FOREST
ECONOMIC PARTNERSHIP
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HOW FAST AND HOW GOOD IS YOUR BROADBAND 2020?

Universal Service Obligation for Everywhere But Rural: The Broadband Barriers to Building Back Better

DIGITAL CONNECTIVITY SUB-GROUP, FOREST ECONOMIC PARTNERSHIP

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How Fast How Good is Your Broadband Summary

Last year FEP raised concerns about the debate is often had about rural broadband catching up to an existing average which is significantly behind what is attainable in the urban setting.

This year our survey and Ofcom's May data shows how far behind rural households are to the Universal Service Obligation which came in March. 50% of our sample and 19% of the Ofcom rural sample do not receive a 10Mbps download speed. This is a significant gap. Much bigger than the 2% target.

The How Fast How Good is Your Broadband2 (HFHGB2) survey updates responses in the Forest of Dean District against the current national averages (urban and rural) provided by Ofcom. It covers all technology types except cable which is available to half the UK but not the District. The faster technologies are available to some but not all in the district as a result of the Fastershire programme of infrastructure upgrades.

Consumer uptake of the newer technologies is evident. Why more households do not upgrade is a puzzle. Partly it is the confusion of technology; partly the perception of previous promises being broken and partly consumer inertia- it is the responsibility of the provider to supply a fast service as standard eg meeting USO. In rural areas, are deprived households likely to rely on ADSL2 so is lack of update due to poverty?

HFHGB2 also measures those responses against the rural opportunities where better than average fits the emerging needs of Industry 4.0 and the Smart economy; and the desire for better work-life balance; the need to maintain landscapes and natural resources; and opportunity to exploit rural's role in the City Region/powerhouse models.

When the retired respondents are excluded from the sample, 81% of respondents were using their broadband for business purposes. On the same basis this is down from last year's 91%. This year the mean average use is up to 42.6% of the time. Broadband at home is a fundamental of rural business. With so many not meeting the USO minimum this is a critical issue. Especially when USO allows for planned delays of up to 3 years from the initial complaint to remedy.

Ofcom shows that while the average download in the UK is 71.8Mbps in 2020. This appears to be driven by more people accessing Fibre to the Cabinet (FTTC) lines. Nationally FTTC have seen no increase in download performance since 2019. 9% of households fail to achieve USO download speeds of 10Mbps. 63% have a download speed in excess of 30Mbps.

It states that 2% or 590,000 homes do not get 'decent broadband'. If decent is USO then this is 2.7M homes of which over two thirds are rural because 19% rural v 10% urban don't achieve USO downloads.

HFHGB's 151 respondents had on average a download speed of 18.2Mbps and a median of 9.4. FTTP, FTTC and wireless all achieved averages in medians above USO but ADSL lines averaged 5.1Mbps and median 4.3.

The national average upload speed is shown at 14.2Mbps. Overall HFHGB achieves a mean of 4.75Mbps and a median of 0.9. But 55% of the sample did not receive a USO compliant 1Mbps upload speed. The solution could be technological by switching to a better network or for some it may be improvements in practice and internal wiring. Either way with a world increasingly image-based a less than 1Mbps upload is painfully slow.

Latency in a data-centric world will become increasingly important to make secure decisions in real-time. Nationally ADSL delivers latencies in the 20-30ms range and other services 10-20ms. HFHGB has a mean average 80ms and median of 37ms. This is markedly faster than last year as an average. What is worrying is the steepness of the curve to slower speed after the 50ms line is cross with groups suffering at the 250-350ms mark and 400-450 mark. The ADSL responses average 114ms (median 50ms). Latency impacts significantly on productivity. Voice-based search relies on low latency levels to operate effectively. Nationally

and locally latency has large ranges and variations from the mean for ADSL lines which is also shown on our data.

Nationally no data was collected on satisfaction by Ofcom. Overall HFHGB respondents are somewhat dissatisfied on a 5-point scale and are as a group more satisfied than last year. 38% were highly dissatisfied and 21% somewhat dissatisfied. Some of these are stuck on non-performing ADSL lines. Others have upgrade to FTTC but are still not getting the performance they sought. For some this is simply a faster speed at the hub then being divided amongst more populous households all with multiple devices. For others the technical solution is outside the home and simply the extended distance to the cabinet over copper wire.

If a download speed of 20MBps can be achieved then the consumer is more likely to have a neutral satisfaction level. Upload and latency have less direct correlations with satisfaction. When satisfaction is broken down by technology types, the role of key perceptual anchors is revealed. We need something to compare against. So, if you are on an ADSL line and have a download speed of less than 8Mbps you are likely to be highly dissatisfied but might achieve a neutral view at 12-14Mbps. If FTTC Fast then you'd need a speed of at least 24Mbps as you have probably already experienced ADSL and are paying a premium for FTTC.

76 respondents also answered the 2019 survey. For this group overall the situation has improved. This is because 16 have switched to higher technology services while the 16 worse off were already on those services and saw a 5Mbps fall in download speeds at the time of survey. This underlines the clear message that the consumer needs knowledge as to their choice of services to meet their price and usage expectations. Simply providing technology is not sufficient.

FEP is focused on enabling practical improvements to broadband through 3 approaches:

1. Continuing to work with partners to facilitate the technological fix. While some are happy with ADSL performance; most are not. Across the district ADSL needs to be optimised to deliver its maximum performance where such performance meets the USO. For others fibre and wireless are the only option to achieve the speeds they want below ultrafast. This requires communities working together to understand real benefits which result from speed.
2. Beginning to unpick issues of perception and knowledge. Our focus is on practical useful broadband working at the current optimum performance for the technology used. As consumers we use available tools to measure for ourselves performance. For broadband, speed checkers are that tool and typically use wifi from a device. Work needs to be down to reduce the internal problems that reduce performance.
3. Leading on the reality of rural broadband through succeeding surveys. While this survey shows mean average improvements within the district over last year; it also highlights again the potential yawning chasm between urban and rural services and the impact that will have on broadband used at home for business purposes.

1. Introduction

In 2019, FEP produced its first report on rural broadband in the District of the Forest of Dean. This highlighted the dangers of talking about rural broadband in terms of catching up to an existing average, often based on what is attainable in the urban setting. A clear example of this would be the performance levels shown achievable on cable through Virgin Media. If like this district, you are not served because Virgin does not deliver in your area, then cable is not a solution. Much of the district like many rural areas is still mainly served by ADSL. This limits the speeds achievable. Last year nationally on ADSL lines urban areas achieved according to Ofcom average download speeds of 11.9Mbps and rural 7.2Mbps. The district in 2019 achieved an average of 5.6Mbps on lines assumed to be ADSL.

This year we asked respondents to identify the type of service they used so that we could distinguish between Fibre to the Premises (FTTP), Fibre to the Cabinet (FTTC) in two variants (Superfast and Fast), regular broadband (ADSL) and wireless. From the responses it is clear that some respondents were unclear as to which service they were on as evidenced by their speeds. This is in part because the providers call their services slightly different things and may use the same term for different performance levels. Where possible we have unpicked this confusion through the combination of speed and provider. Another reason may be that the respondent was not necessarily the main bill payer and therefore not fully aware of the specific service purchased.

What is clear is that with the exception of whitespots, of which there are numerous small clusters, many households now have some choice of technology to resolve their broadband speed if it is seen to be a problem. That option however comes at a financial cost. It is inhibited by consumer confusion as to what are the best or available options.

A key issue here is a national focus on ultra-fast, superfast and ever higher descriptors which serve to draw overall mean averages higher and may distort analysis. Hence why we also quote the median or middle value in the sample and the range. FEP's focus is upon the norm faced by the district not an arithmetic mean average skewed upwards by the few able to access full fibre today.

The UK Government (pre-Covid) pledged to extend superfast broadband networks to cover at least 97% of the UK by March 2020 and commenced its Universal Service Obligation (USO) with a minimum download speed of 10Mbps and upload of 1Mbps for all. It also wants gigabit full fibre to cover 10M premises by 2022. While there is good news for the District on the latter through the Fastershire deployment of Gigaclear contracts and previous FTTC work; on the former a significant number of rural households are failing to achieve the USO. This proportion for the district is worse than the national rural 19% of the May 2020 Ofcom update who are below the USO. These are people who need the basic service today; not two years hence.

In this second report half of the respondents are drawn from the first survey and half are new respondents. Together the 151 respondents cover much of the district geographically and provide information on all types of broadband available in the area. We have been able to link data from this survey with the previous survey respondents to understand what might have changed in the interim. In any aspect of the virtual world it is impossible to provide the definitive answer.

It is also important to understand that samples are drawn for different reasons and may not therefore be directly comparable. Use has been made of the May dataset provided by Ofcom and their interim report. Their full report is not due until December 2020 where we hope there is comparative analysis on rural performance not commented on in May. Their data is gathered through specially modified routers from SamKnows and monitor speeds constantly over a given period. They also know what type of broadband is used from a sample drawn to measure comparative brand performance and delivery for specific uses. This skews their sample away from rural and lower technologies such as ADSL. Indeed, in our sample there are

more users of wireless services than in Ofcom's sample for the rural South West. It is typically the May Ofcom data that we refer to when making national or South West comparisons.

2 The Relevant Contexts

The results of the How Fast How Good2 is your broadband (HFHGB2) survey need to be considered first in context of the Universal Service Obligation, national performance, local technological upgrades and rurality.

2.1 Universal Service Obligation

In March 2020, the USO became live. Under this obligation every household should expect to have:

1. A download speed of 10Mbps or higher and an upload of more than 1Mbps. In the event that the service is less than either of these, the customer can request that their service is reviewed so that it complies with these norms.
2. If the cost of the upgrade is £3,400 or less then it is free of charge to the user. Over that amount then the excess is paid by the user.
3. To be upgradeable the area must not be subject to already planned upgrades.
4. Openreach or other providers have 60 days to respond with a quote.
5. Then the work can be completed in 12 or 24 months.

From the advice on Ofcom's website it appears that USO is firmly weighted towards the provider rather than the consumer. Let's take each of the criteria in turn. For the first the key question is how and when are the speeds measured. For our survey, we use a speed checker from the hub. Networks will use a speed checker to the hub. Badly placed hubs reduce the attainable speeds so quite rightly some households will be rejected because they have not optimised the location of the hub. But others will be caught by a higher service level which takes the service marginally over on the average speeds in a 24-hour period. If the network review shows USO is achieved then the consumer needs to actively look at alternative solutions such as other providers for the same or higher levels of service or internal optimisation.

The second step is weighted towards urban settings where the upgrade cost is more likely to be less than £3,400 by simple proximity to networks and faster solutions. The exception to this is where the existing network based on old infrastructure has not connected all the properties in a town setting and that upgrade is required first. For rural settings, the simplest way to delay anything proceeding is for the provider to quote a silly price for the work at the outset. This silly quote can appear logical given the distances that need to be covered shared by fewer households and given most people have no benchmark to judge the cost by. See FEP's Hewelsfield case study for an example.

Areas proposed for upgrade is something of a moveable feast and often has blanket coverage of an area. An area may be identified as being in need, but the actual technological solution may not be known, as that part of the process has not been started. So, an area might be zoned for an update but with technology and build date unknown as it is possible that it may start any time in the next two years. This is not very useful to the household with poor broadband.

Openreach has sixty days to respond with a quote after all the other steps have been taken. This is not 60 days from the problem being identified. For most properties Openreach is still the main first option. Where other providers wish to quote, they are still typically reliant on access to Openreach infrastructure and therefore precise information. Numerous media stories show that this is not the easiest or timeliest thing to achieve. Again, the potential rewards of the customer density of urban areas outside of rural districts make it easier to achieve this step.

Network upgrades are considerable pieces of work. They take time. But 24 months for completion when the first stage could easily have taken 6 to 12 months to achieve is a significant delay. Planning and access may be lengthier in urban areas on this than rural, but if the backbone technology is laid in urban then it is easier to connect simply. For rural areas that backbone such as FTTC still needs to be laid for many excluded pockets. The time is exacerbated by patchy mobile 4G coverage which might provide a faster option or the benefits of 5G due for most rural areas in the second half of the 2020's. Just by considering the technological changes in the last 5 years shows how much wider the gap will become between rural and urban.

2.2 The National Context and Technology Skew

At present fixed line "*superfast broadband*" (24Mbps+) networks are available to around 96% of the UK, which is mostly via hybrid fibre such as the FTTC of Openreach or cable EuroDOCSIS technology. Cable covers over 50% of the UK. A very few are within reach of ultrafast over 100Mbps typically delivered by cable and by FTTP. The latter covers 7% of UK premises. However, despite the wide coverage of superfast services, around 35% of the UK still takes slower and less reliable pure copper ADSL2+ (up to 20Mbps) lines. This drags the Ofcom overall results down. The take-up of faster connections should improve over time, but some people are also discouraged by issues of cost of faster connections, a lack of awareness or personal need and existing contract terms.

In Ofcom's 2019 Connected Nations report, Ofcom uses an alternative method of taking the technical data provided to ISPs as the speeds possible to that premise. This calculates higher performance speed as it does not allow for speed attenuation within the premises such as through internal wiring. But, this adds confusion to the situation for the end-user as figures from speed checkers never tally with the 'possible' figure.

Any discussion of broadband can become quickly mired in technology discussions. These often focus on the performance of a technical solution rather than the experience of individuals, unaware of technical differences, who complain ardently of poor speed. Ofcom research shows that average download speeds in rural areas can be less than half those in urban areas. The Broadband Performance 2018 Report explained that some of this is due to technology:

"*A characteristic of the copper technologies used to deliver ADSL and FTTC broadband is that speeds slow down due to attenuation over the length of the copper over which data travels. With ADSL, data travels over copper all the way from the local exchange to the end user's premises, whereas with FTTC copper is only used from the street cabinet to the end-user. As ADSL copper lines tend to be shorter in urban areas than in rural ones (where population density is lower), urban lines tend to perform better than those in rural areas.*

For ADSL connections, the average 24-hour download speed in urban areas (11.9 Mbps) was 65% higher than the 7.2 Mbps average in rural areas. There is less variation in the length of copper line from the street cabinet to the user's premises, and we found that average FTTC download speeds in rural areas (43.8Mbps) were in line with those in urban areas (47.8Mbps). Most rural ADSL customers who upgrade to FTTC will experience a significant increase in performance, and average FTTC download speeds were around six times faster than ADSL average download speeds in rural areas in 2018."

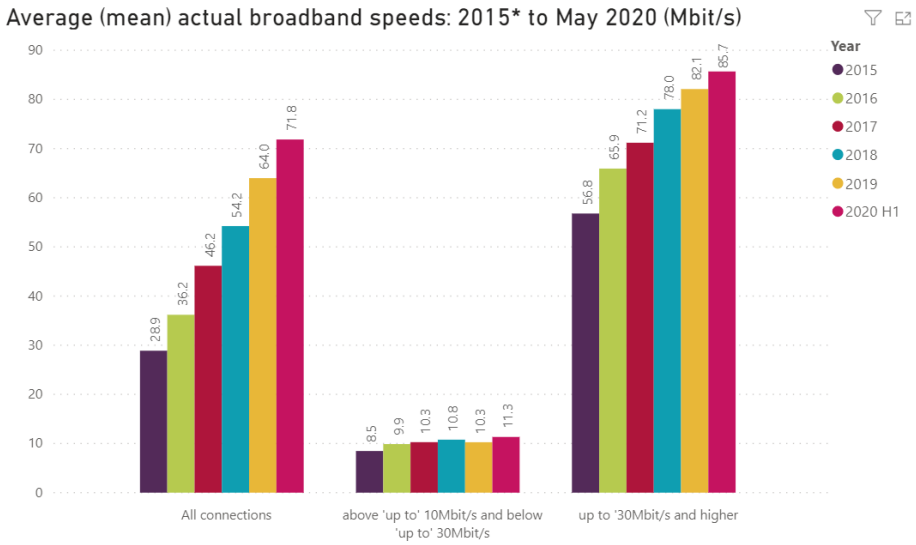
So, the choice is therefore seen to be a purely technical-economic one. This assumes consumers understand the issues and choose logically. From this year's and last year's FEP study, they don't with many confused by the choice and the real potential locally.

2.3 National Download Speeds

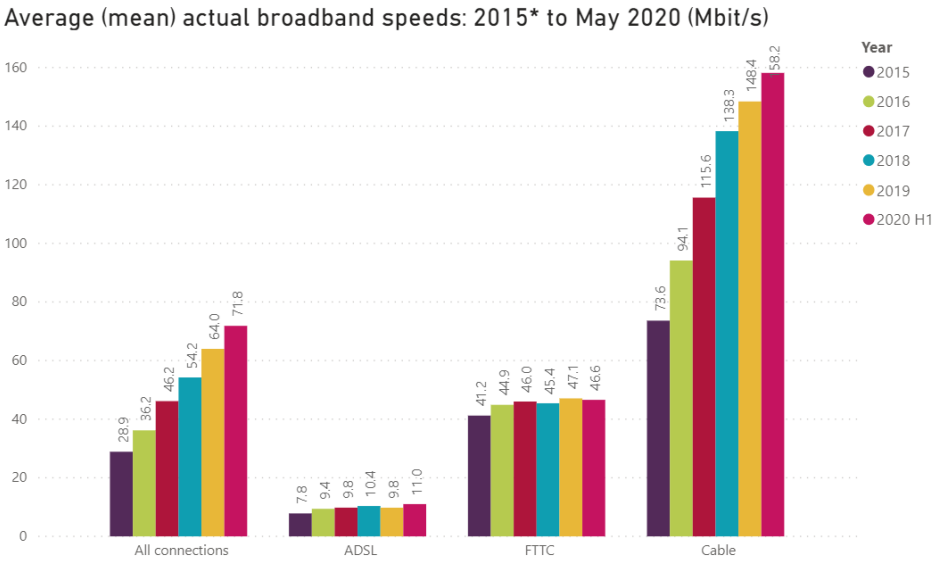
Ofcom's May update does not focus on geography and while the dataset is supplied, it is not possible to compute a national picture by applying the weightings given to provide this rural data. This section therefore

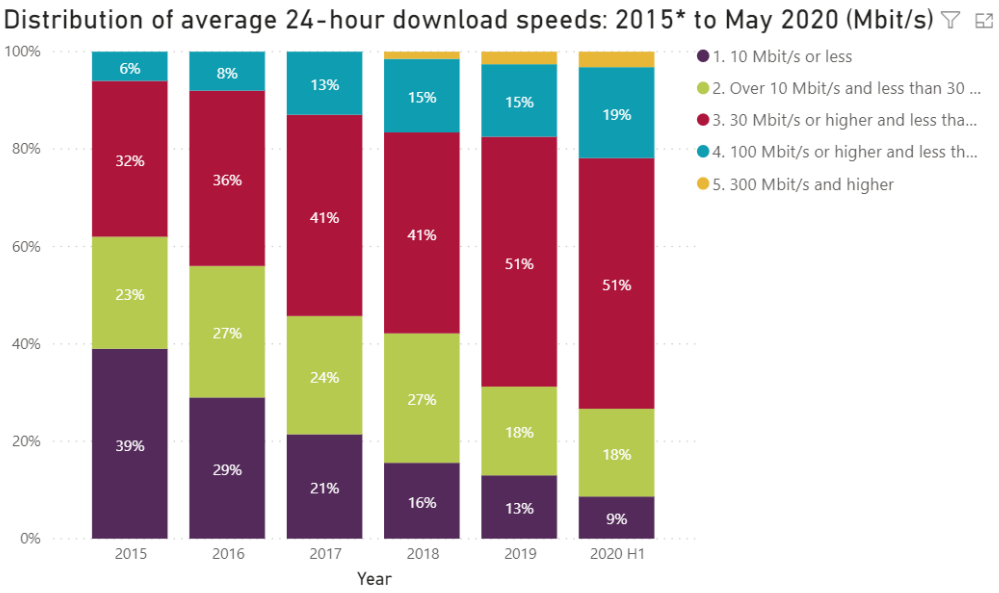
is predominantly about performance in the whole of the UK regardless of location and therefore has an urban skew.

The mean average download speed in the UK has increased to 71.8Mbps from 64 Mbps in 2019. This is not due to a significant technological change. The increase in broadband technologies in excess of 30Mbps has moved on average from 82.1 to 85.7Mbps download. The overall change is the result of more people accessing and paying for higher speeds accessible through FTTC and many superfast services. The year-on-year improvement for fast services that might use FTTC is negligible comparing 2020 to 2018 and just above the compliance figure. Indeed, after March 2020 providers were still happy to quote below 10Mbps guaranteed minimum download performance for so-called fast and superfast services.



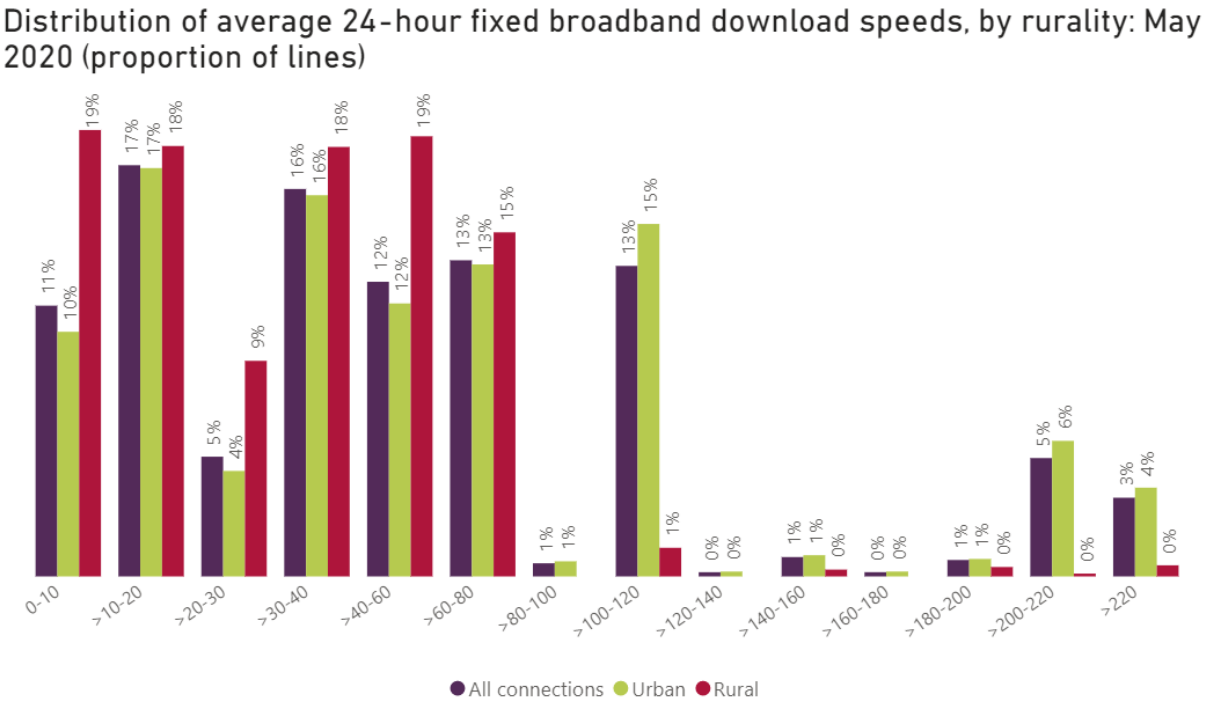
The second chart splits out the national mean average download speeds by technology averaging the performance over the time period. FTTC has declined marginally to 46.6Mbps. This can be in part as more people use and share the bandwidth there is a decline in individual performance. Perhaps more significant is the 11MBbps mean average download for ADSL when it is remembered that urban performance draws this average up with predominantly ADSL2+ lines. On ADSL2+ urban has an average download of 11.7Mbps with a high degree of confidence. Rural achieves on ADSL2+ an average of 10.6Mbps with a much larger confidence interval at 95%- in other words a much larger range of values.





Ofcom estimates that 80% of homes have a fixed broadband service. Wireless services are in addition to this. 67% of users were on superfast more than 30Mbps download services. 27% of consumers are on speeds of less than 30Mbps. While 2% could not get 'decent broadband' or 590,000 homes spread through the UK.

From Ofcom data, 9% of the UK does not achieve over a 24-hour period the 10Mbps download speed required by the Universal Service Obligation, if taken as a simple guarantee. FEP believes that the bar for 'decent broadband' should be the same as the USO. So, based on the above 2%, is in reality 2.7M homes. A further 18% achieve over 10Mbps but below 30Mbps. From the previous data, many of these will be just above the 10Mbps rather than being close to the 30Mbps. This is significant when the number of users in a household is considered, all of whom are sharing (and dividing) that download speed. The combination of a Netflix watcher, a gamer and a social media surfer soon devours 10Mbps download and needs 30Mbps.

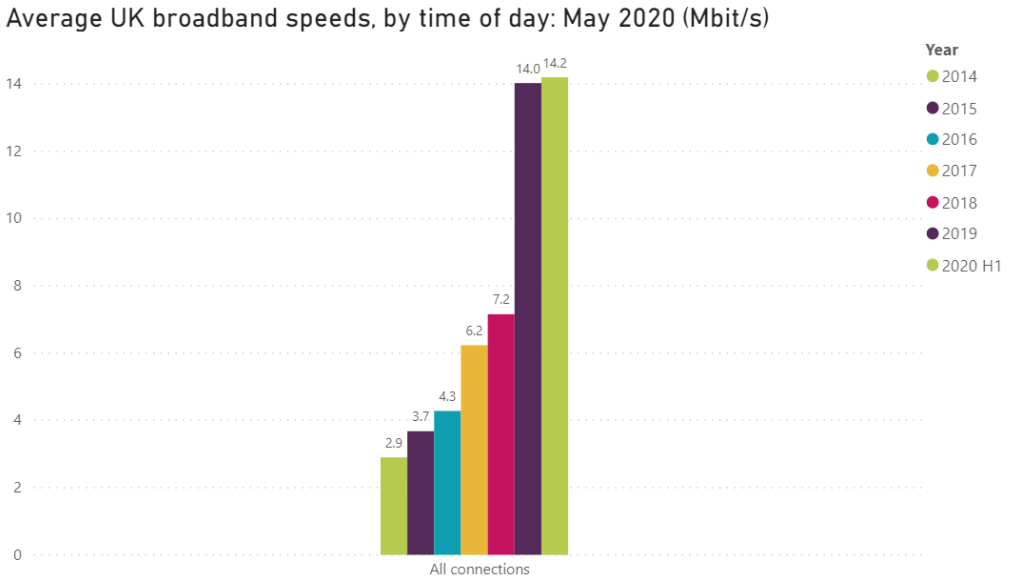


On the above data for May only which is split between urban and rural, the scale of the problem becomes clear. 10% of urban broadband users have an average download speed of up to 10Mbps. For rural, this is 19%. Almost one in five rural broadband users fail to meet the USO! As one member of FEP's Digital Connectivity subgroup asked, does the 'U' stand for Urban rather than Universal?

46% of rural broadband household users have a lower than 30Mbps download speed v 31% urban. Only 1% of rural households can achieve a 100Mbps download speed nationally. This Ofcom data set demonstrates a broadening gap between rural and urban at just the time when there is an acceleration of home-buying in rural areas given new freedoms on home-working and the realities of urban living.

2.4 National Upload Speeds

Nationally upload speed are little changed from last year at a mean average of 14.2 Mbps upload. Given that this had doubled between 2018 and 2019, this consolidation might be expected. Again, the caveat here is being able to use the technologies that give these speeds. If the household is 2 miles from the cabinet on copper wire, even a superfast service would struggle to give these types of upload speed.



2.5 National Latency Levels

The third factor of interest is latency. This is a useful measure of the time (delay in milliseconds) that it takes for a packet of data to travel from your router to a remote server and then back again (ping). A lower number (shortest time = faster) here is better. This is particularly important for fans of online multiplayer games, where a low ping can result in smoother gameplay. Most modern connections should deliver good latency performance, unless there's a problem within the providers own network, local network setup or a remote internet server.

Overall ADSL2+ typically deliver latencies of 20-30ms and other services typically 10-20ms at the national level. FTTP is the fastest with a stable latency of around 5-10ms. All broadband services suffer from contention (when networks become congested in busy periods). This can impact on latency at peak time but such network congestion can be localised.

2.6 The Local Technology Context

At the time of this report, the Fastershire website showed the following information. Fastershire is a partnership between Herefordshire Council and Gloucestershire County Council to bring faster broadband to the two counties, with funding from central government's Broadband Delivery UK matched by the local

authorities. Phase 2 of the project's strategy will increase total superfast coverage to around 98%, as phase 2 seeks to provide faster broadband to premises that were not covered by Phase 1 or commercial rollout.

The Strategy falls in the following phases to provide a technological fix:

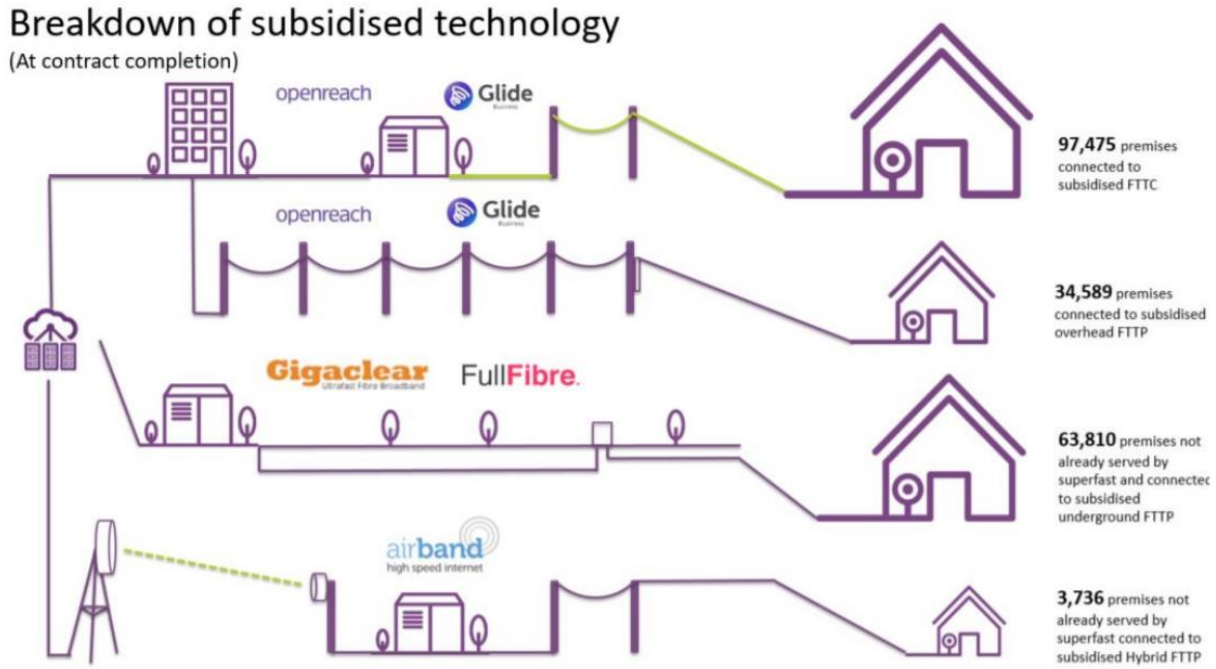
Phase 1 of the Fastershire strategy has provided approximately 90% of the homes and businesses across Herefordshire and Gloucestershire with access to superfast broadband and speeds of 30Mbps or above.

Phase 2, Stage 3 - Rural Herefordshire and Gloucestershire. Gigaclear has been awarded the Fastershire delivery contract for rural areas of the county. Gigaclear is a wholesale network provider and internet service provider (ISP) who specialise in connecting rural communities by installing its pure fibre network straight into the property. Pure fibre, also known as Fibre to the Premise (FTTP) offers a more future-proof solution and broadband speeds of up to 1000Mbps. This technology is not affected by how far your home is from the network cabinet and the connection is symmetric so you get the same upload and download speeds.

Phase 2, Stage 4 For the remaining, hardest to reach properties, Fastershire is using a mix of solutions, including a bespoke grants and contract extensions.

- *Business Grant*. Fastershire, in partnership with Connecting Shropshire and Superfast Telford and part funded by the European Regional Development Fund, have designed the Marches and Gloucestershire Broadband Grant. The grant provides up to 100% of the capital installation cost for an eligible SME that not be included in Fastershire's main rollout and that can demonstrate the economic return.
- *Viable Clusters*. Fastershire has been awarded funding from the European Agricultural Fund for Rural Development (EAFRD) and has identified a number of significant property clusters that could benefit from this funding.
- *Contract Extensions*. For the remaining properties, Fastershire will be exploring possible contract extensions with BT and Gigaclear to provide access to faster broadband.

Below breaks down the volume of premises enabled using Fastershire Subsidy by technology type.



2.7 The Current Rural Context of the District

The Forest of Dean District is officially classified by DEFRA as being 95% rural. Forestry and agriculture have been traditional mainstays of the economy and still employ 6.9% of the workforce. It is one of 2 rural, 2 semi-rural and 2 urban districts in the county of Gloucestershire.

The District borders the counties of Herefordshire and Monmouthshire (and a bit of Worcestershire). Each of these are still predominantly rural and together are the lower half of the historic Marcher counties which formed the protective defensive forgotten buffer between Wales and England. For the District relative isolation was made easier by the rivers Severn and Wye providing natural boundaries and geology creating issues for road-building. Its early use as a Royal Hunting Forest for Anglo Saxon Kings established the beginnings of its tourist trade, now employing 7% of its workforce.

Yet if a visitor looks at the district as a rural place built on agriculture/tourism and solely reliant upon it economically, they would be mistaken as 86% of the workforce are not employed in those sectors.

The Forest has always been a working forest where timber production and silviculture is important. However, 15.9% of its employees are in manufacturing with sites spread across the District in large and local business parks and small individual premises. This is twice the urban national average and 4% higher than the rural national average. And more than those employed in tourism and agriculture combined. 4%, the highest proportion in Gloucestershire, work in transport and storage aka logistics. While education and health & social care make up almost a quarter of the workforce.

The District's 4,300 companies are by ONS categories typically small and medium sized enterprises. But within those companies are niche world-beaters with significant export markets inside and outside the EU. The whole workforce in the District is not just those employed in District-based businesses. With greater work-life flexibility and the opportunities offered by the digital world; it is apparent that a number of managers and specialist staff work from home for a number of days per week. During Lockdown those numbers were swelled and after lockdown are still high with adjustments in work-life balance. This opportunity requires effective broadband to maximise economic efficiency. Industry 4.0 is reliant on effective broadband to deliver its benefits. The District already has a very mixed economy which can integrate effectively with others either as the producer of goods or the designers producing elsewhere.

From discussions within the sub-group and approved by the stakeholder group of 200+ organisations, FEP sees specific opportunities for the district related to digital connectivity which go beyond mean averages:

- **Smart Rural Leadership**. Much is made of Smart Urban. Often the commentary is about smart cities where the economies of scale and population density enable the deployment of technology that underpins the apps and expected functions. This exactly matches broadband deployment. FEP has previously highlighted the growing gap between urban and rural and creation of diverging twin track economies and technology. FEP seeks to fill this leadership void through collaborating to develop practical solutions that balance needs with cost.
- **Tech Nation Aspiration**. With a district history of innovation, FEP will be assessing the potential for a Tech Nation cluster with others in the relevant travel to work area. This also relates to the potential for cyber-security at all levels with the developments in Cheltenham. This aspiration balances natural capital with the ability to work remotely already evidenced by technology companies already in the district.
- **The national Industrial Strategy promotes 4 Grand Challenges**. 3 apply directly to District broadband:
    1. AI and a Data driven economy demands effective broadband operating reliably at set standards. It also requires that the rural economy accepts that unless the price premium for highest speeds is met, they are not attainable for all. Conversely a lower constant speed and latency can be

depended upon that meets and exceeds actual needs for most people. Given the issues of the ADSL fixed line networks, this might only be attainable through fibre or 5G.

2. Mobility is crucial to rural areas with a rebalancing of the use of public and private vehicles. Here app-based technology has a role to play which integrates mobile with broadband to create real time flexibility. This is a project currently proposed through bids to the Department of Transport T TRIG and Innovate UK Geospatial competitions.
3. The District has an ageing population where the creation of a new hospital requires integration with other health and non-health provider to create efficient services. It is inconceivable that effective broadband does not have a role to play.

3. HFHGB2 Methodology and Sample

The aim of this survey was to understand more fully the actual speeds experienced by users in the District and their level of satisfaction with those speeds. It sought to update the data from FEP's 2019 survey from a district wide perspective.

The survey was not an attempt to replicate the Ofcom/SamKnows methodology. Rather it asked respondents to report their actual tested speeds from an individual speed checker on one occasion within a timeframe of 28th July and 9th August 2020. This approach reflects more closely the actual speeds the household experiences from their devices rather than at the hub itself. Telling a householder that the speed at the hub is 10Mbps download when they are experiencing 5Mbps does nothing to resolve the true problem. This can be further exacerbated when the consumer uses the providers own test which comes out short and is still told the test to the hub shows it is not below 10Mbps. Providers' offers which include other room boosters recognise that the internal layout needs to be optimised, which may not be as simple as the plug and play that is often suggested.

Respondents self-selected to answer this survey. They became aware of survey url by the following means:

- Emails to the FEP stakeholder group
- Emails to previous respondents
- Social media posts on Facebook and Twitter
- Referrals by others such as neighbours
- Business networking group presentations such as CAP.

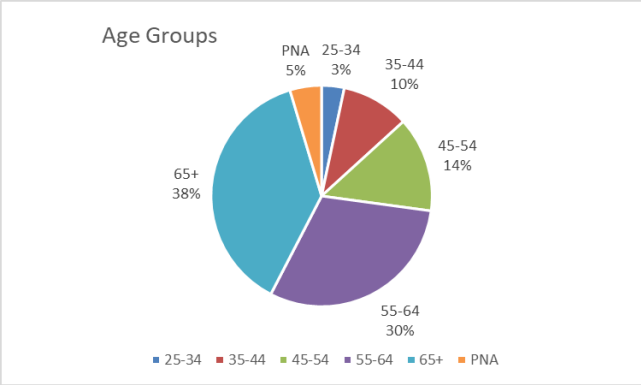
On getting to the url, respondents were requested to follow the link to the Which Broadband checker and to run the checker. They were to note down the three figures on response time (latency), download and upload speeds. The remaining questions covered:

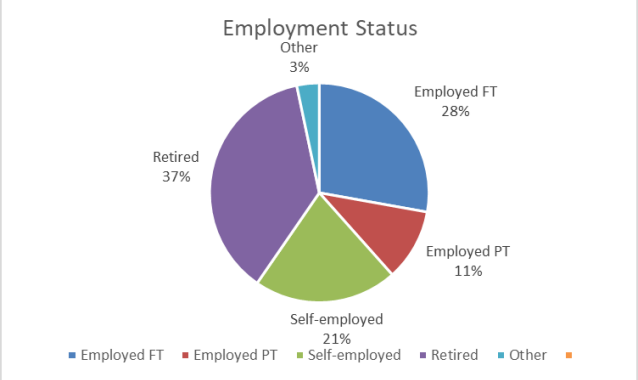
- Level of satisfaction with broadband speed from highly satisfied, somewhat satisfied, neutral, somewhat dissatisfied and highly dissatisfied.
- Whether the broadband was used solely for domestic or business purposes or both. If both could they estimate the domestic percentage.
- Who was their broadband provider from a list with prefer not to answer and other with a request for the provider name.
- What type of broadband contract they held.
- Address details.
- Age group of respondent.
- Number of people in the household.
- Current employment status.
- Whether they wish to be involved in future research stages.

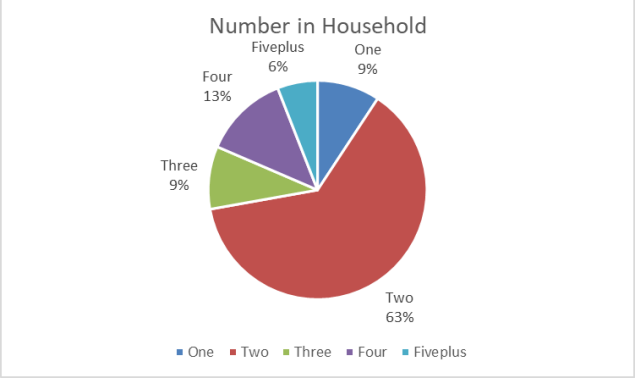
The survey software automatically logged the date and time of the response. It was assumed that this would be roughly the same time as the checker had been used. As each had to provide their address, we were able to exclude those who did not live in the District.

Appendix A discusses the recognised limitations of this survey approach. There were over 156 on-line responses to the survey. These were reduced to 151 complete questionnaires when those out of District, duplicate answers for the same property, offensive/nonsensical responses and those not providing an address were removed. Half the survey had answered the original HFHGB survey in 2019.

With 151 responses, there is little to be gained from allocating them in this report to the District's 41 parishes. The responses are geographically spread across the district with no particular over-representation in one area. As last time responses from the northernmost parts were fewer.







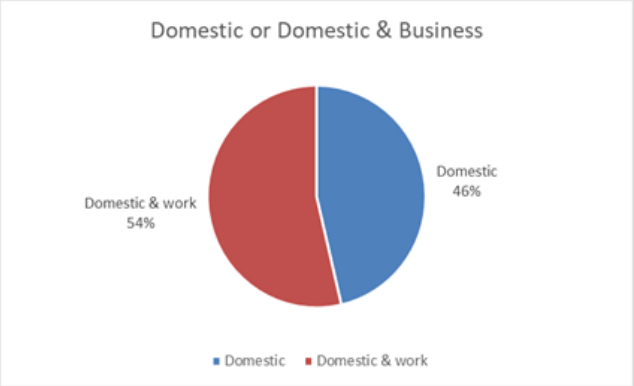
40% of the District population is over 65 which is matched here. That said the remainder of the sample is skewed to the older age groups with householders under 44 represented by 13%. This may reflect that fewer homes are owned or rented by this age group as separate households. It is a little striking given that the main source of sharing the url was social media.

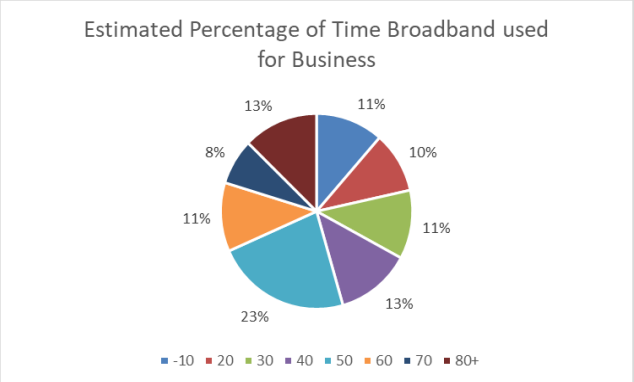
60% of the sample were in some form of work while 37% were retired. A fifth were self-employed. It is important to remember that it was only the respondent who was asked to state their age and employment status. This might be significant given that only 9% of the sample lived alone. It should not be assumed that that the respondent was either the head of the household or the main breadwinner.

Almost two thirds of the sample were 2 person households. 19% had 4 or more inhabitants. This is significant for broadband speeds as wifi accessed by multiple devices in different rooms via the same hub will always be slower than a single user directly by cable to the hub. What is therefore fast for the single user can be significantly slower for the 5+ inhabitant household each with laptops, phones and tvs. There is clear evidence in the following charts that even paying for faster broadband and getting it is still not enough to satisfy some users.

4. How Fast? How Good is Your Broadband? 2020 Results

4.1 Business Use at Home





The sample overall did not show a significant shift to the use of broadband for business use in 2020. 54% of respondents said they used their broadband for business and domestic purposes and 46% for only domestic. This in part is influenced by the 37% who are retired. If they are excluded then 81% of respondents used their broadband for business purposes. This reflects normal and lockdown needs.

It is clear that broadband is already an essential asset of rural economic life. The survey did not ask about academic and study use, but with most district secondary schools also delivering on-line; it is clear it is a fundamental need.

Compared to 2019, those using it for business estimate that use at higher levels. Those using it more than 60% of the time is 7% higher. A third estimate they use it for business purposes less than 30% of the time. In 2019 the mean average percentage of time used for business was 36.8% for respondents that answered both surveys. In 2020 that average is now 42.6%.

Type of Broadband	Proportion using for business	Mean Average Use Percentage of Time	Median Use	Estimated Range of time
Overall	53.6%	50%	47%	10-95%
FTTP	50%	65%	n/a	40-90%
FTTC Super	58.6%	48%	50%	15-80%
FTTC Fast	47.5%	42%	40%	20-80%
ADSL	52.9%	40%	40%	10-XXX
Wireless	71.4%	58%	n/a	10-95%

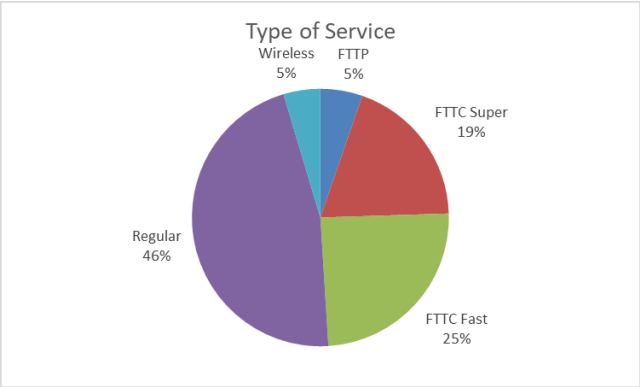
From the above table, the respondents using wireless have clearly invested in that solution because they have a business need. While those on FTTP estimate on average the highest percentage usage for business with none using for less than 40% of the time.

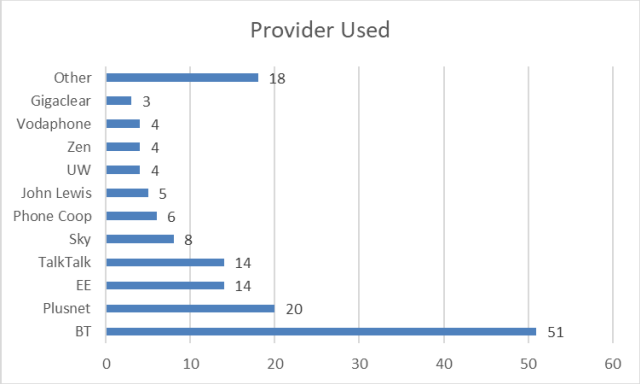
However, care should be taken as each of these have only 7-8 respondents. What is perhaps more striking is the lack of differentiation between the technology types and their use for business with both means and medians in the 40-50% range. Do smaller businesses get by with slower downloads because they don't see the financial business benefits of a higher speed even when video-conferencing has become a norm? Is it presumed that the cost will be significant and unwarranted? Or, is it lack of knowledge or awareness of the technology options available to them in their location that holds them back?

4.2 Broadband Technology and Provider Brand

Within the sample of 151, five technology types were used. Cable is not available in the District and no respondent claimed its use. 5% were using FTTP and 5% wireless. 3 respondents were signed up to Gigaclear

as a result of the Fastershire contracts. FTTC was split between those services that were Superfast or referred to a 'fibre system' and those that were Fast and had been purchased as a premium on regular broadband.



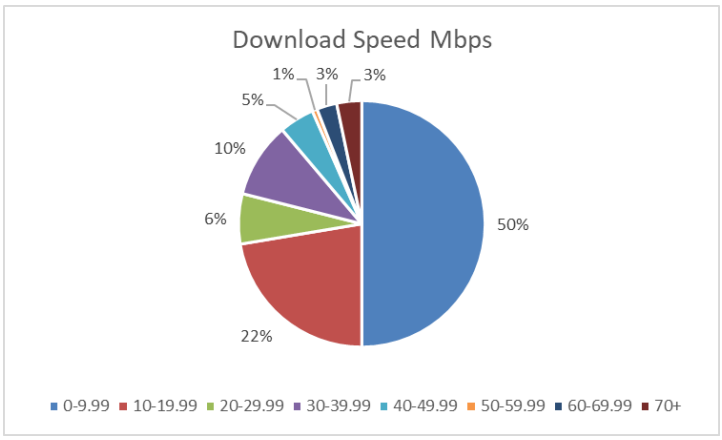


The responses given were cross-checked to the upload and download speeds and provider given. In some cases, the level of satisfaction was also reviewed. Where these did not tally, the responses were moved appropriately so that they would map onto the Ofcom types. This would typically be an upgrade of the technology stated for about 10% of respondents.

ADSL lines might be overrepresented at 46% of the sample. This reflects in part the lack of real awareness of the technology distinctions that enable broadband to be delivered. But if one considers that if these lines were not ADSL, then they must be FTTP and some are therefore paying for a service that clearly does not deliver either the upload or download speeds advertised or expected.

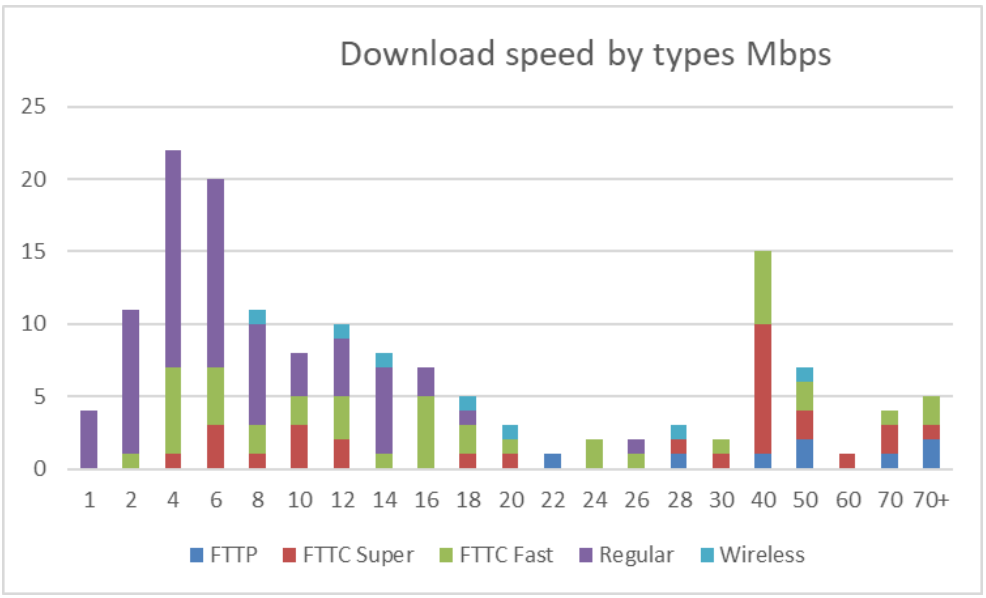
No analysis has been done on provider used. A third of the sample were on BT broadband. Plusnet, EE and TalkTalk account for a third. The final third demonstrates the large number of other providers being tried in the district. Whether this is the result of a high level of competition or of frustration is not known.

4.3 HFHG Download Results

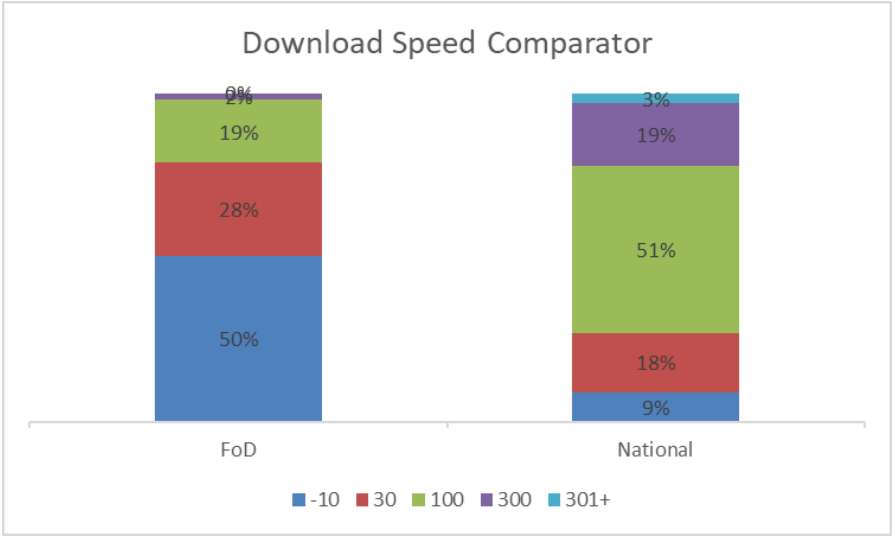


While the mean average download speed of the sample of 151 is 18.2Mbps; this is skewed by the FTTP and wireless respondents. The median is 9.4Mbps and the range 2-152.9Mbps.

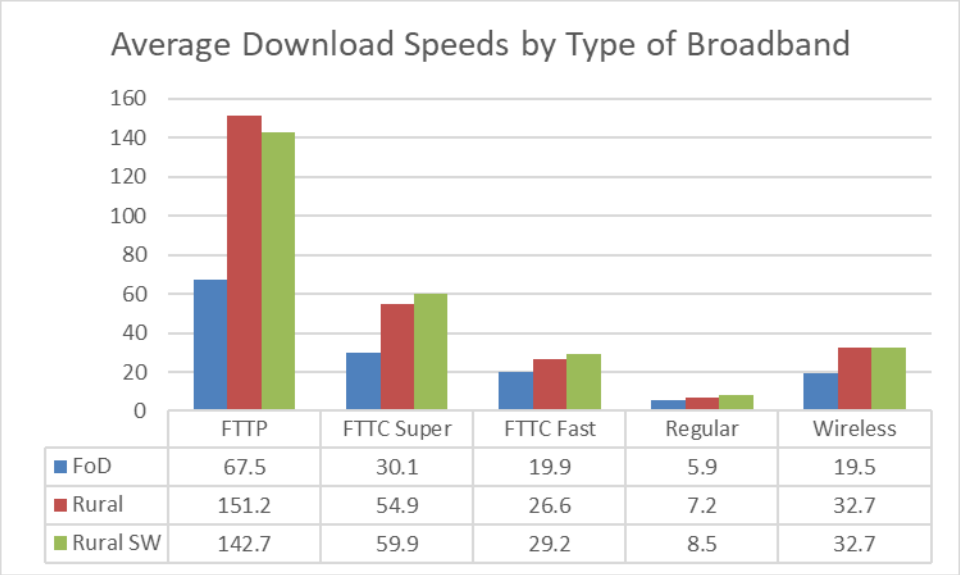
50% of those surveyed did not meet the baseline standard of the Universal Service Obligation of a download speed of 10Mbps or higher. A further fifth were over this minimum standard with speeds between 10 and 19.9Mbps. But it is clear that this is skewed closer to the 10 than the 19.



What is also concerning to see from the bar chart above, are the numbers of FTTC that are below 10Mbps download. These are self-allocated but typically the upload speed, latency and provider would suggest those allocations are correct. The download reading could result from multiple devices in use at the testing time although respondents were asked to turn the others off.



The above chart is a direct comparison between the published national picture provided by Ofcom and HFHGB2. Nationally only 9% of the UK is shown as having a download speed of less than 10Mbps and 63% of the country exceeding a download speed of 30Mbps. In the sample for the District the former is 50%. This is an overstatement of the slowness because on a self-selecting survey it is often the most disgruntled who chose to answer to vent their frustration. This should not be overplayed as the 2019 survey showed 64% of that sample with less than 10Mbps. In either case venting frustration is unlikely to be five times the proportion. Given that 78% of the sample gets downloads of less than 30Mbps; this rural district is some way from the norm suggested by Ofcom for the country as a whole and for rural at 19% under 10MBps.

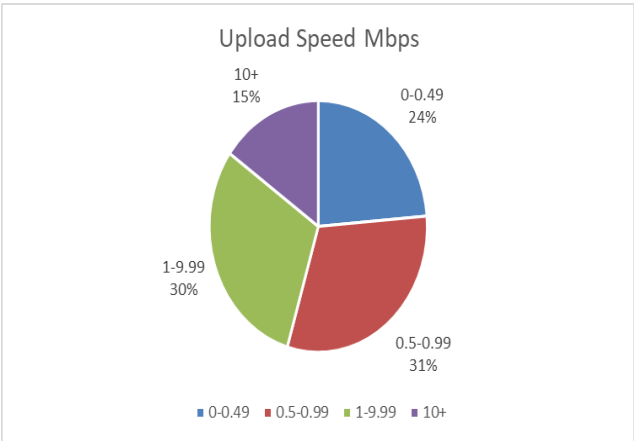


	FTTP	FTTC Super	FTTC Fast	Regular	Wireless
FoD	67.5	30.1	19.9	5.9	19.5
Rural	151.2	54.9	26.6	7.2	32.7
Rural SW	142.7	59.9	29.2	8.5	32.7

Ofcom provided the dataset for their May research as well as an overview. In average Download Speeds by Type of Broadband above, FoD is the District results by type of technology; Rural is the national average download of the Ofcom sample for average speed; and Rural SW those respondents shown to be based in the South West and rural areas. The Ofcom sample does not permit the sensible calculation of the splits between technologies because of its weighted selection.

Care again should be taken with wireless as there were more wireless respondents in our survey than in Ofcom's rural SW. But the trend is clear. The District's blue bar as an average is always well below both rural and rural SW. On FTTP and FTTC Superfast, the district average download speed is half that of rural or rural SW. Some but not all of this difference can be explained by the measurement point and methodologies.

4.4 HFHG 2020 Upload Results

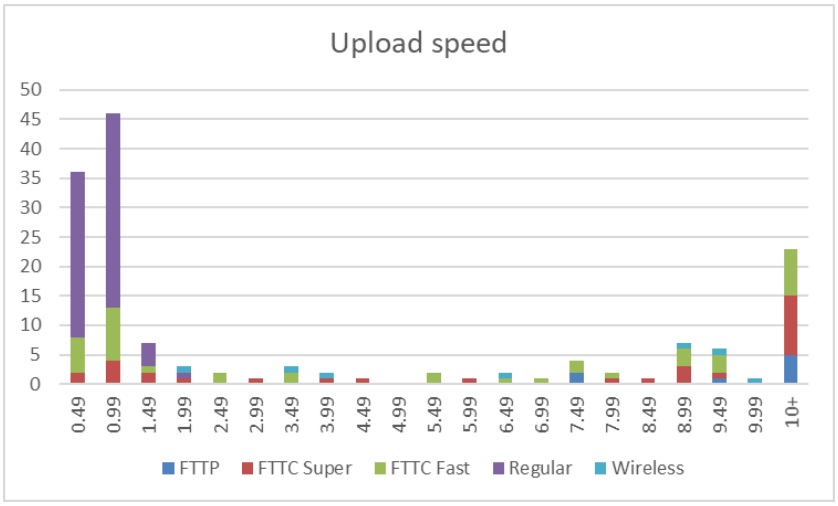


55% of the sample did not receive a USO compliant upload speed on 1Mbps.

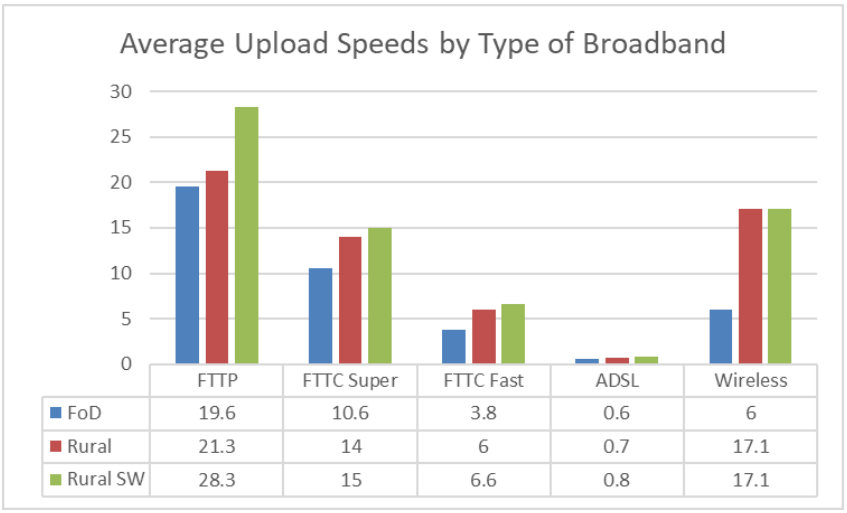
The mean average upload speed is again skewed by the speeds attained by the higher performance more costly technologies at 4.75Mbps. The median is 0.9Mbps and the range from a virtually unusable 0.2Mbps to 278Mbps.

Of interest is that FTTP is said to be synchronous in down and upload speeds. This was not the case for any of the 7 FTTP respondents.

From the chart overleaf it is clear that this also affects a proportion of those paying for FTTC services. The causes of this can be distance from the cabinet as well as internal arrangements within the household and multiple users. Conversely 15% of the sample had an upload speed of over 10Mbps.



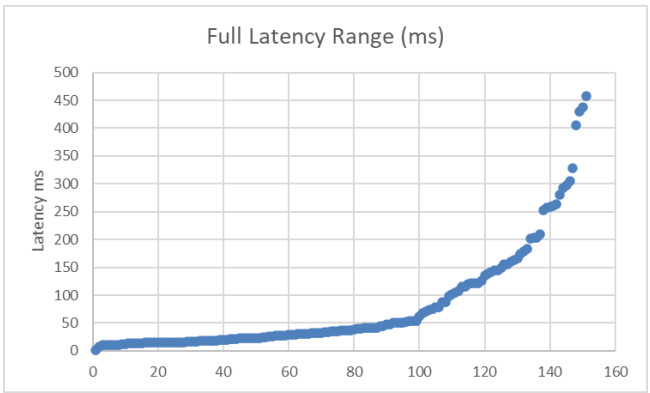
When comparing the District sample with Ofcom, the mean averages are much more in line. For FTTP, the district is a little behind the national average, but somewhat behind the rest of the rural South West. On both versions of FTTC, the district lags. In terms of USO, the most worrying technology is ADSL which for all three categories is well behind the 1Mbps set.

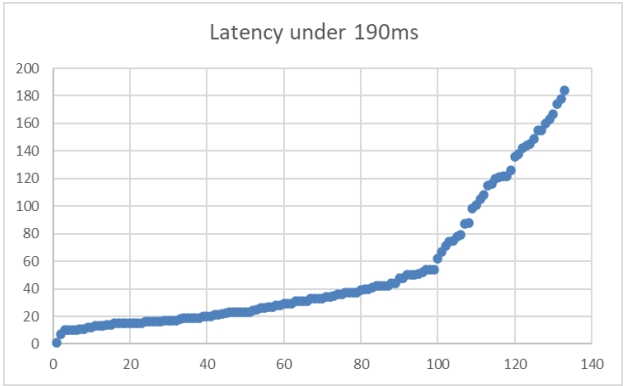


	FTTP	FTTC Super	FTTC Fast	ADSL	Wireless
FoD	19.6	10.6	3.8	0.6	6
Rural	21.3	14	6	0.7	17.1
Rural SW	28.3	15	6.6	0.8	17.1

4.5 HFHGB2 Latency Results

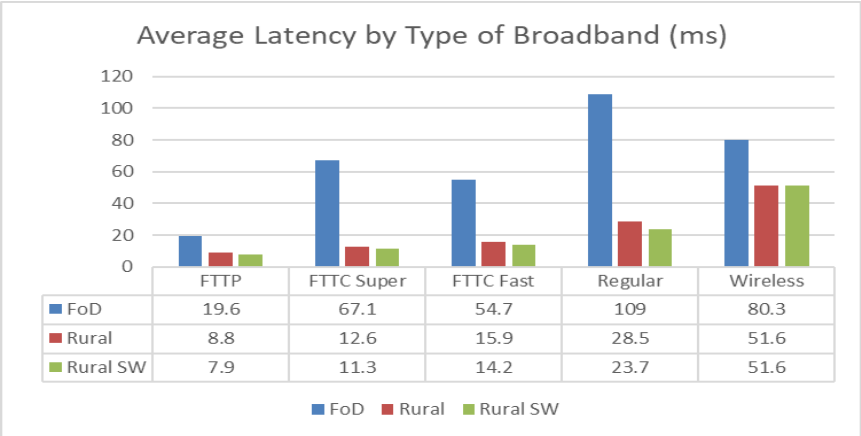
Overall, the mean average latency is 80ms. This is skewed upwards by slower responses over 300ms. The median is 37ms. As in 2019, there are a wide range of latencies recorded by the sample. From the first chart, it can be seen that 10% of respondents had latency in excess of 200ms. Depending on the type of usage this can have a significant impact on functionality.





65% of the sample had a latency below 60ms. It's after this point that performance levels start to markedly deteriorate as the graph moves significantly steeper. We suggested last year a target rural latency should be 50-100ms. The data suggests more people are achieving that this year despite the higher volumes of use.

On the chart below the higher the column, the worse the performance. On any type of technology, the District's mean average latency is slower than Ofcom's rural or rural South West mean average. Often this is by a substantial margin. The responses for FTTC for the District are particularly worrying if taken at face value. But these are mean average values where very large latency has a disproportionate effect. The medians are 26 and 29ms which is well within normal requirements. With FTTP at 20ms for the District, the real impact would only be felt by elite gamers or financial flash traders where every millisecond counts.



4.6 Summary Tables by Type of Broadband Technology

FTTP is said to be symmetric with the same upload and download speeds. From our data on the District this isn't on either an average or a median value. For both, download is 3 times higher than upload.

For FTTC Superfast the District could expect latency of 26ms, download between 35-40Mbps and upload on the 10Mbps. But the wide ranges also suggest there could be problems on this selection. The median values for FTTC Fast comply just with USO. While ADSL is nowhere near on average or median. The data shown and the gaps between promises and observed service serve to underline the real confusion about technology choices to gain a service that fits the household needs ie is satisfactory.

Type of Broadband		Latency ms	Download Mbps	Upload Mbps
FTTP	**Mean Average**	19.6	67.5	19.6
	Median	16.5	46.1	15.5
	Range	7-54	21.1-152.9	7-67.6
FTTC Super	**Mean Average**	53.7	40.6	10.6
	Median	26	35.9	9.2
	Range	12-258	8.7-130.9	1-27.8
FTTC Fast	**Mean Average**	60.9	12.6	3.8
	Median	29	10.1	0.9
	Range	1-438	1.3-36	0.3-19.7
ADSL	**Mean Average**	114.1	5.1	0.6
	Median	50	4.3	0.7
	Range	13-458	1-16	0.1-1.1
Wireless	**Mean Average**	80.3	19.5	6.0
	Median	42	17.5	6.4
	Range	22.4-297	6.3-41.1	1.8-9.6

The next two tables show the mean averages and medians for Ofcom's May data for the Rural South West and for rural nationally. ADSL for both fails USO so it is not just this District. The other technologies are significantly above USO on this data.

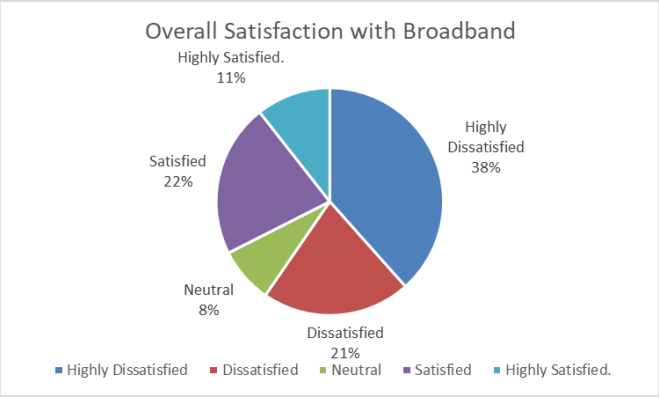
Rural SW

Type of Broadband		Latency ms	Download Mbps	Upload Mbps
FTTP	**Mean Average**	7.9	142.7	28.3
	Median	8.5	147	28.9
FTTC Super	**Mean Average**	11.3	59.9	15.0
	Median	10.4	68.2	18.3
FTTC Fast	**Mean Average**	14.2	29.2	6.6
	Median	11.3	34.0	7.3
ADSL	**Mean Average**	23.7	8.5	0.8
	Median	23.8	7.0	0.8
Wireless	**Mean Average**	51.6	32.7	17.1
	Median	50.2	29.5	12.9

Rural

Type of Broadband		Latency ms	Download Mbps	Upload Mbps
FTTP	**Mean Average**	8.8	151.2	21.3
	Median	9.0	75.8	20.5
FTTC Super	**Mean Average**	12.6	54.9	14.0
	Median	11.1	60.9	17.5
FTTC Fast	**Mean Average**	15.9	26.6	6.0
	Median	12.9	28	6.5
ADSL	**Mean Average**	28.5	7.2	0.7
	Median	29.3	5.0	0.7
Wireless	**Mean Average**	51.6	32.7	17.1
	Median	50.2	29.5	12.9

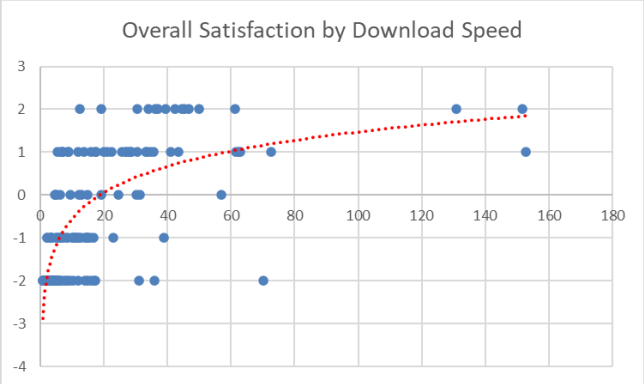
4.7 Satisfaction with Broadband

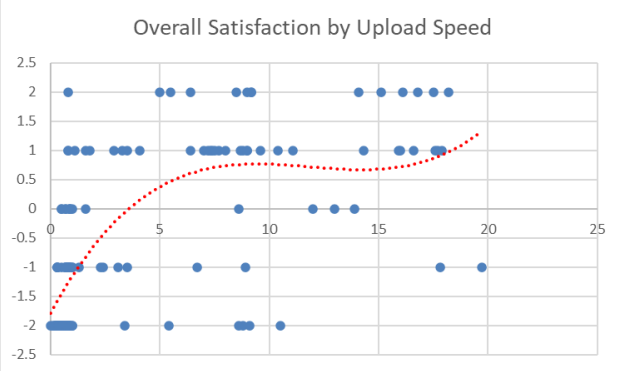


Overall, 59% of the District sample were dissatisfied with their broadband. This is an improvement on last year where there was a bigger sample size but 71% were dissatisfied.

Highly satisfied has also almost doubled from 6 to 11%. As previously noted, those discontent with broadband may be seen to be more likely to respond to a survey like this in order to vent their frustration. Some of the change towards the positive does result from taking half the sample from last year's respondents. Here some households have changed services and moved from highly dissatisfied to somewhat satisfied. Others have not been able to change or may not have attempted to do so and are therefore still highly dissatisfied in 2020 as 2019.

The following series of charts breakdown satisfaction by speed as a whole sample and then by technology. On the latter it is easy to see when upgrading technology has not resulted in the performance increase expected.





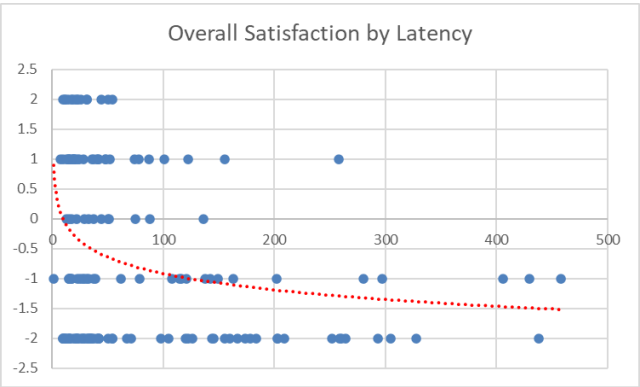
As might be expected the faster the download and upload speed the greater level of satisfaction is the general trend. On download speed with all respondents combined a neutral view comes at the 20Mbps download speed. As noted last year, there are of course some people who are happy with speeds as low as 5Mbps as they are light users of broadband and the products supported on it.

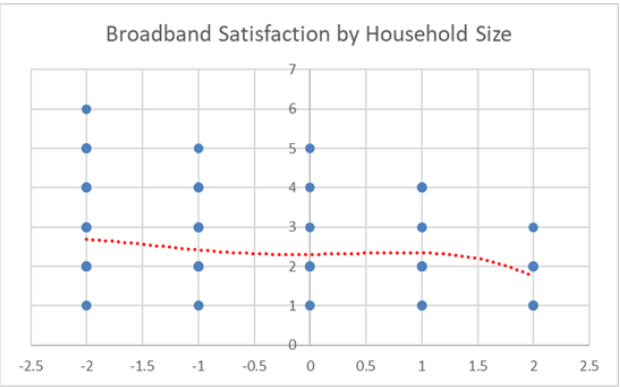
The highly dissatisfied respondent with a download speed of 70 Mbps lives with 4 other people who could be streaming or gaming at the same time.

On upload speeds, the trend line suggests that satisfaction is triggered somewhere between 3-4Mbps for most people. Although there are a good number of respondents where upload speed per se does not seem to affect their satisfaction levels as long as it is above 1Mbps. Conversely the negative ratings for those above 5Mbps suggests that those who have paid for a higher service are unhappy not to receive significantly higher upload speeds.

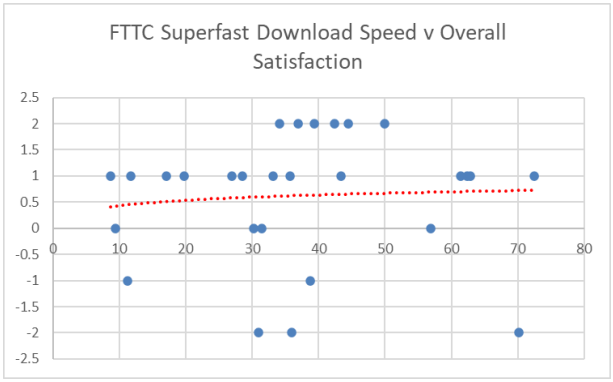
Latency, on the chart below, is faster at the lower speeds so as might be expected those with the lowest latency tend to be the most satisfied. But there are still a high number of respondents still showing overall dissatisfaction at the lower latency. Latency is not often something that is promoted by broadband providers and its importance is probably little understood unless the user is a gamer needing a less than 20ms response time ideally.

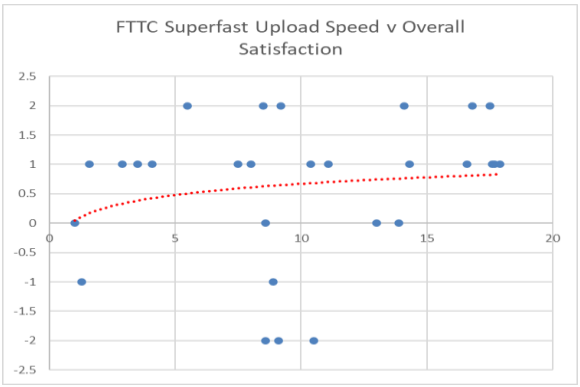
There is a correlation between size of household and dissatisfaction as seen in the chart below. This is particularly in the case where the respondent has opted for a more expensive and faster service and still finds that it is slow due to the number of connected devices. With phones using wifi, in addition to laptops, televisions and game consoles; a household of five can easily have 15-20 connected devices at the peak time of 7-9.59pm.

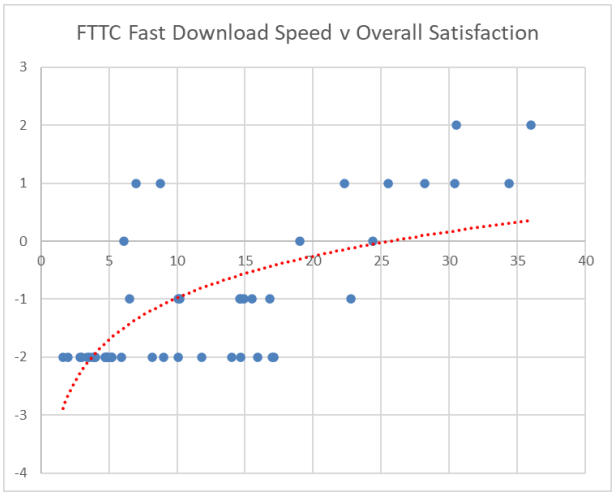


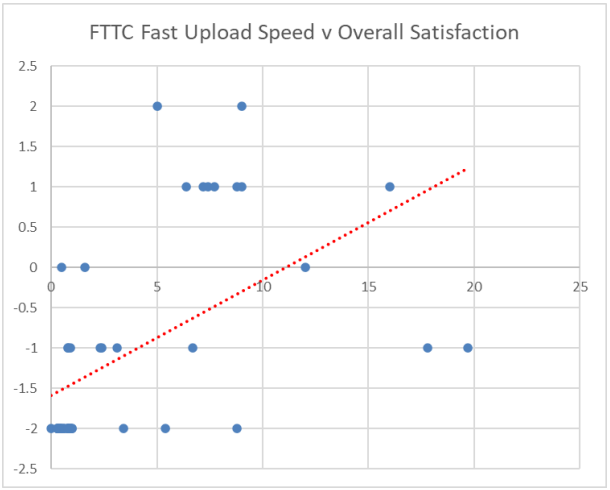


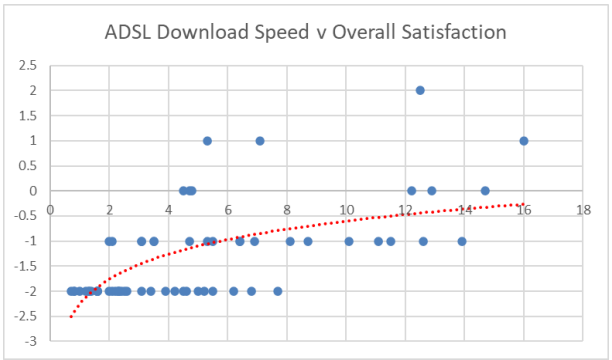
FTTP and wireless excluded from following analysis as number of respondents is too small for meaningful charts by technology. In the charts that follow if the same reported satisfaction and speed are given by different respondents they are typically shown with a single dot.

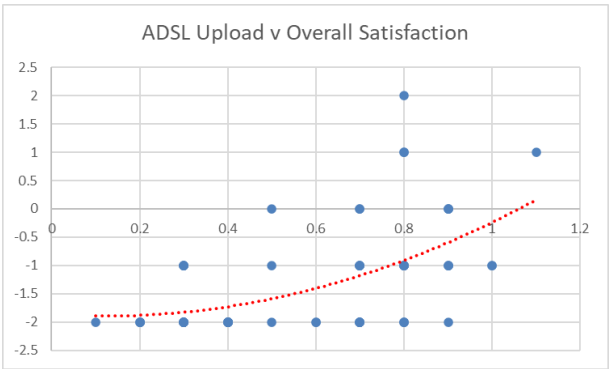












4.8 This Year Versus Last Year

76 are the same respondents so some comparisons can be made between 2019 and 2020.

Year	Latency (ms)	Download (Mbps)	Upload (Mbps)
2019 Mean average	138.9	12.8	2.9
Median	54	5.5	0.9
2020 Mean Average	74.5	17.9	4.6
Median	34.5	7.9	0.9

On mean average over the year from the survey results in the district:

- Latency improved by 64ms
- Downloads improved by 5.1Mbps
- Uploads improved by 1.7Mbps.

But the median shows a slightly different story:

- Latency improved by 30ms to 34.5ms
- Downloads improved by 2.4Mbps to 7.9Mbps
- Uploads stayed the same at a median 0.9Mbps.

16 respondents made significant upgrades of download speed in excess of 10Mbps. The average increase was 32.5Mbps with a median of 23.5Mbps. Typically, this must involve a change of technology. However, 16 were worse off by more than 5Mbps on their test day. These typically were those who were already on faster services and the slowdown may be a case of reduced bandwidth as more take up superfast options.

Year	Overall mean	Highly dissatisfied	Somewhat dissatisfied	Neutral	Somewhat satisfied	Highly satisfied
2019	-1.0	34	22	9	7	4
2020	-0.6	31	17	6	12	10

Respondents have moved on average from somewhat dissatisified to closer to neutral. 40% are still highly dissatisfied but most are happier people. A reason for this happiness is that they typically made a significant change either of provider or of technology. Some may also have adjusted their expectations.

Appendix A Limitations of Survey

We recognised the following potential limitations of the survey. Some of these arise from the desire to keep this survey short to enable as many as possible to answer:

- Choice of tester. All results were deemed to have come from the same tester and therefore suffer from the same defects and provide results that are consistent between respondents. Where other testers were used or the data was incomplete, the responses were excluded from the survey. Pre-survey trials demonstrated that different testers provide markedly different results for the same premises tested in the same place with the same machine. The Which tool was selected because it provided all three tests and was an independent test of performance. Other 'independent' tools may suggest alternative suppliers and may not then be unbiased.
- No knowledge of how test was taken. The Which test suggests connecting the device directly to the router to get the best results without wifi degradation. Some respondents may have taken this option. Others may have tested at the furthest distance from their router. We assume most have taken the easiest option of wifi and being in the same room.
- Responses accepted as genuine and transcribed accurately. The results are shown with a mean average, a median value and a range to enable wider understanding and to overcome sample errors. If there were any doubts over the responses they were excluded from the survey.
- Self-presenting so a likely bias to the negative and poor performance. This should not be overplayed as there are a good number of satisfied respondents across all broadband technology types.
- Data on perceptions. The world is based upon perceptions not on finite measurement. The consumer perception of speed is based on the speed checker they use. This might possibly be backed up by another speed checker which gives two points of measurement and a concern if they vary, as is likely. A consumer does not have the technical ability to measure at the wall nor can they actually use the speed shown there. Yet those wall speeds will be used by operators to avoid USO. Whether they are then more proactive with solid hints and tips on speed improvement is an accessible way is uncertain. At least one major broadband provider supplying 4G as a back-up advises positioning the hub away from windows and putting the 4G dongle in the window but supplies only a 1m cable on the dongle!

Appendix B A Bit About FEP

The Forest Economic Partnership (FEP) was launched in 2018 by the FoDDC. Its mission is to deliver a thriving economy in the Forest of Dean District by connecting business, councils, people, ideas and resources. Already over 160 organisations/individuals voluntarily participate in its quarterly steering group or four sub-group meetings. The three voluntary sub-groups focus on areas of particular challenge to the District and are shown with their individual missions below:

- **Education & Skills.** Within a lifelong learning context, how do we get the workforce we need for the District now and in the future to power and sustain economic growth by removing barriers and raising aspirations.
- **Transport & Infrastructure, Bridges & Borders.** The District Plan guides future development that gives us the space to work, live and play. Once those uses are known we can consider the transport routes in the District to enable them become fit for purpose. What is the practical new vision that defines the Forest we want to be and the balance between the use of space? The Severn and Wye have preserved the Forest. The best future protection is connection with all those around us to ensure a mutual understanding of economic needs. Looking outwards, what do we need and want to trade for bridges; participation in the South Wales-West of England economic powerhouse; and neighbours' plans.
- **Digital Connectivity.** We are told we live in a digital world. What practical steps can we take to get the speed, reliability and connectivity to support the ways we increasingly work, live, study and play now and in the future.

Work is ongoing to shape a new economic plan so that in 2050 the District is an attractive, vibrant and dynamic destination to live, work and do business. It has actively contributed to a number of consultations such as the House of Lords investigation of the Rural Economy where FEP's submission was cited.

Authors

HFHGB was undertaken by the Digital Connectivity Sub-Group of FEP.

The main analyst and author was Andrew Callard who runs Aimed Business, a management and marketing consultancy. Following his MBA at Warwick in 1985 he joined a Japanese market research consultancy using quantitative and qualitative methods to analyse the telecoms, office automation and consumer electronics markets in the main European countries. While there he undertook significant projects in fax machines and mobile telephony networks. Subsequently he spent a decade working in Higher and Further Education increasing the volume and quality of applied and blue-sky research and vocational training through business engagement. He has been a board member of the Institute for Research in Applicable Computing at the University of Bedfordshire. His first involvement with the web was in 1996 through running a EU Leonardo project Since 2007 he has worked extensively in the rural economy and assisting the businesses based there.

David Trevelyan is the Sub-Group Leader for Digital Connectivity and runs a technology and sustainability consultancy. 20 years ago, starting out in an international food business as a commercial analyst, very early on there was recognition of the importance of data drive decision, implementing analytical tools that improved operational performance. Mid 2000's saw a switch to the construction sector and implementation of leading edge analytical and IT tools. The 2000's saw increasing demand for business sustainability and a switch into delivering Environmental and Sustainability programmes for prestige UK Infrastructure projects including Heathrow Terminal 5, 2012 Olympics, and Crossrail. A final 5-year stint in a FTSE35 implementing IT, Energy, Sustainability and Supply Chain systems he has an extensive knowledge of agricultural, construction, utilities and rail industries alongside global supply chain and international business.