University Centre Peterborough

UCP

The impact of gigabit connectivity in Peterborough

In partnership with

CityFibre

Contents

Peterborough: A Gigabit City

In October 2013, CityFibre announced they would be transforming Peterborough into a Gigabit City with the build of a 90km city-wide pure-fibre network. A year after signing a strategic partnership with Peterborough City Council, CityFibre had built approximately 70% of the gigabit network, identified hundreds of council sites for connection and encouraged more than 25% (1000+) of the city's businesses to register their interest in gigabit speed connectivity. The demand from the business community and the vision of Peterborough City Council were instrumental in bringing this ultra-fast pure fibre network to the city. The plea from businesses also led to this network being expanded to include business parks in Fengate, Lynch Wood, Orton Southgate and Cygnet Park.

In early 2015 the initial build was completed and Peterborough became one of the best digitally connected cities in the UK. With over 4000 businesses within reach of gigabit speed services up to 100x faster than the UK's average. The city now has a world-class modern digital infrastructure that supports an emerging generation of gigabit speed services direct to business premises. Its public sector sites are also directly connected to a dedicated, resilient and pure-fibre infrastructure.

Less than two years after CityFibre began construction on its Gigabit City network, Peterborough City Council trebled its utilisation of the pure fibre infrastructure and has connected a further 220 new sites via its ICT Managed Service Provider Serco. The sites comprise CCTV cameras, Wi-Fi connections and a network of Information Traffic System locations. By migrating these sites from legacy connections on BT Openreach to CityFibre's pure fibre network, the Council will not only increase its technical capabilities, but reduce operating costs.

Once connected, the new sites will enable the Council to introduce High-Definition CCTV and Wi-Fi based cameras that can be moved around in place of fixed point cameras. With increasing reliance on CCTV for security and traffic management purposes, movable HD cameras represent an invaluable upgrade to their capabilities. By leveraging the unlimited capacity of a pure fibre network, the technology can be easily accommodated without an increase in costs – something that is impossible on traditional copper networks operated by incumbents.

The available speeds prior to the Gigabit City Peterborough network deployment were too slow for many businesses' needs and the disparity of high speed broadband availability resulted in staff being unable to work effectively in their offices. The unreliability of copper based infrastructure resulted in businesses being unable to embrace technological advances such as Voice over IP or cloud solutions. Improvements to a business' internet network either lacked a suitable timescale or resulted in large financial costs to the end user. Many of the businesses felt high speed internet was needed for them to not just grow but to continue to provide services to their customers, as technology continues to develop under the assumption that users have access to high speed or ultra-fast internet connectivity.

The 120km Gigabit City network makes Peterborough one of the best connected cities on the planet, dramatically accelerating the digital capabilities of businesses, local government, schools, hospitals and mobile operators. As a Gigabit City, Peterborough is already future-proofed as the thirst for greater bandwidth continues to grow exponentially over the coming decades.

About Peterborough

Peterborough has a diverse and robust economy with six high performing business sectors - advanced engineering & manufacturing, agri-tech, food & drink, digital & creative, energy & environment and financial services.
From innovative SMEs to large global headquarters, the local companies are pushing the bounds of innovation and sustainability, and they're growing.

2014 saw a record 1,918 new companies started in Peterborough, compared with the 2013 year-end total of 1,503. The Net company growth in 2014 (the balance between business births and deaths) was also at a record high of 825, compared to the 2013 figure of 596.

Peterborough is a medium-sized UK city and was awarded the 2015 global Smart City Award, recognising Peterborough's commitment to becoming the UK's first circular city and its environment capital vision, beating larger competitors – including Moscow, Dubai and Buenos Aires.

The report

CityFibre recruited Aaron Rowinski, a student from University Centre Peterborough, as part of a bursary to conduct the research and produce an independent report to explore the impact that gigabit connectivity has had on Peterborough and to test if it lives up to its claims.

In order to understand how such projects benefit the local area this report will explore gigabit connectivity against the following criteria:

- Reliability
- Remote working capabilities
- Future demands
- Customer expectations
- Competitiveness
- Business needs
- Productivity
- Financial savings/implications

Examples of similar reports and case studies can be found later in the report.

Method – The CityFibre and UCP report

Participants were chosen from contacts CityFibre identified as users of their gigabit internet connection. Thirteen people were interviewed in total, covering a range of sectors; tech, hospitality, media and public. Interviews were transcribed to be coded for analysis. The coding was processed using Grounded Theory (Matthews and Ross, 2010).

The transcriptions were initially analysed using open coding to identify themes and categorising the data into tables. Axial coding was then used to explore the relationships these themes had to each other before data was interpreted with selective coding to find the core themes of experiences.

These were; before gigabit connectivity; the reasoning behind taking up gigabit service; and present experiences with gigabit internet connectivity. Quantitative data from NOMIS (2016a) and Opportunity Peterborough (2015) was examined in relation to participants' answers.

User experience before gigabit internet

The participants' experiences with internet connectivity before the gigabit internet connection were focused on four areas.

1. Slow speeds
2. Expense of expansion
3. Reliability
4. Ineffective remote working

Slow speeds

The connection speeds available to businesses was universally perceived as too slow for them. Participants equated these limited speeds to their businesses being unable to meet their needs, such as their ability to compete with businesses with access to good internet infrastructure or adopt improvements in data security systems. Participants also discussed how the slow speeds were affecting their ability to meet the needs of their customers. One business was unable to run the online element of their store from the store itself, losing them business. Others were unable to offer services rivals were able to, such as video conferencing, or respond to customers within expected timescales. Participants deemed these problems to be ultimately damaging their business growth.

"Before we had a gigabit connection our business internet connectivity was dire. So much so, we launched the 'yes to fibre' campaign to try and bring fibre to our business park – we succeeded and CityFibre extended the network to reach us!"
- Lindsey Hall, EasylifeIT

Expense of expansion

Those who looked to expand bandwidth were limited to purchasing dedicated leased lines or installing more lines into the premises. Participants noted that upgrading of the internet infrastructure by other suppliers lacked reliable timeframes and was prohibitively expensive. Both the expansion options were noted for the sizeable increase in monthly costs. Current costs for a leased line from BT (2016) cost anywhere from £239 a month for a 10 megabyte connection to £487 a month for a 100 megabyte connection, excluding connection fees. The unreliability of

the network and the slow speeds had led some to adopt mobile internet services but as Uswitch (2016) indicate, these often come with more restrictive download limits. One participant noted that the download limitations within one of their offices had caused them to have to limit access to the internet and had meant they had to pay out for exceeding their data cap, which can be prohibitively expensive.

"What we get from BT is so inadequate that I have to have a leased line. They wanted to charge me over £800 a month to get the speeds I need to run my business" - John Bridges OBE DL, Chief Executive of Cambridgeshire Chambers of Commerce

Reliability

Broadband provision was noted by many participants to be unreliable. Voice over IP (VoIP), by those that wanted or needed it, was commonly not accessible via other internet providers due to outages and the slow speeds available. One of the participants noted this was because of the reliance on old copper wires for providing connectivity and a lack of fibre to the premises. The copper wires commonly used to connect broadband cabinets to premises are not built with the long term in mind and become more unreliable with age as well as being slower to transfer information than a pure fibre network. Participants also commented on the lack of service level agreements on fixing line faults.

Ineffective remote working

One of the participants found they and other members of staff were feeling forced to work from home rather than the office, as internet provision to their households was more reliable. This limited working options and would have had cascading effects on office usages and reduced productivity, as comments were made about staff coming to the office and choosing to leave as they were unable to do what they wanted to do. Another participant commented that internet provision to their home was very poor compared to their office, although they still found the internet speeds at the office too slow for business needs. Without the connectivity speeds, VoIP or cloud services were unable to be utilised. These were not only services the participants had commented on simply wanting but are necessary for home working solutions to be efficient. Gigabit was seen as a solution for improving data sharing techniques and home working.

"It's made a massive difference to the businesses we work with, they're able to actually do business much more efficiently and effectively, which a lot of our customers struggled with before" - Claire Swindale, GreenCity Solutions

Reasons for needing gigabit internet connectivity

Participants indicated a number of reasons for needing a gigabit connection beyond just the increased speed.

Future proofing

The council and businesses noted that technology and infrastructure reliant on the internet appears to be increasing exponentially. An increase in program sizes and their demands on the internet, the moving of data and servers by many providers to the cloud, and the sharing of ever increasing file sizes via the internet have meant that increased speeds were needed.
A fundamental shift was required to maintain competitive advantage and continue to provide customers with the high level of service they expect. This sentiment of gigabit connectivity helping future proof a business has been shared by a recent Institute of Directors (IoD) report (Lewis, 2016) that suggests that Ofcom's forecast of data consumption is an underestimate as it misses the increased adoption of 3D technology and the inclusion of data sharing technology in many everyday things.

"With the arrival of CityFibre's gigabit speed internet network, Peterborough businesses can now benefit from a future-proof digital infrastructure that gives them a competitive edge"
- Tom Hennessy, Opportunity Peterborough

Opportunity Peterborough

Customer expectations

Participants found that customer expectations had risen, in part due to the high speed internet connectivity available in other countries and from home. Customers want to be able to access information quickly and easily and expect responsiveness and speed from companies they buy from. As discussed in the previous section, there is easy private access to high speed internet and places outside of the UK such as Estonia, Lithuania and Singapore have access to fast, free, public Wi-Fi (Zaliauskiene, 2016). This has also been shown in research by Liao and Cheung (2002) who looked into customer perspectives of online banking, who found that the speed of the network connection was important for customers who wished to use it.

"Previously some of our guests have mentioned that when they've stayed at other hotels in the area, they are unable to stream their television and that simply isn't a problem here and they've commented how wonderful it is. That's hugely positive for us" - Howard Vacca, The Bull Hotel

Business needs

Many of the participants identified that ultra-fast connectivity was needed for their business. This would enable them to improve efficiencies as business technologies advanced to be able to offer superior service to their customers. There were concerns that any business not doing so would soon be facing issues with their connectivity as programs and hardware begin to assume people have access to high speed internet, for example the increased demand for video conferencing. The IoD report into broadband provision (Lewis, 2016) has shown that the United Kingdom lacks the upload speeds seen in other countries, something that is necessary for VoIP and the increase seen in file sizes. This report also found that the government's new Universal Service Obligation to ensure everyone has access to a connection of at least 10 megabits per second by 2020, will significantly underserve the public who do not have the same demand on internet connectivity as business does.

"For us the connection is very important. In our magazine finishing business we are transferring a huge number of images and files on a weekly basis, It's time sensitive so we can't afford any delays. So for us, high speed, reliable internet is really, really important"
- Marco Cereste, Cereste Holdings Ltd

Experiences with gigabit connectivity

Participants' experiences with their ultra-fast gigabit internet connections showed several commonalities alongside the improvements in speed.

Competitiveness

Businesses felt that they and the city have become more competitive. For the businesses the gigabit connection had allowed them to stay ahead or in line with competition, as they were better able to provide and respond to customer needs and changes in the market. Participants commented on the increase in customer expectations and that the gigabit internet speeds had increased the reaction times of requests both internally and externally. Within the hospitality sector particularly, international customers had an expectation of internet services being capable of handling cloud and streaming services and being able to contend with this was important for the business to retain and win more customers.

Participants had also observed an increase in businesses attracted to Peterborough and growth within the tech sectors. Comments were also made about the likelihood of further growth in the tech sector, with Cambridge's limited connectivity working poorly for tech based industries used as an example. With there being a limited number of cities with affordable gigabit connectivity available within the UK (Exa Networks, 2016), Peterborough has a competitive advantage over many other cities. This has been seen in an overall increase in businesses in Peterborough.

From 2012 to 2015 there has been a 15.83 percent increase, with the largest increase coming between 2014 and 2015 (NOMIS, 2016a). As seen in Stockholm (Forzati and Mattsson, 2013) and Chattanooga (Remy, 2013), Peterborough has also seen an increase in tech sector employment. As of 2014 (Office for National Statistics, 2015) there was a 34.62 percent increase in the tech sector. There are a variety of factors that will attribute to this figure but evidence from Stockholm and Chattanooga (Forzati and Mattsson, 2013; Remy, 2013) has shown similar correlations between gigabit availability and growth. Other research has linked gigabit with a rise of around 1.1 percent in GDP in American cities with access to ultra-fast internet (Sosa, 2014). These pieces of research are indicative of how gigabit could be positively effecting Peterborough's growth.

'More than 1,900 businesses were registered in 2014 making it a record year for start-ups in the city'
www.keycities.co.uk
July 2015

Improved communication between sites

The improvements to the asynchronicity of the upload and download speeds from gigabit internet connections had allowed businesses with multiple sites to improve data sharing techniques. Participants spoke of using VoIP effectively to communicate with remote working employees, resulting in improved productivity. Other participants had used cloud services to share documents in real time allowing them to respond to customers faster and better manage interoffice workflows.

The uneven speeds between uploads and downloads had previously resulted in file sharing and data backups being excessively time consuming, damaging productivity. This had knock on effects for data security, as remote backups could interfere with working patterns and result in them being cancelled or avoided. Business integrations between suppliers and partners had also improved, having a positive effect on customer relations and service level agreements. This had occurred through embracing cloud solutions, which had led to faster response times from better data sharing and management. The council for example is now able to embrace the idea of the Internet of Things (Van Kranenburg et al., 2011), a network of data collection devices that can gather and share information, to upgrade Closed Circuit Television systems and make improvements to traffic management. This is similar to the Smart Grid seen in Chattanooga (Remy, 2013) that has been used to improve efficiencies in the city's power grid, reducing the lengths of outages and saving the city money.

Financial savings

Some participants could not directly identify immediate financial savings with the gigabit connection as it often correlated with investments in new programs and services that assisted with financial savings. These include cloud computing solutions, which research conducted by Integra (2014) found to be saving businesses money. This same research (Integra, 2014) linked restrictions in bandwidth, notably the lack of synchronous upload and download speeds, with limiting businesses ability to adopt these services.

Participants commented on previous connectivity issues restricting uptake of VoIP. Using VoIP participants were able to save money on their phone calls and line rentals.

"The VoIP service has been a great addition. It has brought the cost of our telephone calls down and that means we've been able to pass the benefit onto our customers with a reduced tariff for using the phones in their rooms"
- Howard Vacca, The Bull Hotel

Gigabit internet connectivity had allowed a consolidation of phone and internet lines, with some participants needing multiple of each, into a single connection. This not only had the potential to bring financial savings but also improved service standards as only a single provider needed to be contacted. Participants who had previously used leased lines or had needed to install more connections to achieve the required connectivity speeds commented on the fact that these often cost 2 to 3 times more than the gigabit connection, without being as fast or reliable. Participants discussing financial savings indicated that the gigabit connection had allowed the business to grow and make more income, often through improved efficiencies.

Productivity

The improvements to upload and download speeds increased staff's ability to work on and share files, even to the point of processing emails faster. Ofcom (2016) register average standard broadband speeds of 13 megabits per second and average superfast broadband speeds of 71 megabits per second in Peterborough. Comparing these to a gigabit connection with downloading a 100 megabyte file there is a significant difference. The standard broadband connection would take around 18 seconds, the superfast connection around 8 seconds while the gigabit connection would take less than a second (T1 Shopper, 2016). This can save staff a meaningful amount of time over the course of a working day and participants commented on this being the case. Some participants discussed how large file transfers could put staff members out of action until it had finalised. Adaramola (2012) found links between worker stress and events that block adequate performance, such as internet outages or slow download speeds, which in turn then cause harm to future productivity.

"One of our customer's previous connection was so slow uploads usually failed and took so much time as they had to restart the whole process again. They got further and further behind. The gigabit connection has now fixed the problem!" – Alice Rowberry, Hello Voice

Remote working

Comments were made about an increase in hot desking and remote working within the council as intersite connectivity has improved. Businesses were often already using home working as, previous to connecting to gigabit, home connections were commonly faster. Gigabit has made this a more viable option however, as the office can now cope with the interchange of data by making use of Virtual Private Networks and cloud solutions, but ultimately has made office space more effectively used.

Additional benefits

Businesses' overall usage of internet connectivity has remained similar to their pre-gigabit connection, but with an emphasis on the increased effectiveness and productivity of staff and systems. Participants felt confident in looking to embrace technology and practices in the future that they felt would improve their business. Businesses were further embracing cloud and VoIP technology, with less concerns over losing connectivity.

Internet connectivity: The 4th utility

Although the connection had made noticeable differences to things like productivity, many participants commented on how the connection had become efficient and unnoticed unless there was interruption to the service. These drops were still significantly faster than the previous connection but staff had quickly adapted and become used to the higher speed of the connection.

This becomes a catch-22 for the gigabit connections. It has been working so well that businesses are able to grow, perform and develop effectively without concerns of losing connectivity, a requirement for many of the participants spoken to as well as many businesses in the near future (Lewis, 2016).

However, it has also meant that businesses do not necessarily think of it instantaneously when measuring productivity, customer satisfaction and growth. Previous research into gigabit connected cities indicates a direct correlation between productivity, customer satisfaction and growth (Forzati and Mattson, 2013; Remy, 2013; Sosa, 2014), and other research has shown how an invisible connection can benefit staff's mental wellbeing (Adaramola, 2012).

"We take it for granted now. When we switch on we know we're going to get ultra-fast speeds we don't even have to think about"
- Andy Tatt, Peterborough City Council

Demand from others

Businesses who had spoken to partners or had conversations with other businesses, both nationally and internationally, about internet connectivity had noticed that there was an increased demand for gigabit internet speeds.

Some of these conversations mimicked the apparent divide between private home connections and business connectivity discussed earlier in this report. Others highlighted that gigabit connectivity had helped cement business relationships as they were able to implement systems and programs business partners used. Some participants argued that there was more private demand for gigabit speeds, particularly around the Hampton area where there are a number of home workers.

"I've talked to a lot of businesses and many of the new arrivals in the city, one of their determining factors for their location in Peterborough is connection speed"
- Simon Machen, Peterborough City Council

Participants had also noticed an increase in businesses attracted to Peterborough and new business starting up in the areas around them and felt this highlighted how Peterborough had become more competitive because of having gigabit connections. Some of the participants had had discussions with other businesses who had considered leaving Peterborough and then chosen to remain as Peterborough's internet infrastructure was now able to service them.

Participants were also impressed with the timeframe and limited disruption for implementing this infrastructure especially those who had had dealings with other providers and the lack of SLAs.

"The ultra-fast network has allowed us to focus purely on our business, saving us time and money. We now have an amazing super speedy internet connection and are delighted with the services offered by the Eco Innovation Centre"- Tracey Rushton-Thorpe, Keystone Communications

Conclusion

This report has demonstrated the effects ultra-fast gigabit internet connectivity has had on the city of Peterborough. Businesses that have begun using the gigabit infrastructure have experienced positive effects on their growth, productivity, competitiveness, ability to communicate and serve customer and business needs. These effects have reflected on Peterborough, showing how important a role gigabit internet connection has played in the city and its development.

As the Institute of Directors (Lewis, 2016) showed in a recent report, ultrafast internet infrastructure is growing ever more important. Gigabit connectivity is becoming more important for businesses and having access to it within Peterborough will continue to increase the businesses attracted to the city and the number of start-ups beginning and staying in business in Peterborough. The gigabit connection in Peterborough is future proofing the city and allowing it to stay ahead of competition.

Peterborough City Council has already begun to utilise the gigabit network for smart solutions to improve CCTV and traffic management, similar to what can be seen in Chattanooga and Stockholm. The increase in tech businesses seen in these cities has begun to occur within Peterborough and further growth is expected to follow.

The research undertaken previously has shown the increase of GDP and individual business growth that come from gigabit connectivity. Participants highlighted the occurrence of such within their businesses and looking forward Peterborough is likely to follow the trends seen by Sosa in 2014, with Peterborough's GDP increasing by around 1 percent.

Further longitudinal research should be undertaken as the gigabit connection in Peterborough is developed and embraced by more businesses to further understand the impact it has had on the city.

The gigabit connection in Peterborough has followed the trends seen in previous research. The businesses that use it have improved their productivity, their competitiveness, their ability to communicate, serve customer and business needs and ultimately their growth. This can be seen reflected on Peterborough as a whole as well.

More businesses are succeeding in Peterborough, choosing to come to Peterborough, starting in Peterborough and the city is growing. Gigabit internet connectivity has become an important and integral part of the package of Peterborough. Ultrafast internet connectivity is only going to grow to be ever more important for businesses and gigabit internet connectivity has allowed Peterborough to stay ahead of competition and help ensure it remains future proof.

"The ultra-fast gigabit connection has helped us to sell Peterborough, and it's one of the attractions to the city. It's brought a lot of people and businesses into Peterborough and that's what we needed"
- Councillor John Holdich, leader of Peterborough City Council

CityFibre customers - The Eco Innovation Centre (left) and The Future Business Centre (right), both multi tenancy buildings benefiting from an ultra-fast gigabit connection.

"The ultra-fast internet connection has allowed us to have the confidence to move forward with some of our ambitious plans and to think big. In time, this will not only benefit the visitors, but will help us to offer better facilities to our partners and improve event and education bookings - and help us plan for future events"
- Matthew Bradbury, Chief Executive, Nene Park Trust

About the researcher

Aaron Rowinski is entering his third year of a joint psychology and sociology degree and will be moving onto a research based Masters Degree.

Aaron began the research stage of the report by undertaking a qualitative analysis of interviews with key users and explored quantitative data provided by Opportunity Peterborough (2015) and from NOMIS (2016a).

The interviews highlighted the issues Peterborough businesses were facing, before the availability of an ultrafast connection.

Aaron Rowinski

Andy Starnes - CityFibre
Marco Cereste - Cereste Holdings Ltd
Rob Baldacci - GreenCity Solutions

About CityFibre

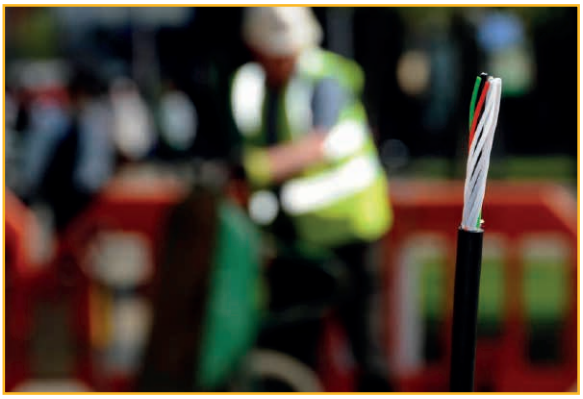
CityFibre is the UK's builder of Gigabit Cities and the national alternative provider of wholesale fibre network infrastructure. It has major metro duct and fibre footprints in 40 cities across the UK and a national long distance network that connects these cities to major data-centres across the UK and to key peering points in London.

The company has an extensive customer base spanning service integrators, enterprise and consumer service providers and mobile operators. Providing a portfolio of active and dark fibre services, CityFibre's networks address 28,000 public sites, 7,800 mobile masts, 280,000 businesses and 4 million homes.

The CityFibre network runs at symmetrical speeds and this means that the network is as fast at uploading large files as it is at downloading them. This is possible because the networks are pure-fibre.

Unlike other 'fibre' services, delivered using technology known as Fibre-to-the-Cabinet (FTTC), there is no copper cable to slow the connection down. With pure-fibre from the exchange right through to the business premises you get the most advanced digital connection possible.

CityFibre 'Breaking Ground' launch event March 2014



Ultra-fast pure fibre installation in progress

Background Research

Chattanooga Report by C. Remy
In 2013 Remy conducted research into the effects of gigabit infrastructure on the city of Chattanooga, Tennessee. Chattanooga provides gigabit broadband citywide through a network installed by The Electric Power Board (EPB). This network currently has around 3,500 residential and business customers. This network also works as a Smart Grid for the electricity network, helping monitor and automate power distribution and fault management.

Unlike the copper based broadband, the Fibre To The Home (FTTH) that EPB have installed is considered future proof, as it isn't limited to the 100 megabits per second that copper is and fibre has a fifty year lifespan. With access to an uncapped ultrafast connection the public library has been able to run technology focused events and help reduce the digital divide. These things were unable to happen prior to the gigabit connection as other suppliers were unable to provide fibre.

Since installing this network Chattanooga has created 6,800 jobs from large businesses and attracted $1.3 billion in business investment. The paper concludes that high speed internet is now a necessity for all aspects of a city, from public provision to business needs. Chattanooga's gigabit provision is unique however, as EPB is a non-profit organisation and is publicly owned, meaning provision is focused on providing what the city requires.

D. Sosa report on the effects of gigabit on GDP
In 2014 research was conducted into the general economic benefit of gigabit broadband in the United States of America (USA). Sosa (2014) explores whether gigabit broadband can bring the same economic benefits that came when broadband was rolled out to replace dial up internet.

14 communities across 9 states in the USA were classified as having gigabit broadband widely available, with on average over 70 percent of households within them having access to gigabit. Sosa (2014) compared these to 41 similar sized communities across 9 states who did not have access to these speeds, with an average of 1 percent of households having access to gigabit connections. Sosa discovered that the per capita gross domestic product (GDP) of the gigabit communities was around 1.1 percent higher than those that did not, with these communities gaining an additional $1.4 million in GDP.

This study lacks data on the reasons that gigabit caused this increased GDP. Nevertheless the comparisons between communities from across the USA, who would have differing funding focuses, does show the overarching effect gigabit can have on a region.

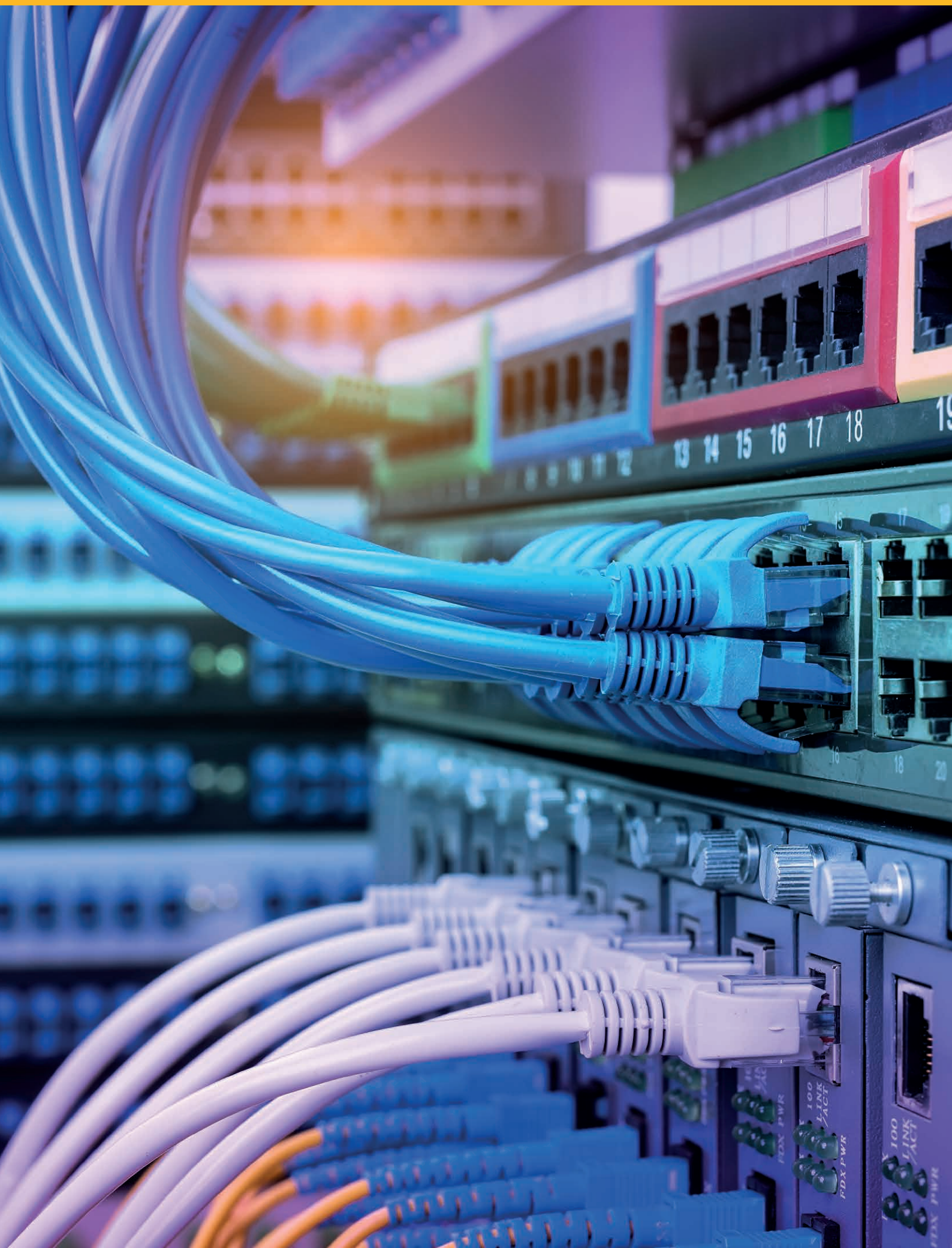
Forzati and Mattsson Stockab report
A larger study into the direct benefits of gigabit broadband was carried out in 2013 by Forzati and Mattsson. Forzati and Mattsson (2013) conducted a socio-economic study of Stokab's work in Stockholm. Stokab are the developers and owners of Stockholm's 1.25 million km passive fibre to the home network. This network supplies to industrial areas, all major healthcare buildings and urbanised areas.

Forzati and Mattsson comment that Stokab's infrastructure has improved Stockholm's business and information technology developments, including the growth and creation of Kista as a Science City, as well as being vital to the development of applications like Spotify and Skype. Leasing fibre in Stockholm is half the cost of similar leasing in other capitals across the world and this saving is linked with the increase in innovation in services. Stokab resell through a large number of telecommunications operators creating an equal ground for broadband competition, thus ensuring prices are low and services are comparable. This Forzati and Mattsson (2013) contrast with Copenhagen, where telecommunications group TDC installed and control the fibre network. Copenhagen does not have a future proofed network as TDC design the network around their own service needs rather than that of demand. This has resulted in fewer people having access to high speed broadband and higher costs for asymmetric connections.

Forzati and Mattsson (2013) argue this has had a noticeable effect on business creation and has resulted in more international businesses locating their Scandinavian headquarters in Stockholm, with there being a 69 percent difference between the two cities.

Stokab's network has enabled the development of smart options for water, heating and electricity. Monitoring and control systems are able to communicate effectively. The housing company, Svenska Bostäder, for example expect to save 30% in heating, electricity and water costs over a 20 year period.

It is highlighted in Forzati and Mattsson's (2013) report that there are also other infrastructure improvements in Stockholm that will have an effect on the increase in business and other economic activity but stress that keeping service delivery over the fibre network open to the market has fostered an improved environment for businesses.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- Chief Executive of Cambridgeshire Chambers of Commerce - John Bridges
- Opportunity Peterborough – Tom Hennessy and David Simpson
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