**In-depth home broadband troubleshooting**

**Troubleshooting should be carried out using a personal device where possible**. CCC’s Global Protect gateway has a marginal impact on network performance. When it comes to in depth technical investigation from a broadband supplier/ISP, they will require evidence based on personal devices. Screenshots should be taken as evidence prior to engagement with ISP technical support. Where possible, the evidence should be collated over a matter of days/weeks to eliminate any infrastructure upgrade works going on in your area.

Once a potential connectivity issue has been identified, the links above should be used to identify and address the following problem areas:

1. Home network speed/performance issues, such as:
	1. Device distance from hub/router.
		1. Number of walls between device and hub/router? There can be between 5-10Mbps reduction between each single brick wall within the home. Open a technical support dialogue with your Broadband supplier to see if there is scope to upgrade the hub/router and improve the home WiFi infrastructure with WiFi repeater mini hub/discs. This is an example of BT’s HALO 2 Home hub 2 with repeater disc:



They can be hung up on walls using small tacks and use very low amounts of power. They can be set to switch on/off automatically dependent on users’ preferences. Most ISP utilise these extra hardware units to improve home network performance without the need for hardwiring CAT5 cables.

* + - 1. If there is no scope for moving the problematic device closer to the hub/router then you will need to investigate how to run an Ethernet/CAT5 cable to your office space via cable trunking and attic spaces. Telecoms companies can do this work for you and it would be worth discussing with the CCC Digital Connectivity team, to see if any grant funding can be made available to help. Another less favoured option, is to use powerline adapters but this requires some technical ability/assistance to setup and maintain. More detail on powerline adapters can be seen here: <https://youtu.be/3AlPCoxjVq0>
		1. Try a hardwire test by plugging the Ethernet/CAT5 cable directly from the back of the hub/router to the device in question. Reduced dropouts and more reliability may indicate that there are too many devices connected at one time and the use of powerline adaptors may be beneficial. See here how to connect you Ethernet/CAT5 cable: [How to Hook Up an Ethernet Cable to a Desktop? : Computers & Tech Tips - Bing video](https://www.bing.com/videos/search?q=how+to+plug+in+an+ethernet+cable+to+my+laptip+youtube&docid=608006102289350875&mid=4E3CF7D46C06E0E3123D4E3CF7D46C06E0E3123D&view=detail&FORM=VIRE)

Most CCC Laptops will connect via a docking hub like this:



The Ethernet cable must be connected via this docking hub as most modern laptops do not have CAT5/Ethernet adapters anymore.

* 1. This section is aimed more at dropouts on the home network. This is where you are working and suddenly you get warning messages that Outlook/TEAMS is not connecting, and/or OneDrive is unable to synchronise. This is mainly caused by the number of devices connecting via WiFi (running games consoles and TV streaming services along with work laptops, will have a detrimental impact on connection performance). The main problems identified with too many data intensive devices are connection dropouts.
		1. Do you experience better connection performance whilst all other devices are off?
			1. Are the other devices causing the hub/router to reach maximum permitted connected device levels? Hubs/Routers will disconnect devices that are deemed low usage in the event of maximum permitted level being exceeded. You should follow your ISP’s support pages for more information regarding this control process. You can block certain devices at certain times of day to improve performance during core working hours.
			2. Hub/Router hardware will inevitably reach end of life quicker if they are being worked hard through managing many devices all the time. Hardwiring games consoles can reduce hardware fatigue, but only ISP Technical support can figure out if their hubs/router is under performing and supply you with a new one.
		2. Are the other devices connecting within the communication radius of your work device and hub/router?
			1. Is it possible to utilise an Ethernet/CAT5 line and/or Powerline adapters to the games consoles to eliminate the extra WiFi resource required?
			2. Can your ISP send some WiFi repeater mini hub/discs to balance the loading on your home network infrastructure?
1. Liaising with the broadband supplier will often resolve any connection deficiencies. Their technical support processes should be able to identify if you require an upgraded hub/router, extra repeater discs/mini hubs or an upgraded package.
	1. Do you feel like you have exhausted all options with your existing broadband supplier?
		1. Are you still in contract? Have you researched what other ISP’s can provide?
2. After the above has been exhausted with the ISP’s and home networking scenarios have been corrected, this is the time to approach the helpdesk via self-service to identify any CCC networking issues. CCC ICT Self-service can be accessed here: [CCC ICT Corporate Self Service (gov.wales)](https://ictselfservice.carmarthenshire.gov.wales/production/Portal.aspx)

According to thinkbroadband.com ([Browse Maps and Check Broadband Performance and Coverage Across the UK (thinkbroadband.com)](https://labs.thinkbroadband.com/local/broadband-map#10/51.9256/-4.0402/balquhidder/box/zoominternet/gigafast/glide/ecom/gigaclear/ifnl/b4rn/vfm/community/countyfibre/fibrenest/fibrefirst/grain/spectrum/gnetwork/fullfibre/fwnetworks/pinemedia/zzoomm/exascale/fibrus/internetty/lila/youfibre/toob/wightfttp/technological/pure/tove/herefordshire/hampshire/raveningham/ridgehill/myfi/trooli/truespeed/its/farn/callflow/relishswindon/relishfibre/wessexfibre/wessexwireless/airband/lothian/quickline/boundless/county/hiwifi/itswisp/kijoma/reeth/ruralcomms/solway/sws/virair/voneus/wildanet/greenco/), Wales has a 95.6% coverage of ‘Superfast 30Mbps and or faster’. Helpdesk need to concentrate their efforts on identifying the 4.4% of connections that fall outside of that scope and work towards different options, for example 4G Satellite connectivity. There are several telecoms suppliers in the area and there are grant options available to help with installation costs. Details on these options can be discussed with the CCC Digital Connectivity Officer when this stage is reached in the troubleshooting.

**Working example**

The following is a working example of how to test the different scenarios outlined above. Tests carried out on an early 2000’s 3 bed bungalow, utilising BT’s Superfast 1 option for 150Mbps ‘Fibre To The Premises’ (FTTP) connection. WiFi data connection is delivered via the Halo 2 hub with 1 x repeater disc due to initial problems with dropouts due to high numbers of devices connected. Typical end of day can have 2 x CCC Lenovo Thinkpad laptops, 1 x Nintendo Switch, 1 x XBOX OneS, 1 x Apple 12 Pro phone, 3 x Samsung Android phones with 2 x ROKU TV streaming services. The following testing processes were carried out in line with BT Technical Support to identify root causes of the dropouts.

Hardwired non CCC laptop test returns speed at:



Children arrive home from school, have tea then go online for an hour to play games with their friends before supper and homework. Slowdown of network performance already felt with glitchy TEAMS screens during calls and patchy sound. Ookla.com speed test via Android device clearly shows slowdown.

Before children go online gaming:



After children start online gaming:



A significant drop in performance but connections remain stable. 1 x ROKU TV streaming comes online, and 1 x Samsung Android phone goes on TEAMS to check child’s school assignments:



Again, another significant drop was experienced and the quality of video/sound on TEAMS was fully apparent and included dropouts.

After Technical support discussions, it became clear that the Halo 2 hub was not sufficient for the requirement expected, so a repeater disc was dispatched, and it has corrected the issue. Nintendo Switch and XBOX One S were hardwired via the attic voids and further increased WiFi performance.

Under the same loading scenario, the network now performs as follows and is within acceptable range again:



This working example is based on one of the better performing packages available due to the local Fibre Broadband infrastructure. It proves that different home networking scenarios can have a major impact on performance. The more popular 67Mbps Broadband packages will have far more problems based on this working example and shows how quickly performance can be compromised.

This document is intended as a guide to ensure users do not lose time in the CCC Helpdesk queues regarding issues that the Helpdesk officers will not be able to rectify.

The following flow chart should be used to aid the end-to-end process from issue identified to issue to be passed to CCC ICT Helpdesk self-service.

