



Economic impact of Lightstream full fibre broadband

An Innovation Observatory
report for KCOM

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OBSERVATORY**

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Contents

Executive summary	4
Lightstream progress	5
Assessing the economic impact of Lightstream	5
Our approach to impact measurement	6
Benefits of Lightstream	7
The significance of the “digital economy”	11
Businesses run from home	12
Local economic impact of Lightstream on residential consumers	14
The measurable value of Lightstream	15
Conclusion: Lightstream is a major enabler of the local economy	16
Annex: How we did the research and impact assessment	17
Structured online and telephone surveys	17
In-depth telephone interviews	18
Economic impact modelling methodology	19

Executive summary

This report examines the impact of Lightstream fibre broadband within Hull and East Yorkshire. The results of surveys of Lightstream business customers, and consumers who run small businesses from home, were combined with government data on business demographics, and KCOM's own customer data, and fed into a model of economic impact that uses an approach broadly similar to that of other relevant economic impact assessments such as that undertaken over several years in Cornwall¹. We also assessed the value of the local investment by KCOM in deploying Lightstream. Results from the surveys, including in-depth interviews with selected customers, also provide non-financial quantitative and qualitative data about the impact of Lightstream on the local economy.

The key findings from the report are:

- Lightstream is a major enabler of the Hull and East Yorkshire economy. We estimate the cumulative direct economic benefit of Lightstream to customers from calendar years 2012 (when the first customers were connected) to 2018 was £439.0 million, composed of salaries related to new jobs created and the additional GVA (Gross Value Added²) of local businesses, attributable to Lightstream. Added to this is the direct local benefit of KCOM's investment in Lightstream rollout, which was £30.3 million between calendar years 2012 and 2018.
- The efficiency impact of Lightstream on business customers is very clear – over 65 per cent of businesses say Lightstream has made them more efficient overall; over a third of Lightstream business customers surveyed say that Lightstream is fundamental to what they do – they couldn't operate without fast Internet access
- While there is variation in the significance of Lightstream to businesses in different sectors, there is less variation by size of business (as measured by number of staff): the benefits of Lightstream are felt from businesses with one member of staff up to those with as many as 500 employees (our survey sampled SMEs only, reflecting the typical take-up of Lightstream)
- 40 per cent of organisations say either that their future growth would be hampered if they did not have Lightstream, or that their business would be less competitive without it
- Businesses with more of their work based in the digital economy tend to be those that benefit most from Lightstream, but many of Lightstream's benefits apply to organisations not currently so involved in the digital economy. Furthermore, 32 per cent of organisations said they expected the percentage of their business that is related to the digital economy to increase in the next 12 months
- Small businesses run from home also identify tangible economic benefits from Lightstream – and some residential Lightstream customers are considering setting up a business from home as a result of having Lightstream
- Residential consumers use Lightstream to buy more online – including from local businesses – and to engage more with local services

¹ Superfast Cornwall, Phase 2 Report, June 2019 www.superfastcornwall.org

² Gross Added Value (GVA) measures the value of goods and services produced in a local economy. It is a widely used indicator of the local economic impact arising from an investment.

Lightstream progress

Since the beginning of the Lightstream rollout programme in 2012, KCOM has made consistent progress in making the full fibre broadband service available to homes and businesses in Hull and East Yorkshire where it owns network infrastructure and provides communications services. As demand for faster broadband and awareness of Lightstream's capabilities has increased, take-up rates overall (across homes and businesses) of the service climbed to 42 per cent of premises passed at the end of 2018³. During 2019 KCOM completed its rollout of Lightstream across its Hull and East Yorkshire network.

Figure 1 shows the progress year by year of premises passed and connected; Figure 2 shows the number of businesses connected at the end of each year since 2012.

Figure 1: Total number of premises passed and connected to Lightstream

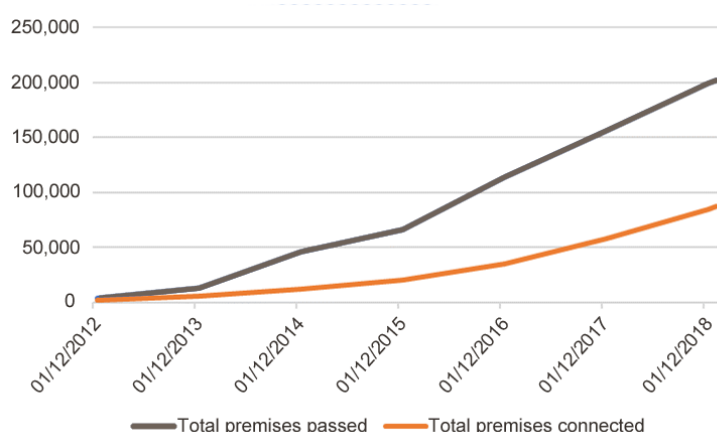
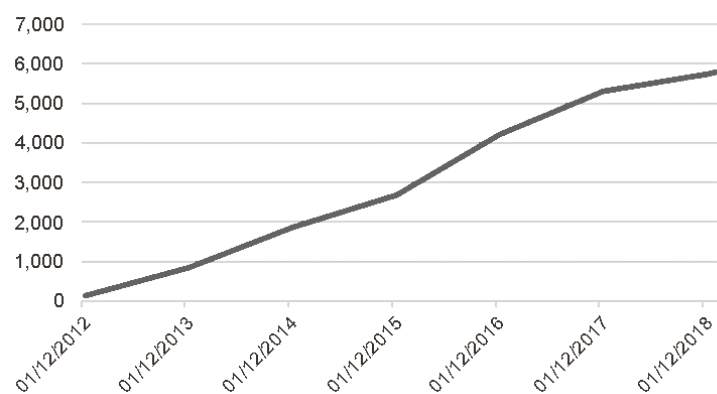


Figure 2: Number of businesses connected to Lightstream



Assessing the economic impact of Lightstream

Measuring the economic impact of superfast broadband is not straightforward. Causal linkage between take up of the service and economic measures such as staff numbers, revenues, profits and GVA are hard to establish and often not evaluated by the organisations taking up the service. Especially for small and medium-sized businesses (which are the main users of Lightstream among non-consumer customers), procurement decisions are unlikely to be taken after a detailed cost-benefit analysis; broadband service is, after all, a relatively minor component of most businesses' total costs. Consequently, there is no real need for a business to measure whether the investment in superfast broadband is delivering directly measurable financial benefits.

³ As of August 2019, overall take-up rates are 66 per cent.

Neither is it necessary for a business to measure the non-financial and indirect benefits of superfast broadband, such as reduced time wastage, happier online customers, and the ability to use cheaper, pay-as-you-go online services instead of software applications running on local servers. Nonetheless, these benefits are real for those taking up Lightstream, and they have an impact on the efficiency and performance of the business – even if it is difficult to measure.

At the level beyond individual organisations, there are other measures of the economic impact of Lightstream that can be examined, such as the creation of new businesses attracted by the availability of superfast broadband, and the increase in entrepreneurialism of individuals at home, who are able to develop new commercial ideas that wouldn't have been feasible without an affordable superfast Internet connection.

Finally, there are the impacts of the deployment of Lightstream itself: the investment in the region by KCOM, and the spend on civil engineering, field engineer salaries, advertising and in-house network planning and other activities associated with Lightstream. We have included, separately, an estimate of the value of relevant parts of this investment (see page 15).

In most of this report we focus on the tangible impact of the availability of Lightstream service for businesses and other organisations, and for consumers running small businesses from home.

Our approach to impact measurement

In assessing the economic impact of full fibre broadband on Lightstream business customers in Hull and East Yorkshire, we have taken a primary research approach, surveying a sample of KCOM's Lightstream customer base. Analysis of two surveys is presented directly in this report; we also used the survey data, coupled with KCOM's own data on rollout, and UK government statistics on business demographics, to estimate a value for the direct, measurable uplift to Lightstream customers. Other questions asked in the survey were designed to help KCOM to understand its own performance in delivering a reliable service, and to help it to understand businesses' priorities, concerns and requirements as the local economy becomes increasingly "digital".

The first survey was of 181 business Lightstream customers, polled online and by telephone. We aimed for a good spread of businesses by sector and size, rather than trying to reflect very closely the business demographics of Hull and East Yorkshire. This was so that we could have greater confidence in the averaged responses of any given sub-segment in the survey. In our economic modelling we have applied weighted averages using organisation size as the primary way of mapping survey data to Hull and East Yorkshire as a whole.

A separate survey of consumer Lightstream customers was also carried out online to identify the impact Lightstream has had on small businesses run from home.

We have taken at face value business respondents' assessment of the extent of Lightstream's impact on key business metrics, rather than relying on impact measures that have been calculated in previous studies elsewhere in the UK. This is because local conditions (both business demographics and telecoms service availability) vary between regions in a complex way, and because the service availability picture was very different a few years ago: in 2019 we are much more used to broadband speeds being faster on fixed and wireless networks. Where the model was particularly sensitive to input values, for instance, on the number of new businesses as a result of Lightstream availability, we have taken a cautious approach.

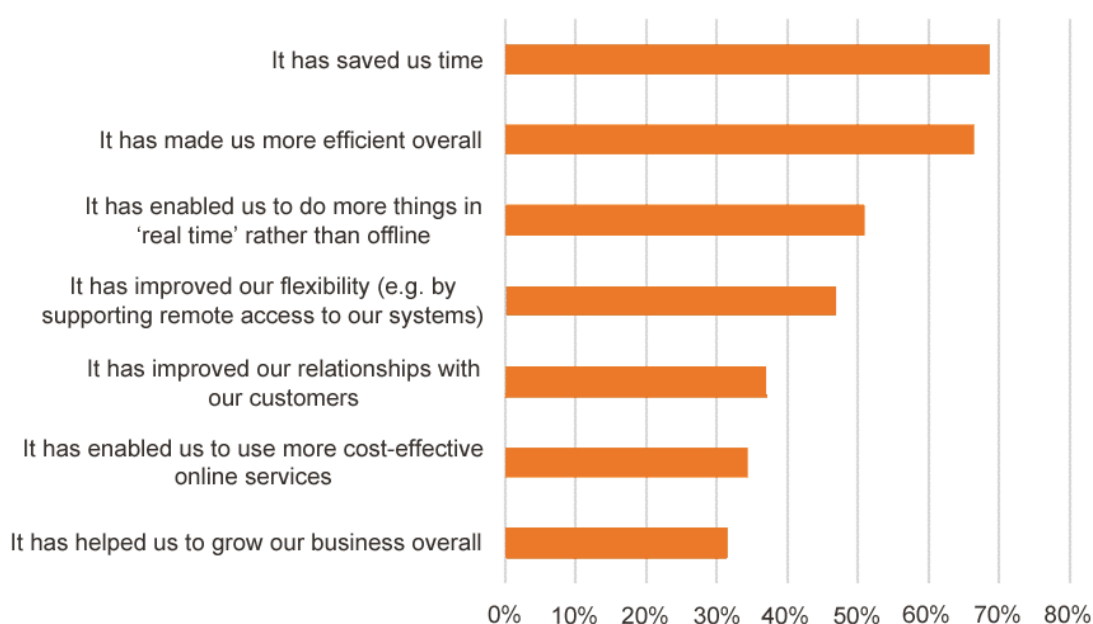
The Annex on pages 17–19 gives more detail about the process we have followed.

Benefits of Lightstream

There are many benefits of superfast broadband for businesses. Some are clear, such as the faster data download and upload speeds, resulting in quicker file transfers and the ability to use online services more effectively. Others are higher-level, derived benefits, such as improved collaboration with the supply chain, or the ability to support customers ordering online, with consequent improvements to business performance.

In our survey of Lightstream business users we asked respondents to indicate which benefits they had seen as a result of their adoption of Lightstream, presenting them with a long list of possible benefits and asking them to identify any others. Figure 3 shows the seven benefits most often mentioned across the sample overall.

Figure 3: Benefits of Lightstream (per cent of respondents indicating they had experienced specific benefits; n=181)



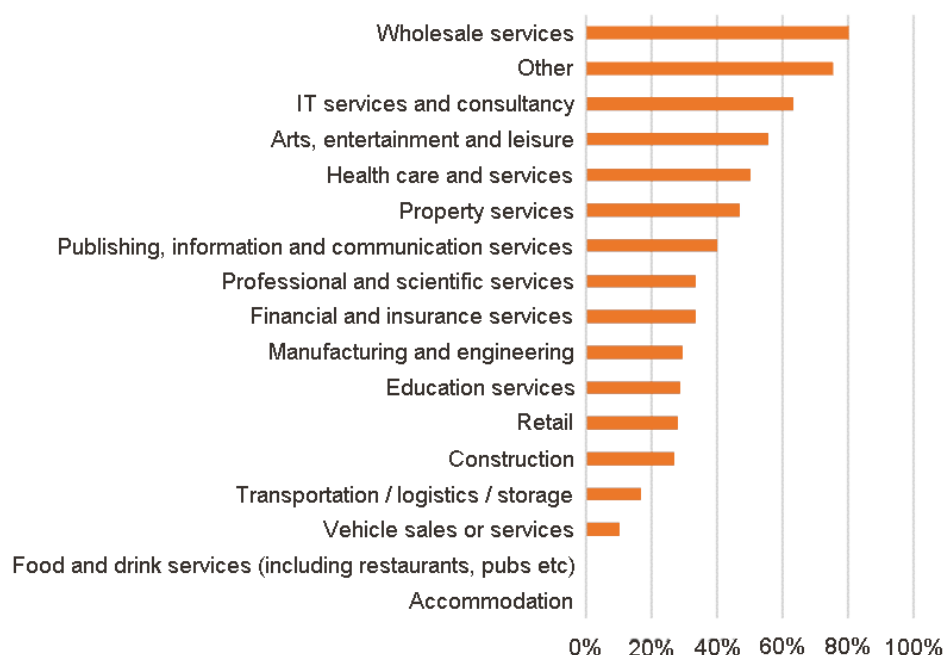
Follow-up telephone interviews with Lightstream customers revealed more detail about the impact of the service:

"Lightstream has massively changed the way we work because the upload speed is so fast. I deliver a lot of films to clients online ... being able to promise my clients a delivery time was difficult in the past, and now it's easy ...it makes things possible that were not possible before."

Corporate video producer

In addition to specific benefits, 38 per cent of respondents said that Lightstream was "fundamental to the work we do; we couldn't operate without superfast broadband". We broke down the responses to this answer, and the answers about specific benefits, by organisation sector and size to see what patterns emerged. The next few charts show the most significant of these breakdowns. Note that the number of respondents in some of the sector subsamples is small, and we have excluded sectors with fewer than three respondents.

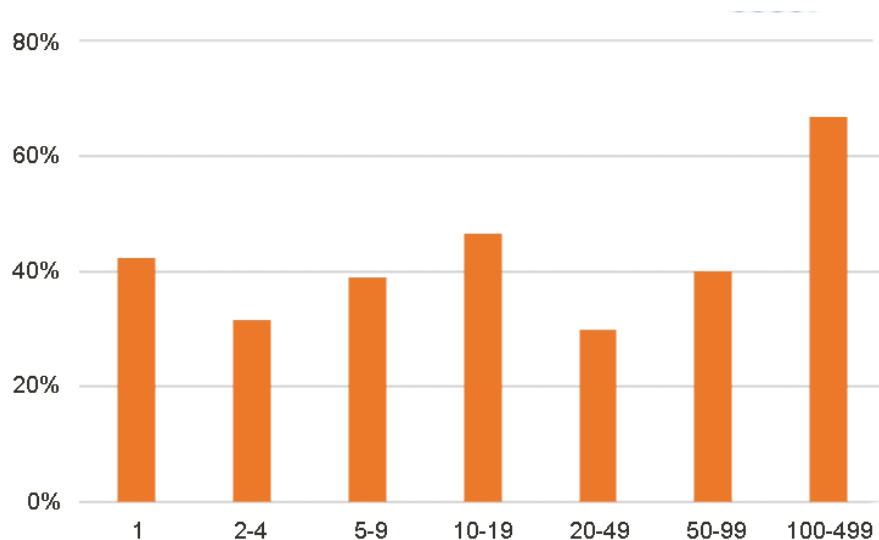
Figure 4: Organisations saying “Lightstream is fundamental to what we do – we couldn’t operate without superfast Internet” by sector (per cent of respondents; subsample sizes between 3 and 24; n=181 in total)



There is significant variation by sector, with over half of wholesale traders, IT services and consultancy companies, arts/leisure/entertainment organisations, healthcare organisations and the “other” category (charities and religious organisations) saying that Lightstream was fundamental to the work they do.

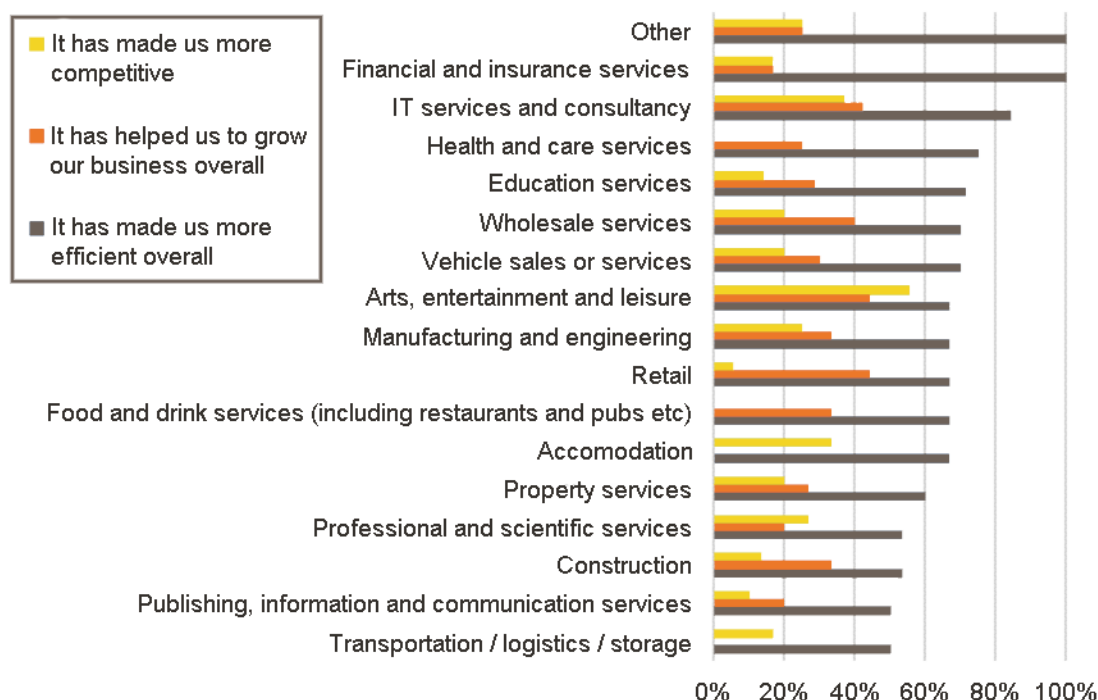
The breakdown in Figure 5 shows no clear pattern by size of organisation (measured by number of local employees), though for the largest organisations, Lightstream is more likely to be considered essential.

Figure 5: Organisations saying “Lightstream is fundamental to what we do – we couldn’t operate without superfast Internet” by number of employees in Hull and East Yorkshire (per cent of respondents; subsample sizes between 6 and 24; n=181 in total)



When we examine other frequently stated benefits of Lightstream as reported by the survey respondents, we see that there are some variations by sector, as for the more general benefits, but that patterns are not consistent.

Figure 6: Organisations identifying three specific Lightstream benefits, by sector (per cent of respondents indicating they had experienced specific benefits; subsample sizes between 3 and 24; n=181 in total)



Organisations of many types say that Lightstream has improved their efficiency (including through the use of online services) ...

"Lightstream is excellent and allows us to work faster and more productively."

Marketing services company

"Lightstream has helped us to use more hosted services that can be accessed 24/7 ... we use Google's G Suite for Education now and we wouldn't have done that without Lightstream."

Secondary school

... and organisations in the arts/entertainment/leisure sector also highlight that Lightstream has increased competitiveness and helped to grow the business overall.

Apart from relatively small subsample sizes, the reasons for variations are most likely to do with the purposes to which a superfast broadband connection is put in companies of different types. For instance, an architect's practice will benefit from the efficiency of being able to more quickly transmit many large drawing files to clients and business partners; an arts venue, leisure centre or restaurant, for instance, may benefit more by being able to improve its online marketing presence by using a Lightstream connection to its own server, or to hosted web or ecommerce servers.

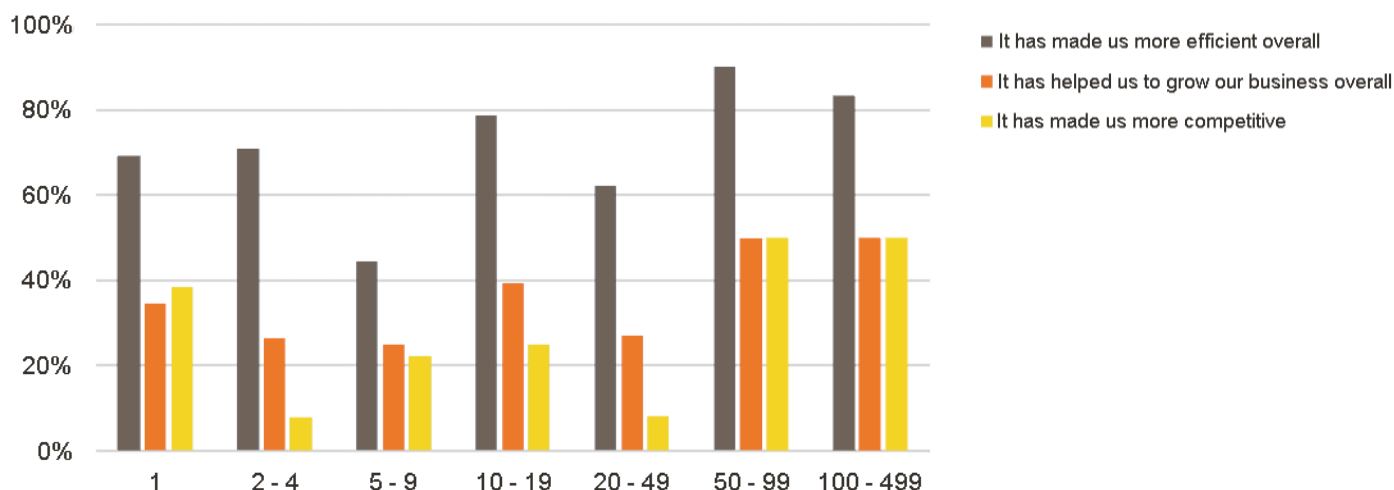
"Virtually everything we receive now – drawings and specifications – is electronic, delivered over the fast fibre Internet ... Lightstream has been very good since it was installed. We have grown and there are a lot more people connected to the Internet than before and there is no noticeable slowdown."

Engineering contractor

Benefits of Lightstream appear largely independent of the size of the organisation (measured by number of local staff), as Figure 7 shows (though there is a slight increase in the stated benefits of Lightstream with

increasing staff numbers). Note that our research focused on Lightstream customers, who are mostly small and medium-size organisations (large corporate enterprises tend to have already had high-speed leased-line Internet access or be served by national providers in the case of larger, multi-site companies). Larger organisations with more than 500 local staff were not represented in our survey sample.

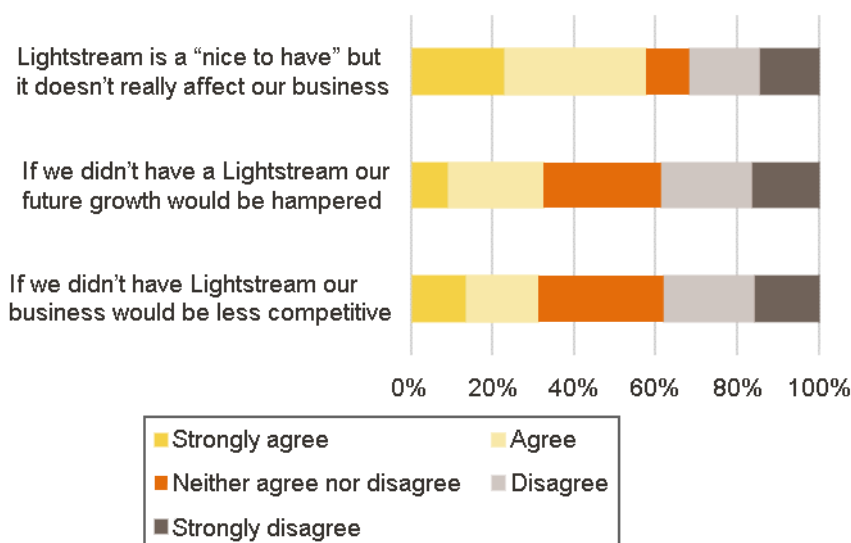
Figure 7: Organisations identifying three specific Lightstream benefits, by number of employees in Hull and East Yorkshire (per cent of respondents indicating they had experienced specific benefits; subsample sizes between 6 and 24; n=181 in total)



“Very fast broadband would benefit anyone that needs to collaborate online – from sole traders to multinationals. I don’t think the usefulness is dependent on the size of the business.”
Specialist IT services provider

We also asked the organisations we surveyed about the overall impact of Lightstream on their activities. Figure 8 shows the strength of agreement with three statements about Lightstream.

Figure 8: Strength of agreement with three statements about Lightstream (per cent of respondents answering; n=177)



The chart suggests that around 30 per cent of organisations think that Lightstream has had an impact on their business, with around 60 per cent believing that Lightstream is more of a “nice to have”; 40 per cent of organisations say *either* that future growth would be hampered, or the business would be less competitive, if they did not have Lightstream.

“I think it allows us to be more competitive than companies elsewhere. We have an edge from a technology point of view ... one of our USPs is a two-way video interviewing system. If you have poor Internet you can’t do that because it will be glitchy, and it doesn’t look good for you or your client or the candidates.”

Recruitment consultancy

In addition to the benefits of Lightstream to business customers, there is evidence from the survey that a small number of new businesses have been created locally because of Lightstream (five companies we spoke to said it had been a factor in their decision to establish the business in the Lightstream area). We have taken this into account in our economic impact calculations.

The significance of the “digital economy”

Research carried out for KCOM in 2015 investigated the significance, and size, of the “digital economy” in Hull and East Yorkshire, arguing that it was much larger than simple measures based on the turnover of companies active in a few specific sectors such as IT and communications services, or the supply of computing hardware. Rather, KCOM argued that the activities of most companies relied on digital technologies to carry out their work – to a greater or lesser degree – and the dependence of companies on the digital economy was growing. Such a view is widely accepted today, even though some industries are, naturally, less “digital” than others.

The current work examined the relationship between the economic benefit of Lightstream and the significance to organisations of the digital economy. Our definition of “digital economy”, used in the 2015 research and current research is:

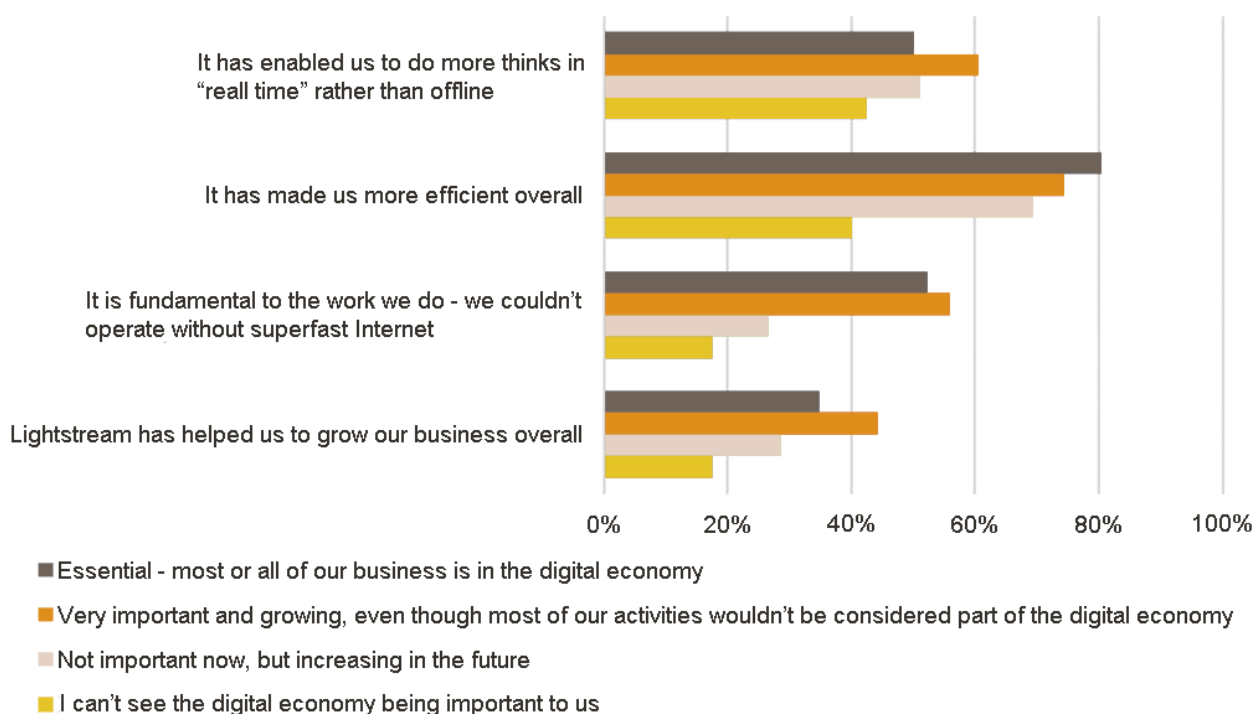
***“An organisation is definitely part of the digital economy if the products and services it offers help consumers or businesses to do things online (e.g., computers, communications equipment and IT services); help consumers or businesses to use connected technologies; need customers to be online or using IT and communications technology to use them (examples include digital content such as music, video or games).*”**

***“Some of an organisation’s activities are in the digital economy if the products and services it provides are bought or consumed using online or other technologies (e.g., it might be a retailer with an online shop, or an estate agent or other professional service whose work is delivered online).*”**

“An organisation is not part of the digital economy if it is connected to the Internet and uses IT and communications technology but does not fit the descriptions above.”

Figure 9 shows the responses to four of the Lightstream benefits questions, broken down by how important respondents said the digital economy was to them.

Figure 9: Percentage of organisations identifying specific benefits of Lightstream, broken down by extent of involvement in the digital economy (n = 178 in total)



What this chart reveals is that those who say the digital economy is essential or very important to them were much more likely to say Lightstream had helped them to grow their business, and to rate it as fundamental. But even for those for which the digital economy is less important, a significant proportion believe Lightstream has made them more efficient, and has enabled them to do more things in real time.

With the digital economy growing, we would expect the benefits of Lightstream to be felt widely across the region: 32 per cent of organisations we polled said they expected the percentage of their business related to the digital economy to increase in the next 12 months.

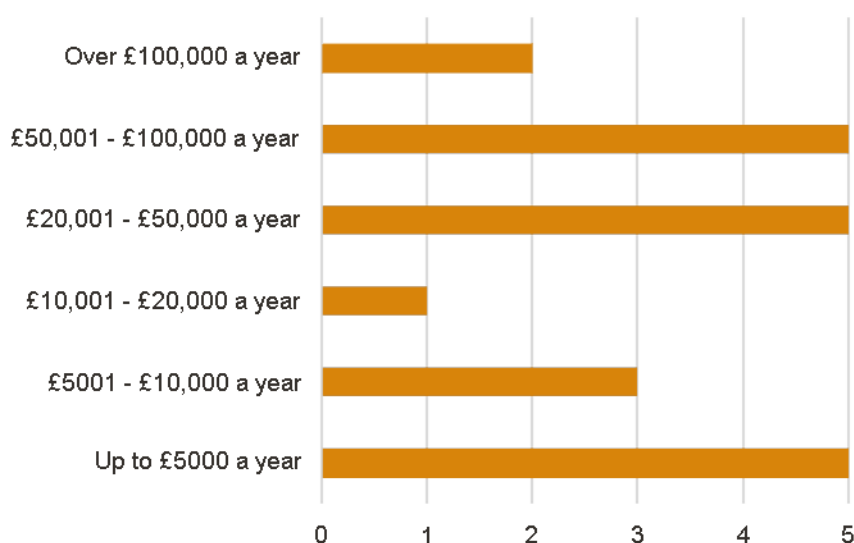
Any communication that is fast – that you can use to exchange data – has to be a benefit ... If everyone has a fast connection, it's better for industry. Times have moved on: it's not just a few people passing a market stall and a hope that someone will buy – there is all sorts of industry that can have global connections, and the world is your oyster."
Engineering contractor

Businesses run from home

In parallel with the survey of business Lightstream customers we surveyed consumer Lightstream users to ask about their use of the service to run a business from home, or to work from home. In total 213 responses were received to an online survey; 21 respondents were running a business from home.

The types of business run from home among the Lightstream consumer survey respondents were unspecified consultancy businesses, professional and healthcare services businesses, and trades. Some businesses were very small in revenue terms (around a quarter generated under £5000 per annum). Others, though, were larger concerns (see Figure 10) and some were big enough to employ staff other than the business owner: a third of the run-from-home businesses in the survey employed at least one other person.

Figure 10: Turnover of companies run from home among Lightstream customers (n = 21)

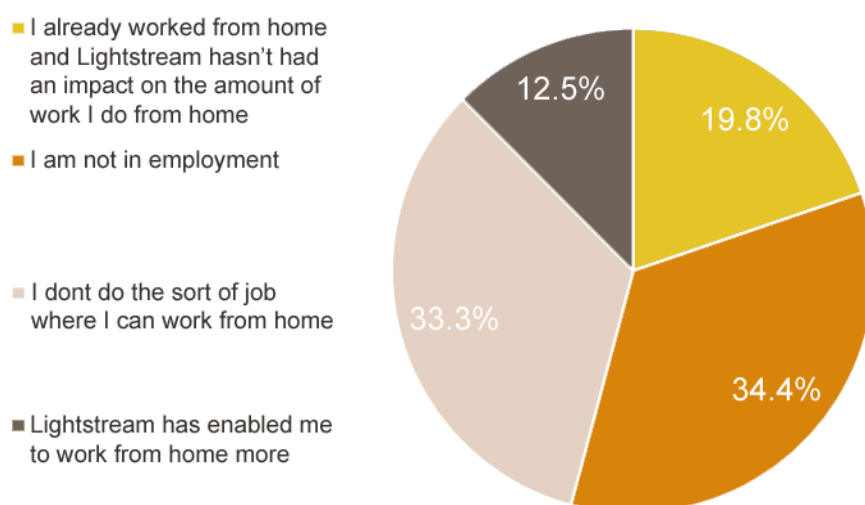


Most of the home-based businesses we surveyed said that Lightstream had not been a factor in business growth, but a minority did attribute revenue growth to Lightstream: in the case of one online service company, growth of 30 per cent in the past 12 months, but more typically, 5 per cent.

In addition to those Lightstream customers already running a business from home, a further 10 respondents (4.7 per cent of the total sample; 5.2 per cent of those not already running a business from home) said they were either planning (1.6 per cent) or considering (a further 3.2 per cent) running a business from home.

Figure 11 shows that 12.5 per cent of consumers surveyed – excluding those running a business from home – felt Lightstream had enabled them to work more from home.

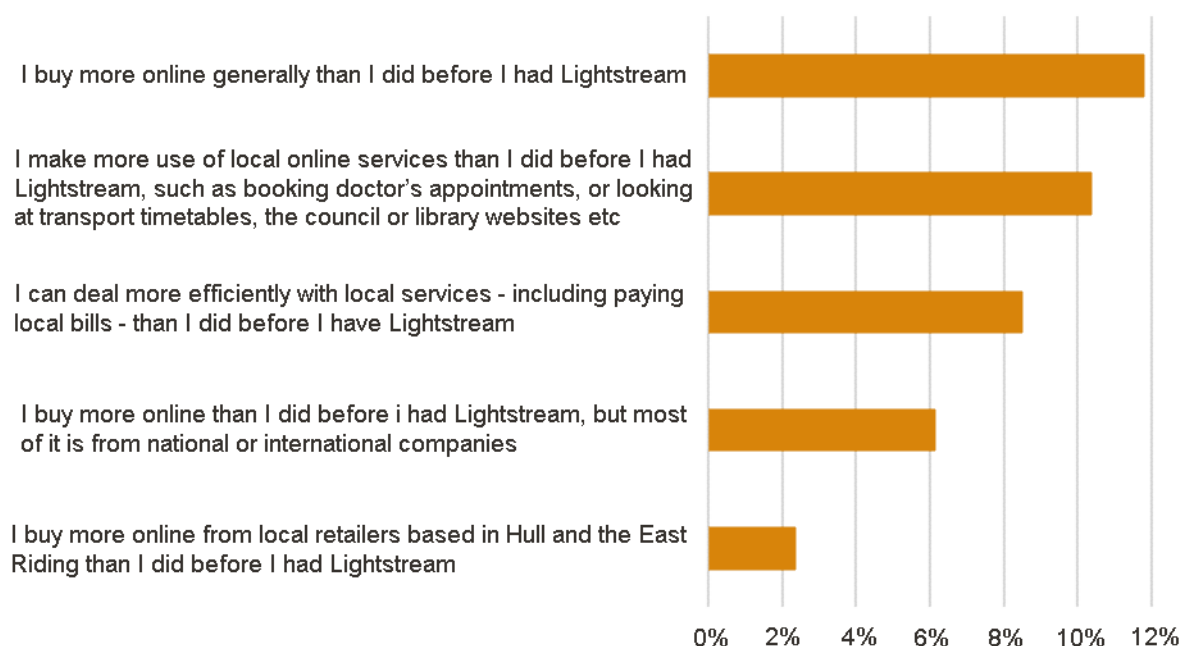
Figure 11: Impact of Lightstream on home working among residential consumer Lightstream customers not running a business from home (n = 191)



Local economic impact of Lightstream on residential consumers

We asked residential Lightstream customers about how the availability of Lightstream had affected what they do within the local economy. Two thirds of respondents said that Lightstream hadn't made a difference to the specific things we asked about, but there was evidence that Lightstream availability has increased use of local online services (8 per cent of respondents) and increased the efficiency of such interactions (10 per cent of respondents) (see Figure 12).

Figure 12: Changes in behaviour among residential customers after switching to Lightstream (n = 213)



In addition, some home workers in businesses we surveyed were explicit about the benefit to the local economy of being able to work from home.

"Fast broadband is very important. It allows people to be employed locally. My business is based in London, so if I wasn't able to operate effectively, they couldn't employ me."

Specialist IT service provider

The measurable value of Lightstream

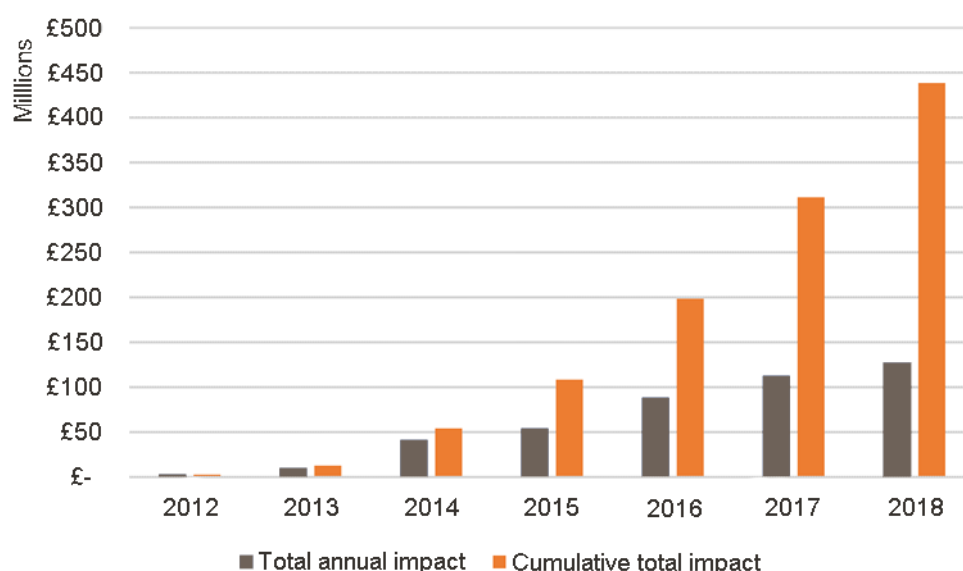
In measuring the local economic impact of Lightstream, we have combined data from our survey, KCOM's Lightstream rollout data, and government business statistics for Hull and East Yorkshire. We have used time series data to estimate the impact year-by-year and cumulatively from the first year of Lightstream rollout (2012) to the end of 2018. The Annex on page 17-18 shows how the data sources were combined.

We estimate that, cumulatively, since the beginning of 2012, the full fibre service has contributed to Lightstream customers in Hull and East Yorkshire:

- £234 million in extra Gross Value Add (GVA)
- £204 million in salaries of additional staff employed as a result of growth attributed to Lightstream
- £1.72 million in revenues from small (non-VAT-registered) business run from home.

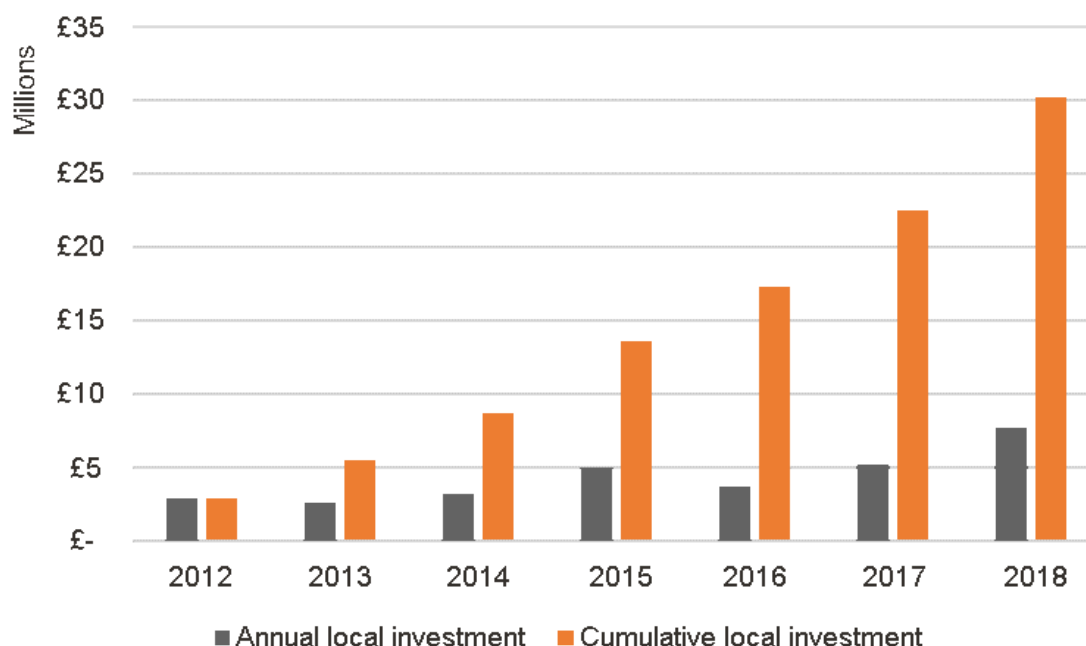
Figure 13 shows this on a year-by-year basis; as more Lightstream business customers are connected each year, the annual value increases. By 2018 we estimate that Lightstream was contributing economic benefits worth £127 million annually.

Figure 13: Economic impact of Lightstream service 2012–2018



In addition to this economic impact, KCOM's cumulative direct investment into the local economy is estimated to be £30.3 million. This is shown in Figure 13 for each calendar year from 2012 to 2018. We have used KCOM's own data, counting only the value of the investment in full-time-equivalent (FTE) staff working on the Lightstream project, and spend with local contractors. It excludes spend on network equipment and materials – assumed to be sourced ultimately from outside Hull and East Yorkshire – as this spend does not in itself impact the local economy.

Figure 13: KCOM's Lightstream-related investment in the local economy



Conclusion: Lightstream is a major enabler of the local economy

In conclusion, the survey responses show that Lightstream makes a difference to businesses that use it; those organisations that have Lightstream gain measurable benefits. Qualitatively too, customers point to a number of real advantages of the service over previous connectivity. Such advantages are not simply related to the speed of data transfer downstream and upstream, but to the changes to ways of working, the opening of new markets and the increase in competitiveness that Lightstream has enabled.

Our modelling work suggests that the cumulative value added to the local economy is significant. Uptake is likely to continue to rise, and the benefits from the service should be sustained, and even grow as more customers migrate to the service. And as more of the economy – globally, nationally and locally – becomes “digital”, Lightstream will become even more important for businesses in Hull and East Yorkshire.

Annex: How we did the research and impact assessment

Structured online and telephone surveys

We ran a combined online and telephone survey of business Lightstream customers (including non-profit organisations). The total sample for the combined online/telephone survey was 181. Not all respondents answered all questions.

The survey questionnaire was designed to provide quantitative and qualitative inputs to our economic impact assessment, and to provide KCOM with information from the customer base about perception of Lightstream and KCOM as a whole, and about various commercial and operational issues (analysis of these questions is not presented in this report).

We asked questions about:

- Company activity (general and detailed)
- Demographics (staff numbers, growth, location, sites, parent company size / location etc)
- Growth in local staff numbers, revenues or turnover, and profits, and the growth attributable to Lightstream, over the previous 12 months

- Spend on equipment in relation to Lightstream
- Significance of Lightstream to the organisation (list of options) and strength of agreement with statements related to Lightstream's impact on the organisation
- The significance to the organisation of, and its preparedness for the "digital economy" (using our broad definition – see page 13)
- Other KCOM services used
- Rating of performance and reliability of Lightstream and KCOM
- Factors influencing Lightstream performance
- Business priorities for the next 12 months.

The sample breakdowns by number of employees and sector are shown in Figures A1 and A2.

Figure A1: Business survey sample breakdown by number of employees (n=181)

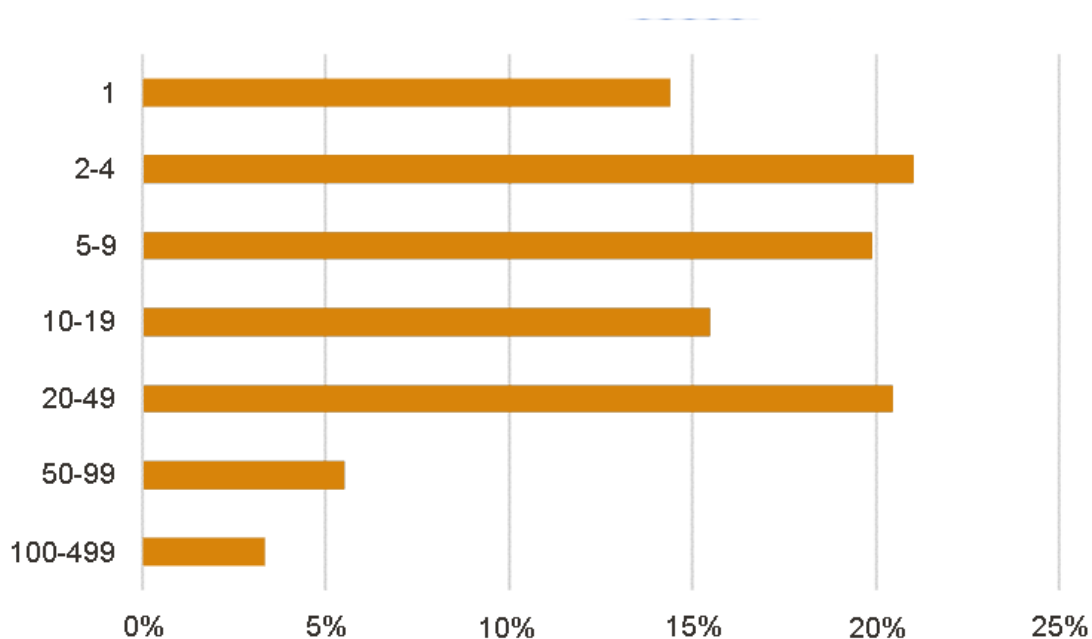
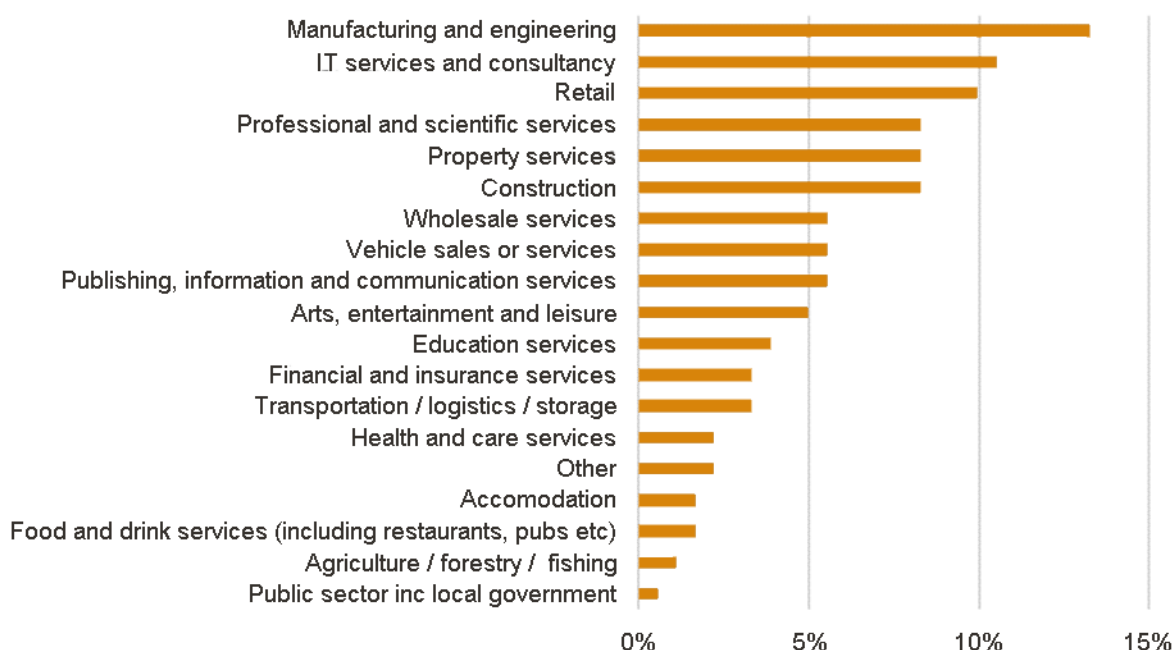


Figure A2: Business survey sample breakdown by number of employees (n=181)



Our sampling design was based on the requirement to achieve a reasonable spread of responses across the Lightstream business customer base while ensuring that no specific sectors or size bands dominated the sample (quota caps were set). In using the survey data for economic modelling, responses were weighted back to the business size demographics of Hull and East Yorkshire.

In parallel, we ran an online survey of 213 residential consumer Lightstream customers, asking questions about

- Whether a business was run from home, and if so
 - Type, size (staff and revenues)
 - Influence of Lightstream on setting up and operation of the business (including strength of agreement with statements about Lightstream)

- Influence of Lightstream on working from home, and plans to set up a business
- Ways in which Lightstream is used that have a local economic impact
- Other KCOM and online services used
- Rating of performance and reliability of Lightstream and KCOM
- Factors influencing Lightstream performance.

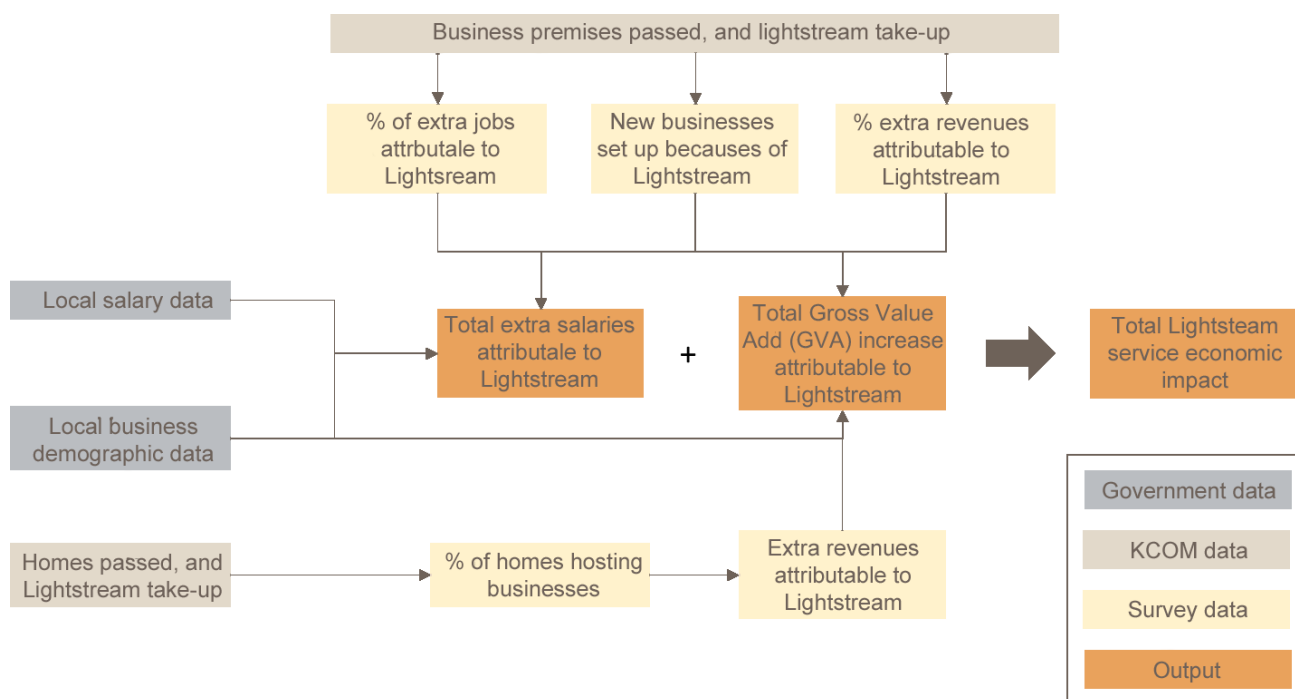
In-depth telephone interviews

We conducted additional in-depth telephone interviews. Ten in-depth telephone interviews were undertaken with selected small businesses responding to the surveys. The businesses selected were those whose survey responses suggested they were using Lightstream to develop their business, or that identified interesting drivers of, or barriers to, digital economy growth. Selected responses to these interviews are included in the report.

Economic impact modelling methodology

Our economic impact modelling process is depicted in the chart below. Note that in order to calculate GVA, we asked survey respondents about costs, including equipment purchases and salaries, and profits as well as revenues.

Figure A3: Economic impact modelling process



Direct investment by KCOM is added to this.

This report has been prepared by Innovation Observatory Ltd at the request of KCOM. Any enquiries about the report should be directed to the project director:
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