the files from the NAS share to the Documents folder.



As shown, the files are the same on both machines.

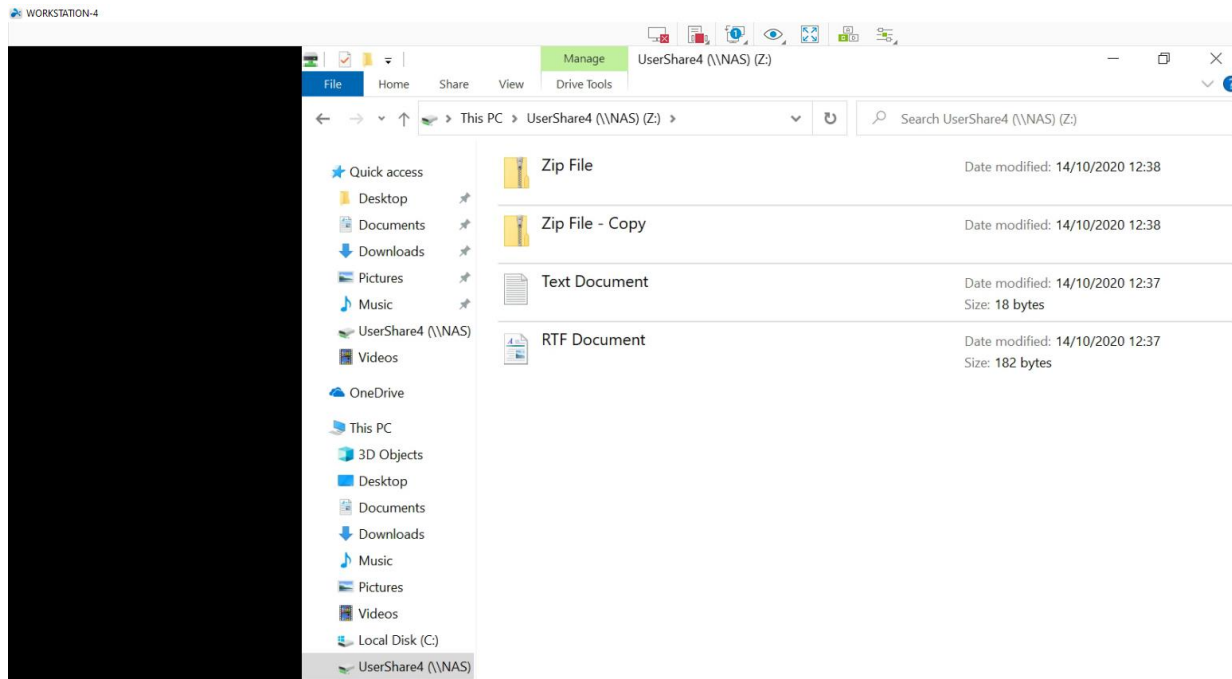
(ii) Settings e.g. Username

There were no bespoke setting bar the mapped NAS share for the user, and all the files for **User4** on the Workstation-4 pc were stored on the **UserShare4** before I proceeded with this work, all the software and Workstation user permissions were the same upon transfer to new Workstation.

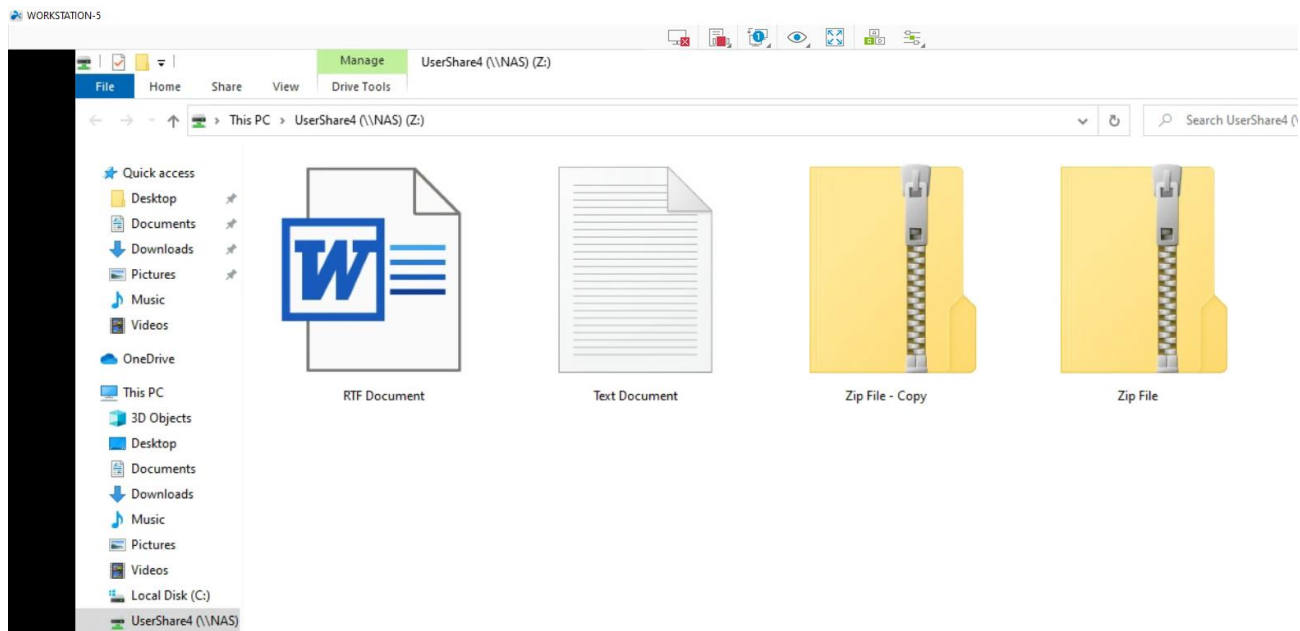
(iii) *Mapped Drives*

As you can see from the screenshot, the current mapped drives between Workstation-4 and Workstation-5 are now the same as they both have **UserShare4** mapped to drive Z:

WORKSTATION-4:



WORKSTATION-5:

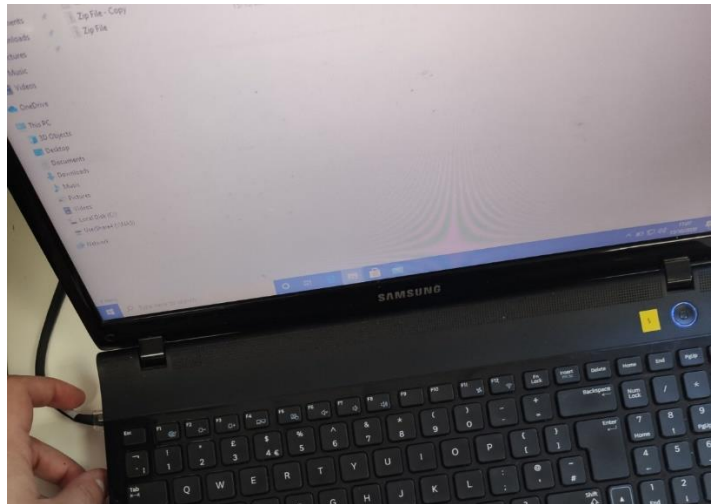
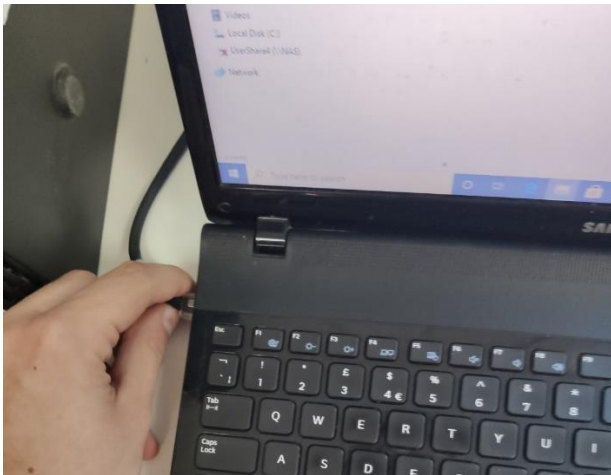


(d) Swapping WORKSTATION-4 Over

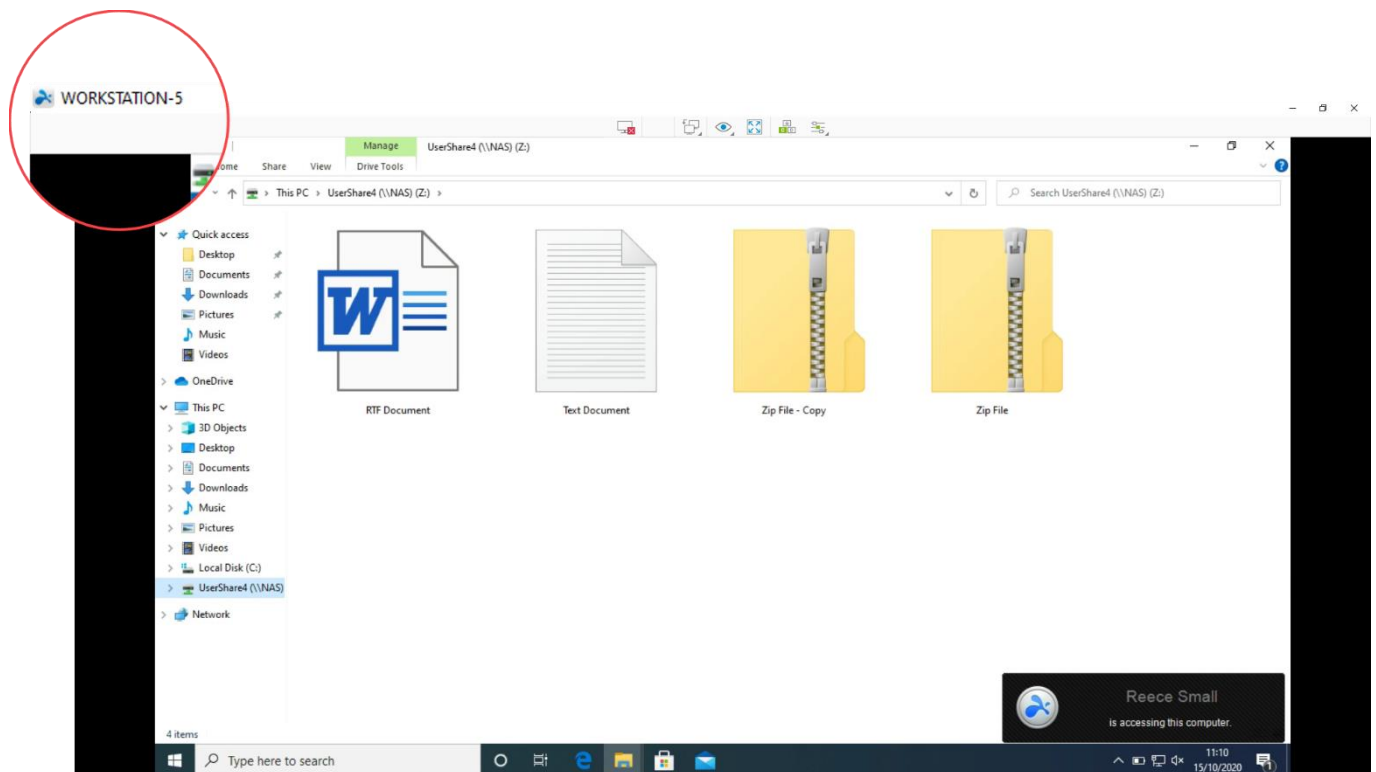
Now I am confident that WORKSTATION-5 can replace WORKSTATION-4 as the setup for the user will be identical, I begin by shutting down WORKSTATION-4 and once powered off, I unplug all power and Ethernet cabling and lay it in place of where the replacement Workstation will be going



Once WORKSTATION-4 is removed I safely place WORKSTATION-5 down in place of the position of where WORKSTATION-4 was. I then plug in the power and Ethernet cable coming from switch port 4 into the Workstation and proceed to turn on the machine.



Once booted, I log into **User4** and attempt to connect to the NAS, and as shown in the screenshots below, the data is still accessible and the work environment for **User4** remains unaffected, the user has access to all their previous data and the NAS.



This completes the migration to a new Workstation, from Workstation-4 to Workstation-5.

Section 2.08 Final Notes

Following Completion of TASK 2, I confidently believe with all the testing I have performed, along with the step by step following of the planning document, that I have successfully created the specified requirement requested in TASKS 1 & 2

Section 2.09 Handover to Practical Observation Officer to review

Now the project tasks are completed, this document has been handed over to Practical Observation Officer for review.

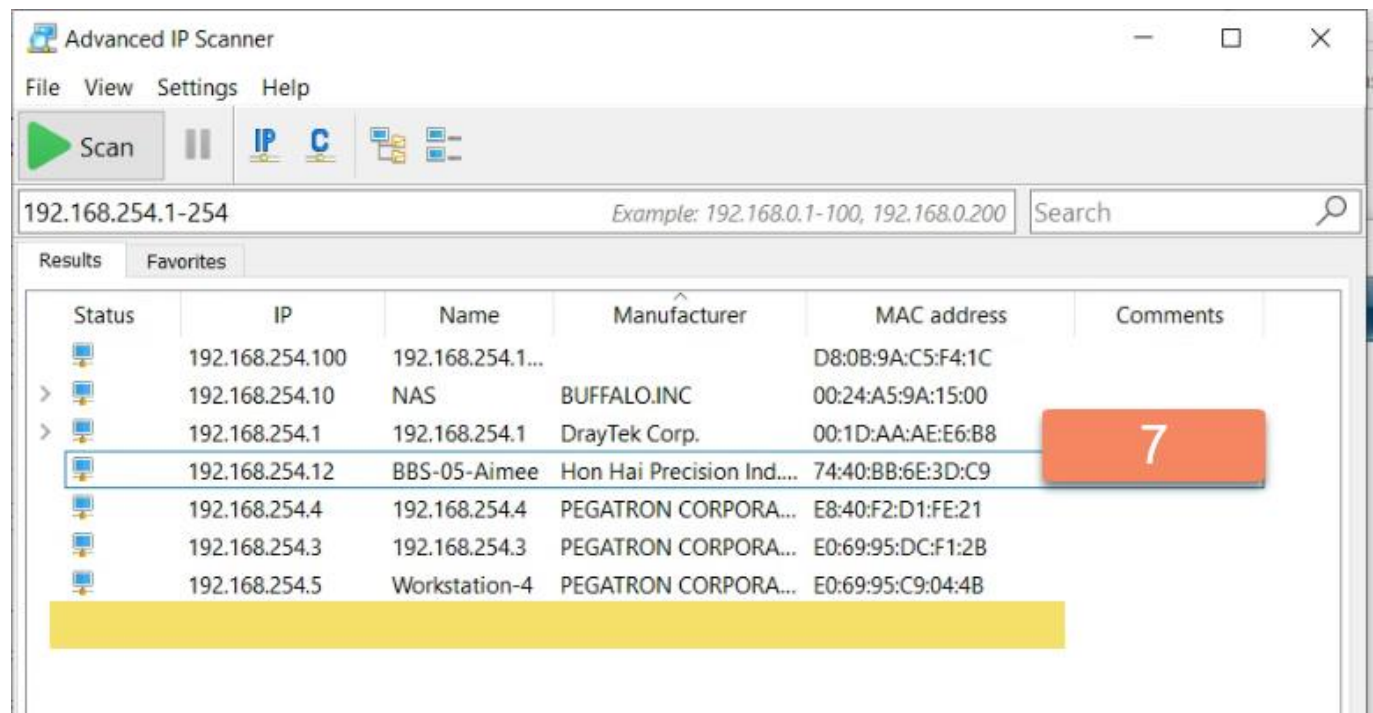
Article III. TASK 3: Diagnostics & Fault resolution

Following an intervention from my practical observer, I have been tasked with resolving a set unknown (to me) fault on the system I have produced.

To begin with, I will do a LAN Advanced IP scan of the network to see if there are any IP Addresses/devices missing. Then depending on that result, it will dictate how I proceed.

Section 3.01 Advanced IP Scan of network to analyse fault source

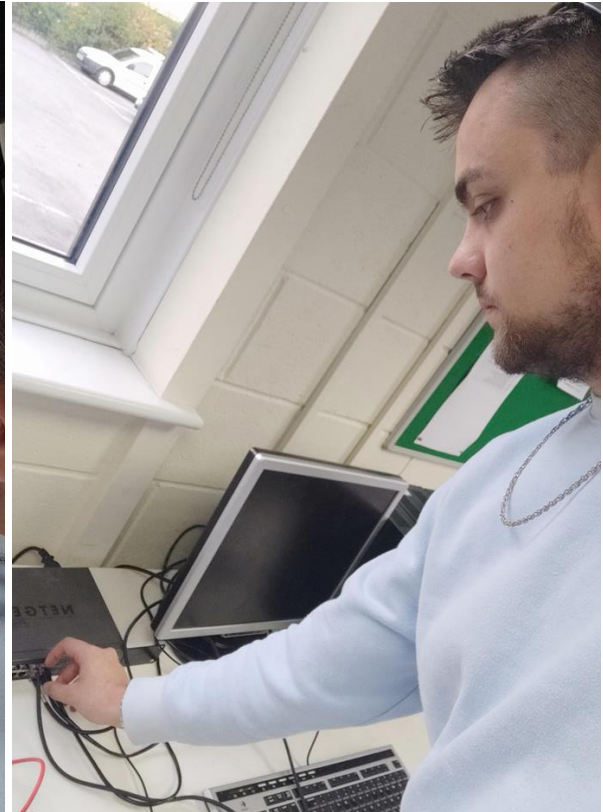
After performing the scan on 192.168.254.12, I notice WORKSTATION-1 is missing, there are only 7/8 devices in comparison to the final advanced IP scan before I handed over TASK 1 & 2 to the P.O.O.



Following this, my initial thoughts are to check the physical hardware to check if the device is on or if the Ethernet cable is fitted securely.

Section 3.02 Checking WORKSTATION-1 Power and Network Hardware

I check that and see the Workstation is still on, I feel around the back and see the Ethernet cable is slightly loose and not clipped into the Ethernet RJ45 port on the Workstation. I plug it in and then trace it to the switch and then see that it is loose on their also, so re-seat the cable in the switch until it also clips into the switch port. This is shown by the photograph below where I am performing this action on both the switch and the Workstation.



With the cables now plugged in both sides I now go to PING the Workstation from the router and 192.168.254.12 to 192.168.254.2.

Section 3.03 PING testing

Upon testing pinging to Workstation-1's IP Address, I can see I got request timed out as per the picture for all 4 attempts my computer made and 5 attempts the router made:

```
Pinging 192.168.254.2 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 192.168.254.2:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss)
```

This leads me to believe the network configuration on the machine was incorrect or that it had been adjusted. That is what I did next.

Diagnostics >> Ping Diagnosis

Ping Diagnosis

☒ IPV4 ☐ IPV6

Note: If you want to ping a LAN PC or you don't want to specify v ping through, please select "Auto".

Ping through:

Ping to:

IP Address:

Result

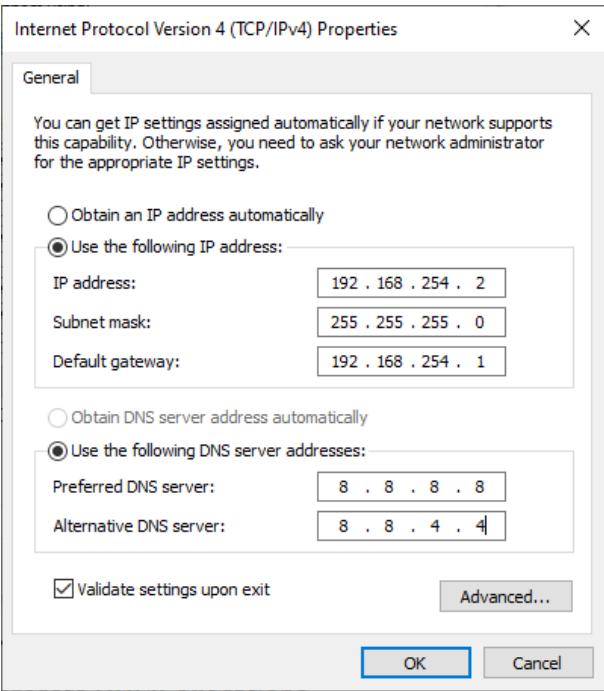
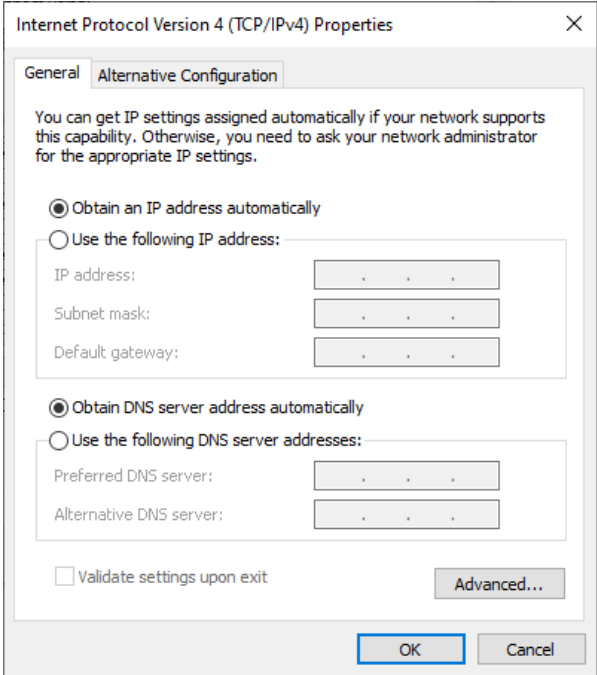
```
Pinging 192.168.254.2 with 64 bytes of Data through LAN
Request timed out !!!
Request timed out !!!
Request timed out !!!
Request timed out !!!
Request timed out !!!
Packets: Sent = 5, Received = 0, Lost = 5 (100% loss)
```

Section 3.04 Reconfiguring network settings on Workstation-1

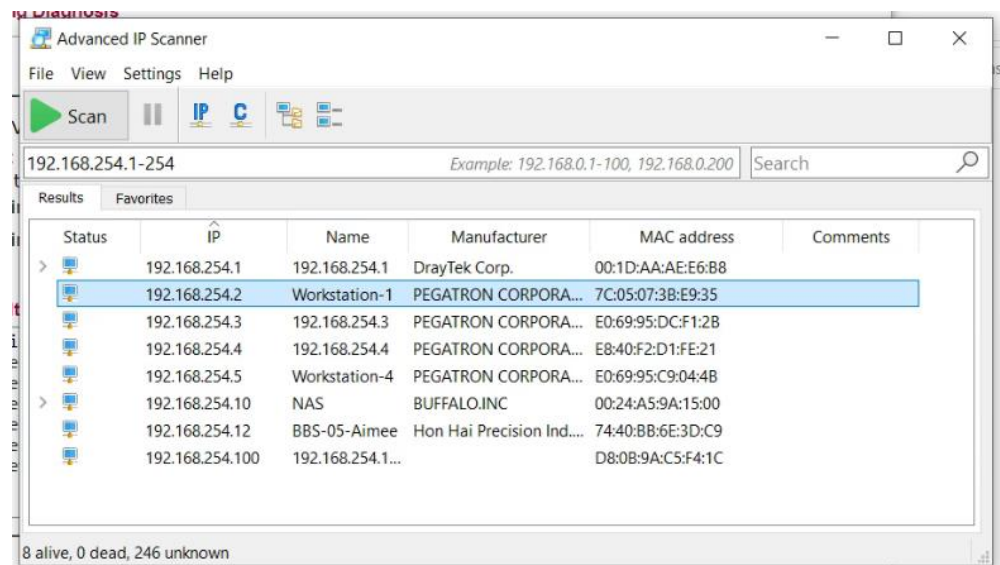
I logged onto the machine to the default administrator account as that has permissions to review and edit the network configuration of the system.

Once logged in I navigated to: **Start Menu > Open Control Panel > Network and Internet > Network and Sharing Centre > Select the Ethernet Adapter > Properties > Scroll down to Internet Protocol Version 4 (TCP/IPv4) > Properties.**

Once in this menu I saw the following was changed.

BEFORE	AFTER
 <p>This will work and connect to the LAN because the IP Address is set statically</p>	 <p>This WONT and DOESN'T work as the computer cannot get an IP Address as DHCP is disabled. Without DHCP, this PC won't get an IP Address automatically.</p>

After reconfiguring the IP Address to be what it was originally as per the BEFORE photo, I now need to test the issue was resolved. A final Advanced IP Scan confirms the machine was back online:



Section 3.05 Testing connectivity

Now the IP Address was set to how it should be and how it was before the intervention, I tested connectivity between the Workstation and the LAN, NAS and the internet.

(a) PING

Using the PING tool again, I tested 3 locations:

- 192.168.254.10 / NAS – NAS
- 192.168.254.1 – Default Gateway / DrayTek 2830n
- Google.com

The results are as follows for each PING:

```
C:\Users\User1>ping google.com

Pinging google.com [172.217.169.14] with 32 bytes of data:
Reply from 172.217.169.14: bytes=32 time=6ms TTL=116
Reply from 172.217.169.14: bytes=32 time=6ms TTL=116
Reply from 172.217.169.14: bytes=32 time=10ms TTL=116
Reply from 172.217.169.14: bytes=32 time=6ms TTL=116

Ping statistics for 172.217.169.14:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 6ms, Maximum = 10ms, Average = 7ms

C:\Users\User1>ping NAS

Pinging NAS.local [192.168.254.10] with 32 bytes of data:
Reply from 192.168.254.10: bytes=32 time<1ms TTL=64
Reply from 192.168.254.10: bytes=32 time<1ms TTL=64
Reply from 192.168.254.10: bytes=32 time<1ms TTL=64
Reply from 192.168.254.10: bytes=32 time<1ms TTL=64

Ping statistics for 192.168.254.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\User1>ping 192.168.254.1

Pinging 192.168.254.1 with 32 bytes of data:
Reply from 192.168.254.1: bytes=32 time=1ms TTL=255
Reply from 192.168.254.1: bytes=32 time<1ms TTL=255
Reply from 192.168.254.1: bytes=32 time<1ms TTL=255
Reply from 192.168.254.1: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.254.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

This shows a 100% connection success rate to all addresses, indicating the connectivity is restored, but it is key to sanity check other aspects to confirm completely the resolution is effective and correct.

(b) IPCONFIG /ALL

Below are the successful connection results to my static IP configuration changes to WORKSTATION-1:

```
C:\windows\system32>ipconfig /all

Windows IP Configuration

Host Name . . . . . : Workstation-1
Primary Dns Suffix . . . . . :
Node Type . . . . . : Mixed
IP Routing Enabled. . . . . : No
WINS Proxy Enabled. . . . . : No

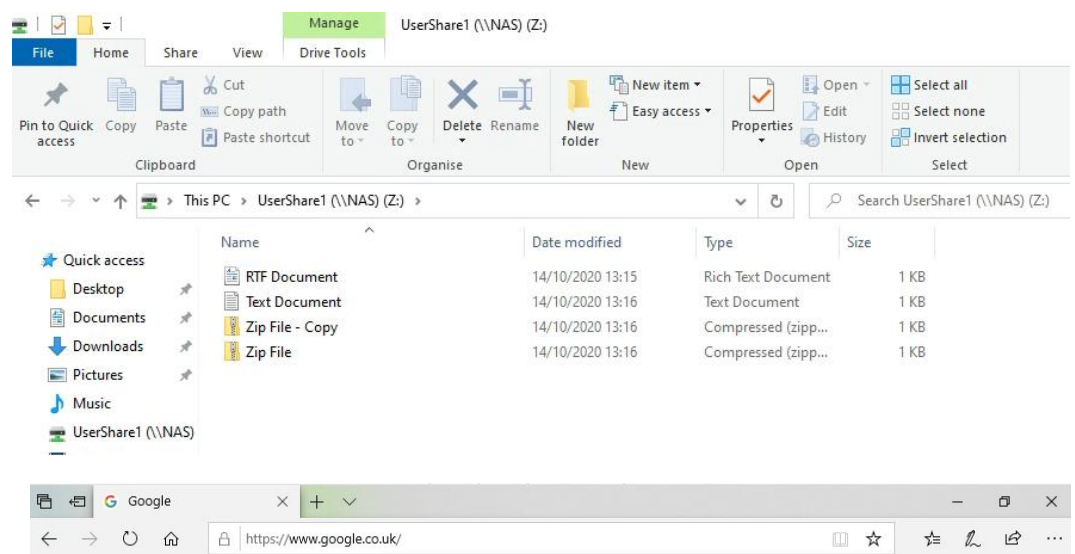
Ethernet adapter Ethernet:

Connection-specific DNS Suffix . :
Description . . . . . : Intel(R) 82579V Gigabit Network connection
Physical Address. . . . . : 7C-05-07-3B-E9-35
DHCP Enabled. . . . . : No
Autoconfiguration Enabled . . . . : Yes
Link-local IPv6 Address . . . . . : fe80::68f0:881:9960:8905%8(Preferred)
IPv4 Address. . . . . : 192.168.254.2(Preferred)
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.254.1
DHCPv6 IAID . . . . . : 108791047
DHCPv6 Client DUID. . . . . : 00-01-00-01-27-0F-F0-B7-7C-05-07-3B-E9-35
DNS Servers . . . . . : 8.8.8.8
                        8.8.4.4
NetBIOS over Tcpip. . . . . : Enabled
```

(c) NAS

Browsing/Access

As shown in the picture, I have successfully opened User1's NAS UserShare1 share after reconnecting the system to the LAN:



(d) Internet access

Finally, I have confirmed browsing the web is working by visiting Google.com as shown:



Section 3.06 Resolution analysis summary – Switch, Router, Ethernet cables

Following my complete analysis and resolution of the issue I discovered, I have checked the cabling and configuration on the Workstation to resolve the problem of it not being connected correctly to the LAN using a wide range of tools and technical knowledge.

Article IV. Closing Statement

Following completion of TASKS 1, 2 and 3. I am writing to confirm that I believe I have correctly covered all aspects required from the proposed scenario, and that I have proceeded with my planning document from TASK 1 accurately and precisely in TASK 2 without any technical difficulties withholding me from proceeding with my original plan shown in TASK 1.

As for my proposed deadlines at the beginning of the document, I have accurately followed them to the letter, they were initially rough predictions, but in the end, they were 100% accurate.

TASK 3 was the only technical issue I faced and resolved promptly, while tracking and noting my resolution steps accurately and concisely, with sufficient evidence to provide enough leverage to qualify this synoptic project to be viewed as the required standard to pass the project.

Here is the final ARP Cache table of the devices:

IP Address	MAC Address	Netbios Name	Interface
S192.168.254.2	7C-05-07-3B-E9-35	WORKSTATION-1	LAN1
S192.168.254.3	E0-69-95-DC-F1-2B		LAN1
S192.168.254.4	E8-40-F2-D1-FE-21		LAN1
S192.168.254.5	E0-69-95-C9-04-4B	WORKSTATION-4	LAN1
S192.168.254.6	E8-03-9A-EC-9C-DA	WORKSTATION-5	LAN1
S192.168.254.7	50-B7-C3-27-E2-DF		LAN1
S192.168.254.10	00-24-A5-9A-15-00	NAS	LAN1
S192.168.254.12	74-40-BB-6E-3D-C9	BBS-05-AIMEE	LAN1
S192.168.254.100	D8-0B-9A-C5-F4-1C		LAN1

Thank you for reading.

Reece Small