

enabling the digital future

Our Story

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1.0 VX Fiber At A Glance

1.1 Who we are

VX Fiber is an international fibre operator with extensive experience building and operating Active Open Access, full fibre networks in multiple countries around the world.

Headquartered in Sweden, VX Fiber has operations in South Africa, the UK, Belgium, Austria and Germany. With over 20 years' experience, it has broadened its operations from acting solely as an Active Open Access neutral fibre operator to also being a fibre builder and investor.

As a neutral fibre operator, VX Fiber partners with owners of passive infrastructure (such as municipalities, utilities, real-estate owners and private investors) to operate full fibre networks on an Active Open Access basis. It then provides gigabit services to hundreds of thousands of subscribers through its universe of independent Service Providers.

As part of this approach, VX Fiber invests in hardware and software, monitors and controls the network, and engages third party Service Providers. VX Fiber's integrated hardware and software can be quickly deployed on new and existing fibre networks, offering genuine open access to all subscribers. This promotes choice in the market and is a strategic revenue-generating asset for fibre owners.

As a fibre builder and investor, VX Fiber typically works in partnership with other fibre owners in order to deploy large-scale fibre networks, which it then operates.

As a consequence, VX Fiber is a 'wholesale only operator' and does not traditionally sell services to subscribers. This task falls to its Service Provider partners. The main benefits VX Fiber delivers are exceptionally efficient operation (much is fully automated) and high utilisation (high take-up) on the fibre networks.

VX Fiber's Active Open Access model has played a key role in enhancing Sweden's full fibre connectivity, where over 80% of homes and businesses are now passed by fibre, with over 60% of those fully connected.

In South Africa, VX Fiber is the largest fibre operator of Active Open Access networks in the country. It commands hundreds of thousands of connections (over 40% of the fibre market) and supports over 60 Service Providers.

BASED ON A PROVEN CONCEPT IN SWEDEN AND SOUTH AFRICA... VXFIBER HAS LONG-STANDING EXPERIENCE OF OPERATING FTTP ACTIVE OPEN ACCESS NETWORKS



1.2 Our Mission and Vision

VX Fiber's purpose is simple: to enable the digital future of the regions it operates in, through close collaboration with its infrastructure partners to help realise their vision for digital transformation.

1.2.1 Mission

VX Fiber's philosophy is centred around creating value in the community in which we live and work, to help individuals, businesses and the community as a whole gain their digital freedom.

Other companies tend to focus their business on profit. They "build and leave". In contrast, VX Fiber prioritises outcomes - an approach that combines money and purpose to create value. This collaborative approach helps the forging of new connections, while doing good locally. VX Fiber is the only neutral full fibre operator that makes use of public money to collaborate to create a better environment and better relationships with the local community. The financial reward is the result of this approach, rather than the prime objective.

1.2.2 Vision

VX Fiber strives for excellence as an innovative leader in creating an outstanding fibre network company. It aims to establish itself as a significant Active Open Access neutral operator in Europe.

GLOBAL OPERATING FOOTPRINT



1.2.3 Long Term Investment in the UK

VX Fiber is committed to long term investment in the UK as a full fibre, Active Open Access neutral operator.

In the UK, where VX Fiber will be building its own network, it has a 10-year goal: to be part of a multi-million fibre connections network, with a proportion being its own fibre and the rest owned by its partners. This is an ambitious target, as the market is currently 80%* slow copper, an ageing infrastructure that puts the UK near-bottom of the list when it comes to providing full fibre broadband networks in Europe.

However, in the face of current and future market demand, with increasing trends fuelling that need, and combined with intensive efforts from the UK Government and Industry to boost connectivity, there is a substantiated belief amongst the VX Fiber Leadership Team that this ambitious goal is achievable.

*Connected Nations update: Summer 2021 (Ofcom)

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2.0 Transforming Digital Landscapes in the UK

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2.1 Championing the Benefits of Digital Infrastructure

Access to ubiquitous, reliable, high speed data at work, at home and on the move is critical for the UK's continued success as a global business hub. Some studies suggest that connectivity is now viewed by residents and businesses as even more important than good transport links¹.

Just as the Victorians built a future-proofed sewerage system in the 19th century, we must now do the same for our digital infrastructure today. Meeting this challenge will require full fibre equivalent technologies, namely full fibre coverage (fibre-to-the-premises) and 5G with full fibre backhaul. Most of this digital infrastructure will be delivered through private investment, and this requires an enabling regulatory environment coupled with digitalfriendly local planning and street works policies.

It is encouraging to see that local authorities, citizens, businesses and operators share VX Fiber's ambition to deliver world-class digital infrastructure. So, there needs to be ongoing dialogue between these parties to address challenges on all sides, adopting best practices to break down barriers and accelerate the rollout of digital infrastructure across the UK.

Given the day-to-day challenges facing councils, fibre operators need to help boroughs convey the wider community benefits of faster, more reliable digital connectivity. This must go beyond faster download speeds for gaming and entertainment, by providing examples of new technologies that are seen as indispensable.

These benefits include:

1. Improvements to economic growth. Estimates suggest that investment in 5G networks, enabled by core full fibre infrastructure, will deliver £173bn in GDP growth between 2020 and 2030 in the UK².

2. Increased number of businesses. Significantly improved connectivity can encourage new business start-ups. At a local level, if download speeds are higher relative to other surrounding areas, new or established businesses may be attracted into the area. Evidence suggests this leads to an increase of between 0.4% and 3.2% in the number of businesses operating in an area³.

3. Direct benefits to local authorities. The increased economic activity associated with full fibre infrastructure can have a number of benefits to local areas, both through additional income (e.g. through business rates) and via indirectly assisting local authorities with other objectives. For example, the increased economic activity could lead to a reduction in antisocial behaviour or deprivation⁴.

4. Promoting remote services leading to savings and improvements to public services. Full fibre and 5G can facilitate innovations in the delivery of public services. For example, online delivery of public services can provide services that are easier, quicker and more convenient for people to use, and that come at a lower cost than other methods.

One report estimated that the average cost of an online transaction was 8p, as opposed to £10.53 for a face-to-face transaction⁵ and £3.39 for a telephone transaction. Moreover, a study by the Nuffield Trust showed that patients allocated to receive telehealth intervention had fewer emergency hospital admissions. In fact, these patients experienced an average of 0.54 emergency admissions compared with 0.68 for control patients – a difference of around $20\%^6$.

¹ Cluttons, 'The Commercial Connectivity Impact Report' 2019

⁵ McNish J, Customer Contact Profiling Report – ESD Toolkit, Aston Campbell Associates, 2008

² Future Communications Challenge Group, UK Strategy and Plan for 5G – Driving Economic Growth and Productivity, 2017

³ Ipsos Moris (2018), based on an increase in connection speed of 100-200 Mbps; and Hasbi (2017), which estimated the impact of very high speed broadband availability in the local area ⁴ Oxera, Impact at a Local Level of Full Fibre and 5G Investments, 2019

⁶ Nuffield Trust, The Impact of Telehealth on the use of Hospital Care and Mortality, 2012



5. Smart Cities. Full fibre and 5G systems will help futureproof the UK's telecoms infrastructure and enable further city-wide 'smart' innovations.

The National Infrastructure Commission estimates that Smart Power – built around interconnection, storage and demand flexibility – could save consumers up to £8bn a year by 2030. Not only that, but Smart Power could help the UK meet its 2050 carbon targets and secure the UK's energy supply for a generation⁷.

Furthermore, research has suggested that Smart City solutions applied to the management of vehicle traffic and electrical grids could lead to large social benefits.

In the United States, for example, a connected approach could produce US\$160bn in benefits and savings through reductions in energy use, traffic congestion and fuel costs⁸. Councils could also use street-side smart innovations to monitor air quality and air pollution. With sensor data gathered in real-time, such a system could then be used to warn vulnerable citizens who suffer with health conditions such as asthma.

Specific examples of how fibre could support digitisation of industry and public services include:

- Providing connectivity for traffic lights, video surveillance and street lighting, as well as to increase the speed and effectiveness of repairs.
- Creating 'Smart Road' projects that use a combination of 5G and fibre connectivity to facilitate the capabilities of autonomous driving. Elements here include: autonomous and remote control vehicles, traffic detection systems, smart cameras and digitised road signs.
- Remotely providing healthcare and education.
 Supported by high bandwidth connections, remote services such as these will play a vital role in supporting the UK's society and economy through the period of turmoil and uncertainty created by the Coronavirus pandemic.
- Providing an environment/platform for a variety of Service Providers to innovate in smart applications on top of the infrastructure.

⁷ National Infrastructure Commission, Smart Power, 2015

⁸ Accenture, How 5G can help Municipalities become vibrant Smart Cities, 2017

2.2 An increasingly crowded market for 'alternative network providers'

 It is encouraging to see so many altnet providers, including VX Fiber,
 become such a driving force in helping the UK to achieve its ubiquitous internet connectivity goals.

It is important to note that, building and owning passive fibre infrastructure does not benefit greatly from economies of scale. With this in mind, many small [passive] fibre networks can survive (and thrive) in the current marketplace. But when it comes to operating such networks, or selling services on them, there are very large economies of scale.

As a neutral Active Open Access Fibre Operator partner, VX Fiber is ideally positioned to bring such scale to a small [passive] fibre network and, as such, VX Fiber would benefit from a fragmented [passive] fibre market while many operators would not.

It is important to understand that in order to offer a real competitive alternative to the limited number of large players that currently dominate the market, Service Providers should be offered standard commercial and operational interfaces as well.

VX Fiber posesses such interfaces, which have been honed over its 20 years of operating history. It is why VX Fiber is keen to help unify the altnets for the benefit of independent Service Providers.

VX Fiber is, and always will be, a neutral Active Open Access operator. This enables it to give subscribers far greater freedom of choice than the larger players can and the ability to select the services that match their specific needs from a wide range of Service Providers.



2.3 VX Fiber Project Examples

VX Fiber is currently building a number of Fibre-to-the-Premises (FTTP) Active
 Open Access networks in several UK locations. These include Stoke-on-Trent,
 Crewe and Nantwich, Bristol, Colchester and parts of London.

Stoke-on-Trent



This project spans across two distinct areas:

In 2019, Stoke-on-Trent City Council appointed VX Fiber as their partner to deliver the DCMS funded (£9.2m) LFFN using the Active Open Access

Operator Model, a model which ensures the best economic and social returns on that investment. The city network (Stoke-on-Trent Private Optical Network) is owned by Stoke-on-Trent City Council, whilst VX Fiber has been contracted to build and operate the infrastructure in the public domain. This represented the upgrade and extension of an original 16km network that served only CCTV, to that of a fully upgraded and extended network [connecting all public sector buildings].

On 7 June 2021, the City Council announced its Silicon Stoke Prospectus which set out the city's digital ambitions. Whilst VX Fiber is working closely with the City Council to help realise many of their long-term ambitions, there was a significant milestone announced in the Prospectus. This was in relation to the completion of its new 113km full fibre city network, which underpins the delivery of the desired municipal outcomes and benefits.

Via VX Fiber's fibre-deployment business LilaConnect, it is further investing in the build of the necessary access infrastructure to connect circa 130,000 premises across Stoke-on-Trent by 2023. LilaConnect hit a major milestone at the beginning of June 2021, passing half a million metres of completed civils work over the last year, and is on track to deliver over 80,000 homes passed by the end of 2021.

Colchester



In March 2021, VX Fiber kickstarted the build of a full fibre Active Open Access network in Colchester. The project is part of Colchester Borough Council's wider plan to transform and future-proof the town's digital infrastructure. Furthermore, it

will establish Colchester as one of the best provisioned towns in the country, providing full fibre broadband to homes and businesses across the city.

VX Fiber is making a multi-million pound investment into the necessary access infrastructure to connect premises. Via its fibre-deployment business LilaConnect, work is progressing well to enable an initial 8,000 homes and businesses within Colchester to benefit from direct access to full fibre gigabit broadband connectivity.

London Grosvenor



The partnership between Grosvenor, VX Fiber and its Service Provider partners – under the project name "Prime Fibre" – will create a transformative full fibre open access network across Mayfair and Belgravia. This will form part of Grosvenor's digital

strategy where, over the next few years, Grosvenor will invest in one of the largest 'single estate' upgrades in broadband connectivity.

As of mid-2021, over 3,000 premises have been passed by fibre, with plans in place to extend beyond the existing catchment areas.

An Advanced Pipeline of Opportunities

VX Fiber has a wide project portfolio in terms of networks in planning or in full operation. Examples of new projects in the UK that commenced in the summer of 2021 include the deployment of FTTP Active Open Access networks in Crewe, Nantwich and Bristol, as well as significant expansion in London. In Austria, Belgium and Germany, VX Fiber is expanding its existing presence into new regions across these countries.

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3.0 VX Fiber -What Do We Do?

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Typically, VX Fiber will provide turnkey responsibility for existing physical infrastructure upgrades, making use of existing passive infrastructure assets (e.g. trenches, ducts, poles, fibre). From there, VX Fiber's FTTP fibre deployment business, LilaConnect, builds out the access infrastructure to connect premises.

VX Fiber's core activity is to enable full fibre symmetric services to Residents and SMEs via its Active Open Access platform. This is a full fibre AON-based [point-to-point software-defined network] and open market platform from which many independent Service Providers can deliver digital services.

It is important to note that this only uses a fraction of the deployed fibre capacity. The optimised network design offers maximum flexibility for future capacity utilisation.



3.1 Full Fibre – Future Proof Digital Infrastructure

It is widely accepted that the emerging centres of economic activity and prosperity in a digital age will be those that enjoy state-of-the-art broadband infrastructure.

A full fibre network is synonymous with fit-for-purpose, future-proof digital infrastructure. 100% fibre networks operate at speeds over 100 times faster than most current broadband links in the UK. These networks are capable of supporting data uploads that are as fast as downloads. 1,000 Mbps (1 Gigabit) of uncontended full fibre bandwidth, both up and downstream, is a step-change even more dramatic than the shift from dial-up broadband to other copper-based technologies.

In addition to the vastly improved speeds and the exponential capacity and reliability that comes with it,

a full fibre network is a future-proof solution to a [city's] increasing appetite for bandwidth. Without copper, data transmission through fibre is uninterrupted. So, increasing bandwidth availability in the future simply involves upgrading the equipment at each end, leaving the fibre network untouched.

Full fibre is widely acknowledged to deliver superior connectivity, which will open up the next generation of applications and services for residential and commercial users across communities. It will sit at the heart of much wider digital advances, underpinning 5G mobile networks and powering smart city ambitions. It will also drive smart technologies in healthcare and in what is being described as Industry 4.0 in the manufacturing sector.

These changes are expected to generate significant economic and social impacts and, ultimately, the increased availability and take-up of full fibre broadband will lead to positive outcomes for businesses, individuals, local government and society as a whole.



3.2 "Fibre" Confusion – FTTC vs FTTP

The term 'fibre' is often misused. Millions of subscribers across the UK who think they benefit from a fibre connection aren't aware that the fibre only goes to the street cabinet. An outdated copper line then connects that cabinet to the premises.

VX Fiber's Active Open Access networks use Fibre-to-the-Premises (FTTP) broadband technology, which provides a dedicated, future-proof connection where the fibre optic cables are laid from the signal source into the property.

This differs from Fibre-to-the-Cabinet (FTTC) offered by some network operators. This is a blend of copper and fibre optic cables, whereby a final leg of copper wire runs from the roadside cabinet into subscriber premises. This causes a bottleneck, resulting in slow and lost connections especially at 'peak' times of the day.



3.3 Applications for Consumers and SMEs

Recent research⁹ has shown that each home in the UK has an average of 10.3 devices that are connected to the internet at any one time. This represents an increase of over 26% since 2017 and this figure is expected to reach more than 50 devices by 2023.

In the years to come, 8K TV is expected to further drive demand for download bandwidths, while increased utilisation of the cloud and video conferencing, for both personal and business use, is expected to increase demand for upload speeds. Applications such as Augmented Reality (AR) and Virtual Reality (VR) also require low latencies. Although the best known VR applications are linked to gaming today, AR and VR applications are also expected to emerge in areas such as education, training and healthcare. In the context of a 2018 study for the UK regulatory authority Ofcom, WIK identified the expected bandwidth and quality requirements of various future applications.

⁹Tech Nation – aviva.com Jan 2020 ¹⁰ WIK (2018) The Benefits of Ultrafast Broadband

Application categories with their capacity and quality requirements 2025, based on WIK for Ofcom (2018)¹⁰

APPLICATION CATEGORY	2015 Downstream bandwith (Mbps)	Assume CAGR in %	Downstream (Mbps) in 2005	Upstream (Mbps) in 2025	Packet Loss	Latency
Basic Internet	2	25	≈20	≈16	0	0
Home Office/VPN	16	30	≈250	≈250	+	+
Cloud Computing	16	30	≈250	≈250	+	++
State of the Art Media and Entertainment (4K, 3D, UHD)	14	20	≈90	≈20	++	+
Progressive Media and Entertainment (8K, Virtual Reality)	25	30	<pre>~300</pre>	≈60		+
Communication	1,5	20	≈6	≈6	++	++
Video communication (HD)	8	15	≈25	≈25	++	++
Gaming	25	30	≈300	≈150	++	++
E-Health	2,5	30	≈50	≈50	++	+
E-Home/E-Facility	2,5	30	≈50	≈50	0	0
Mobile Offloading	2	30	≈15	≈12	0	0

WIK also estimated bandwidth demand per household on the basis of expectations around the prevalence of multiple devices and the usage of applications by different user types (see below). It matched the resulting bandwidth and quality demands against an assessment of the capabilities of different technologies.

APPLICATION Sceptical **Home Office** Avant Occassional **Trend User** Professional gardist CATEGORY Outsider User 1 / / **Basic Internet** / 1 / Home Office/VPN ʹ / **Cloud Computing** \checkmark \checkmark State of the Art Media and Entertainment 1 (4K, 3D, UHD) **Progressive Media** ✓ and Entertainment (8K, Virtual Reality) / Communication Video communication ʹ / (HD) / Gaming E-Health / / E-Home/E-Facility / / / 1 Mobile Offloading / 1

Application categories with their capacity and quality requirements 2025, based on WIK for Ofcom (2018)¹⁰

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WIK concluded that, in a timeframe towards 2025 (and if availability and price were not a constraining factor), that around 40% of UK households would require downstream bandwidths of at least 1 Gbps fibre with upstream bandwidths of around 600 Mbps. This 'top-level' demand would require the use of FTTH/FTTP or Docsis 3.1 Full Duplex.

Bandwidth, Quality of Service and Technologies for the UK in 2025, based on WIK for Ofcom (2018)¹⁰



3.4 FTTP Full Fibre Capabilities

Designed to meet increasing demands in data and broadband capacity requirement, and to unlock applications with transformational benefits. These include:

- Uncontended services and ultra-low latency
- Unlimited symmetrical speed, high bandwidth and greater capacity
- Super resilience and reliability

The technology will improve network quality across several dimensions as listed below.

Faster Symmetric Speeds

- Gigabit upload and download speeds as standard
- Over 12 times faster than FTTC and 3 times faster than DOCSIS 3.1

Increased Capacity

Up to 10 Gbps of broadband capacity will significantly improve broadband speed and quality of experience across a large number of applications.

Lower Latency

There will be significant reductions in network delay ('latency'), if not eradicated, down to just 1ms for many applications. It will improve the experience on timesensitive applications, such as streaming, video calls, video games and autonomous driving. Low latency is particularly important for applications that do not benefit from buffered data and instead require real-time control.

Improved Reliability

Enabling features such as proactive plant maintenance, which can detect degradation of the physical cables and ensure that maintenance is undertaken before disruptive faults develop.

DOWNLOAD/UPLOAD SPEED COMPARISONS

DOWNLOAD/ UPLOAD SIZE	10 Mbps	25 Mbps	100 Mbps	300 Mbps	1 Gbps	10 Gbps
30.6 GB Game	7 hrs 18 mins 5 secs	2 hrs 55 mins 14 secs	43 mins 48 secs	14 mins 36 secs	4 mins 22 secs	26 secs
10.9 GB Game	2 hrs 36 mins 3 secs	1 hr 2 mins 25 secs	15 mins 36 secs	5 mins 12 secs	1 min 33 secs	9 secs
4 GB HD Movie	57 mins 15 secs	22 mins 54 secs	5 mins 43 secs	1 min 54 secs	34 secs	3 secs
YouTube Video (avg 11.7 mins in length, 109.7 MB in size)	1 min 32 secs	36 secs	9 secs	3 secs	Less than 1 sec	Less than 1 sec
100 Photos (200 MB)	2 mins 47 secs	1 min 7 secs	16 secs	5 secs	1 sec	Less than 1 sec
12 Songs (42 MB)	35 secs	14 secs	4 secs	1 sec	Less than 1 sec	Less than 1 sec

INTERNET SPEED

VXFIBER FUTURE-PROOFING



Greater capacity for whatever service is needed, due to near-infinite nature e.g. 10 Gbps.



Provides the basis for future investment in 5G, wireless and Smart Cities.



Positions networks for upgrades to multi-gigabit speeds, adapting to exponential rises in computing power and data use and the emergence of new applications.



VX Fiber's Active Open Access Networks have the ability to increase ten-fold over the next ten years, enabling the creation of new and innovative technologies and new possibilities in the many benefits they deliver.



There is significant 'option value' associated with deploying physical infrastructure that is future-proof – reducing the costs associated with civil engineering in the long-run and the trialling of new services in a more cost-effective way.

3.5 Lessons learned in Sweden...

There is a stark difference in attitude towards fibre in the UK compared with Sweden. In the early days, fibre rollout in Sweden was often driven by local authorities and district councils, as they recognised both its economic value and its social benefits.

As a result, Sweden is nearly 80 percent FTTP, with over 60 percent of homes and businesses connected. The main difference today is the subscribers' understanding of the value of the fibre itself. The UK is almost unique in Europe in that consumers don't yet fully appreciate the distinction between fibre and service.

VX Fiber has operated 120 Active Open Access networks (Municipal and Private Networks) across Sweden and continues to support the largest Active Open Access platform in the country, commanding 70% of Stockholm public housing stock, passing over 450,000 homes.

VX Fiber shares the view with much of the investment community in this sector: that in the future, every business and household will have [at least] one fibre and all services will be over-the-top ('OTT'). Mobile services will be the main access method for roughly 10% of the market and otherwise complement fixed [fibre] connections.



3.5.1 Wide adoption of the Open Access Model

Part of the success of fibre coverage in Sweden is down to the wide adoption of the open access model. In this model, the physical fibre is not necessarily owned by the same company who provides the service, but by different types of Fibre Owners, such as local authorities, private investors, utilities, real estate, and landowners.

Through a neutral Fibre Operator, these Fibre Owners lease the fibre to multiple Service Providers to enable them to access and use the network to deliver their own broadband services. This lowers the costs for the Service Providers, encourages greater competition and leads to much higher uptake and financial returns for the Fibre Owners. However, it does not lead to price erosion as many [UK] ISPs fear.

3.5.2 The DNA of Sweden

Stockholm produces more billion-dollar companies per capita than any other global region after Silicon Valley. Skype, Mojang, Spotify and iZettle are all unicorns founded in Stockholm – directly related to open access fibre.

- In the 1990s, the Swedish government offered a tax break for residents to buy computers. This helped the population become early adopters of technology.
- In 1994 Stockholm built the world's largest open fibre network, with 100% of businesses and 90% of homes connected today. The Stokab fibre network (in Stockholm) has delivered an estimated £1.8bn ROI¹¹, saving the local government over £250m in IT and Telecoms services alone.
- Wider societal technology adoption is a central part of Sweden's DNA, driven by a commitment from, and funding by, the Swedish Government.



3.6 Open Access - what is Active Open Access?

The term "Open Access" is increasingly and deliberately being distorted by some broadband operators that claim to provide it when, in reality, they do not. This is similar to the 'Fibre Broadband' confusion, where subscribers who think they have 'fibre', in fact only have a part-fibre connection combined with copper or coaxial cable. There is no legal or industry standard definition of Open Access, so the term is therefore widely abused.

This has serious implications with RFPs for town and city networks that specify Open Access without the author really understanding what it is and how the model works.

The overviews in this section will help define what real Open Access is for FTTH/FTTP networks. There are also sample questions that municipalities, smart cities, developers etc. should be asking any operator.

3.6.1 Broadband: Basic Business Models

Depending on which roles market actors in the broadband value chain take:

- Fibre Owner
- Fibre Operator
- Service Provider (SP)



VXFIBER'S 3LOM - ACTIVE OPEN ACCESS - ALLOWS FOR MANY FIBRE OWNERS, OFFERS GREAT FLEXIBILITY AND DELIVERS HIGHER PENETRATION



Vertically Integrated Model

If one market actor takes all three roles, it is said to be 'vertically integrated' and the resulting business model is referred to as a vertically integrated model.

Telecoms has historically been a vertically integrated business with incumbent operators controlling everything from network infrastructure, applications, speed, bandwidth, price, data limits and the number of services available to subscribers.

There are variants of this model, where the operator offers access to competing SPs at the wholesale level. There have also been many instances where public authorities have built broadband networks following vertically integrated models. This approach was not uncommon in the pioneering years of municipal networks. In some cases, especially if the vertically integrated actor is deemed to have significant market power, regulation imposes that network access be opened to competitors, either at the passive or active layer. In that case, the network owner designs the network to deliver its own services and gives access to its competitors in forms compatible with the network design. Although sometimes incumbents refer to this model as 'open access', this is in reality a vertically integrated model with unbundling either at the physical layer (Local Loop Unbundling), or at the active layer (Bitstream Access).

All too often, the subscriber is left with poor service and few choices. It's a system of near-monopoly that has stifled competition and innovation within the commercial sector, as well as freedom of choice amongst consumers.



"In VX Fiber's Three-Layer Open Model (3LOM), the roles of the Fibre Owner, Fibre Operator and Service Provider are explicitly separated."



Open Network Models

If the roles are separated, we talk of an 'open network model'. In an open network, the infrastructure is available to all market participants at equal conditions. This can take different forms, depending on whether the network owner operates at Fibre Owner level alone, or also at the Fibre Operator level.

If the network owner is only involved at the Fibre Owner level, the network owner decides either to leave the higher layers to market players (competition in the market) or to contract the Fibre Operator role to one market actor for a given time period (competition for the market). They then have the task of providing end-user connectivity to competing SPs.

Consequently, there are three open network business models that can be identified:

- Passive Layer Open Model (PLOM)
- Active Layer Open Model (ALOM)
- Three-Layer Open Model (3LOM)

Passive Layer Open Model (PLOM)

In this model, an entity (e.g. the Local Authority, a local cooperative, or a private investor, depending on the investment model chosen) builds and operates passive infrastructure to be made available to all market actors under fair and non-discriminatory conditions. Either directly, or through standard procurement, this entity deploys passive infrastructure to a market consisting of civil engineering and network deployment companies, but not telecom operators. The Fibre Owner keeps ownership of the passive infrastructure and runs operation and maintenance.

In PLOM, the broadband network is open at the passive layer and competing operators, like integrated Network and Service Providers or open access Fibre Operators selling connectivity to SPs, get access to the subscribers directly through physical connections.

Generally, there is a backbone Fibre Owner connecting the different parts of the region, county or municipality and a local area Fibre Owner (delivering first-mile and sometimes area network). In some areas, the same entity takes both roles. Similarly, the Fibre Operator and Service Provider roles may be integrated by some



operators, while other SPs may prefer to rely on the connectivity services provided by Fibre Operators active in the market.

The backbone Fibre Owner receives revenue from operators, who lease dark fibre to deliver their services (or those from their subscribers) to the local areas. Here they lease passive connections (fibre, copper or simply antenna sites and wireless frequency bands) from the access-area Fibre Owner to deliver services to subscribers – who may or may not pay a fee for that. Like in all other 'open network' models, subscribers choose the services from their operator of choice for a service fee. The access-area Fibre Owner may receive revenue from subscribers in the form of a one-off connection fee and/or a monthly network fee.

The PLOM gives operators maximum freedom and control in the design of their access network. However, each competing operator needs to deploy active equipment in the access node of each area of service (unless a sharing agreement is reached), which leads to inefficiency and high investment and maintenance costs (CAPEX and OPEX) in areas with low population density. Hence, the PLOM is best suited for relatively large and densely populated areas and favours the large SPs. The PLOM is typically used by public-run municipal networks in large cities, in which the public authority takes the backbone Fibre Owner role. A prominent example is the Stockholm fibre network.

Active Layer Open Model (ALOM)

In this model, one entity deploys and operates the passive and active layer (hence acting as an integrated Fibre Owner and Fibre Operator). This entity places active equipment in all access nodes and builds an open, operator-neutral network over which all SPs can deliver their services to all subscribers.

The value chain for the ALOM sees the backbone Fibre Owner and Fibre Operator roles joined. The backbone Fibre Owner and Fibre Operator provider receive revenue from Service Providers to deliver their services to subscribers through its backbone network and onto the first mile connections. The first mile connections are leased from the access area Fibre Owner. Again, subscribers choose the services from an operator for a service fee. In a variation of the ALOM, the network fee is paid directly to the Fibre Owner and Fibre Operator. In both cases, like the PLOM, the access-area Fibre Owner may receive revenue from subscribers.

Three-Layer Open Model (3LOM) – The VX Fiber Model

VX Fiber believes in dismantling this model by opening-up the network and separating the network infrastructure and management of the network from the supply of services.

The VX Fiber Model, is a three-layer Active Open Access model, which consists of the separation of the physical infrastructure, operations and service provisioning i.e. the roles of the Fibre Owner, Fibre Operator and SP are explicitly separated. Here, competing SPs share a common FTTP infrastructure run by a neutral wholesale operator. The network is open to all providers on the same terms and conditions, providing a real choice for subscribers.

In this case, a Local Authority has the same role as in the PLOM. But at the active layer, the Fibre Operator role is assigned by procurement to one company. The Fibre Operator places active equipment in all access nodes and builds an open, operator-neutral network over which all SPs can deliver their services to all subscribers. In order to guarantee fair and non-discriminatory conditions to all SPs (promoting and maintaining operator neutrality), the Fibre Operator is typically barred from delivering its own services.

The backbone Fibre Owner receives revenue from the Fibre Operator for dark fibre lease. To reach subscribers, the Fibre Operator also leases passive connections (fibre, copper or simply wireless frequency bands) from the access area Fibre Owner to deliver services. Again, subscribers can choose the services they want from their operator of choice and pay a service fee. The service fee from subscribers to the Service Provider generally includes a network fee as part of the package, which is then passed to the Fibre Operator.

In a variation of this three-layer open model, the network fee is paid directly to the Fibre Operator. The access-area Fibre Owner may receive revenue from subscribers in the form of a (one-off) connection fee to the Fibre Owner and/or a monthly network fee.

IN A 3LOM ACTIVE OPEN ACCESS NETWORK, SUBSCRIBERS SELECT AND PAY THE SERVICE PROVIDER OFFERING THE BEST SERVICES FOR THEM



IN A 3-LAYER MODEL (3LOM), A NETWORK OPERATOR DESIGNS NETWORKS, OWNS AND OPERATES ACTIVE EQUIPMENT & MANAGES SERVICE PROVIDERS

Operate Manage and Support **Own Active** Network Service Providers Infrastructure • Design network architecture • 24/7 proactive and continuous · Identify and contract Service Providers network monitoring • Purchase and own hardware - Network traffic - Core network equipment, • Manage Service Provider mix (family package, top of the range, etc) e.g. routers and servers - Fibre values - Access equipment, e.g. distribution - Unreachable subscribers • Second and third tier support for SPs and access switches to support during troubleshooting Maintain network - Network termination devices on the subscriber premises • Purchase or develop software

Manage Service Provider Sales

	RESPONSIBILITIES IN THE 3L	OM ECOSYSTEM	
Service Platform(s) Internet, VOIP, IPTV	Customer Service Marketing and 1st line support Sales	Subscriber Contracts	Service Provider
Software (BSS/ OSS, API) Operator Portal DHCP Server		Open Access Network Operator	Eibre Operator
Backhaul	Active Components Routers, Distribution Switches, Access Switches, Optics, ONT, NT	Active Layer	
Metro Ring	Site Infrastructure Access Network Home Drop	Passive Layer	Fibre Owner
			_



"Can subscribers browse different services and select freely from them? With Open Access, the answer to this should always be YES."

3.6.2 Practical questions for potential Open Access providers

Examples of simple questions that municipalities, property and Fibre Owners can put to any potential Open Access provider to understand their offering more fully and avoid potential errors in selection.

1	Can multiple different Service Providers deliver their services at the same time over the network? [The answer should be "Yes"].	8	Do different Service Providers pay the same price for accessing the network? [This is to sense check any cross-subsidisation of services to disadvantage competitors. For		
2	Can subscribers see these services and select freely from them? [The answer should be "Yes"].		example, an incumbent could charge a rental for the fibre to other operators that is 80% of the retail price, making it impossible for any other operator to compete].		
3	Can Service Providers create new services and easily add them to the offers presented in the online services marketplace to subscribers without the need for assistance? [In an Open Access network, an ISP should be able to create and add a new service, such as a ½ Gigabit (500 Mbps) package, to	9	Can your Provider explain what hardware choices they have made and how these help deliver high performance and uptimes? [Some components last 75 years between failures while 50% of some components will fail in three years].		
their list of offers and this be presented to subscribers automatically without software development or help from any third party].		10	Is the network equipment based on a truly interchangeable technology? [If not, the risk is the network may be tied to one hardware		
4	Can the real estate developer add their own IP-based services to the system, such as CCTV cameras? [Some operators will restrict		over time or lead to problems if the vendor experiences difficulties].		
the offering to their own services and not help the developer with security, access control and other applications. Active Open Access enables additional services and applications to be added easily].		11	Will the system be capable in the future of offering/delivering multiple HD/UHD TV services to subscribers? [Note: if the technology used is GPON then the system will not be capable of delivering such services		
5	5 Is the supporting software already developed, stable and proven at scale? [If not, this opens up the risk of the classic IT		in the future. In Sweden, the home of Open Access, there is not one Open Access operator using GPON – they all use Active Ethernet].		
	problem of long delays, high costs and issues with implementation].	12	How will the network be maintained?		
6	Is it possible to see a demonstration of an existing commercial deployment with multiple Service Providers and Services? [It is better to see a live demonstration of a working system than conceptual reference in a proposal].				
•••		13	Does the Business Model mean the Provider is committed to the development in the long term or can they run away early [for instance if you paid for everything upfront]?		
7	Is it possible to talk to some existing customers i.e. other Fibre Owner partners?				
	[A credible Open Access partner will be happy to allow you to talk to their other Fibre Owner partners].	14	What track record does the Provider have?		
If the Pro	ovider cannot deliver against the above, then you ris	sk having lo sire.	ower penetration and unhappy subscribers that		

3.7 What Does This Mean?

The 3LOM enables diversity and competition in all layers. Where fibre and broadband networks are often considered as a network purely for telecom operators, this model redefines ownership at the passive layer.

It means that the fibre (passive layer/network) can be owned, without the need for the owner to be an operator. This creates an asset class for owners, while enabling multiple Fibre Owners to co-exist in the same market geography.

It means that services can be delivered in a cloud ecosystem where the private sector has an open invitation to compete and innovate.

It also means that services provided over the passive network by new market entrants can be done so at a very low cost of market entry. These services need not be Internet Access, but services requiring network connectivity such as CCTV or IoT applications. Multiple services can be provided simultaneously over the same network, to the same location, over the same fibre.

The availability of more services means greater takeup of fibre, in turn enabling greater economic returns for the Fibre Owners and bringing greater economic benefit to the area.

The procurement of an Active Open Access Neutral Operator ensures that the Fibre Owner (e.g. Local Authority, Housing Developer, Build-to-Rent company, etc.) does not encounter diseconomies of scale or difficulty in onboarding Service Providers (ISPs and ASPs). This therefore, serves to promote fibre ownership but also to create the opportunity for new service entrants (ISPs, ASPs, OTT providers) to emerge.

The 3LOM serves as a collaborative model encouraging both investors in infrastructure as well as multiple Service Providers to offer services in the local/citywide area. It removes barriers to entry too, as it enables investors from within and outside the telecoms industry to obtain a healthy ROI for fibre deployment. Plus, it allows new as well as existing Service Providers to operate without prohibitive capital investment.

Service Demarcation Device (SDD)

Fitted on the internal wall of the premise, the SDD is a fibre converter that delivers the subscriber's connection to the full fibre network. The router and



other devices, such as phone, TV, concierge service, closed-network educational service, etc, all connect to the multiple-port SDD.

Our solution enables a 2nd, 3rd, 4th and 5th service to be introduced at marginal cost.

WiFi Router

Supplied by the Internet Service Provider (ISP). This plugs into the SDD to create a local wireless network for a home or a workplace.

The 3LOM ultimately results in a more competitive environment all round, with lower barriers to entry for Fibre Owners and Service Providers, and greater choice for subscribers.

Full Fibre

Fibre optic cables are laid all the way from the signal source directly into the premises – it is a dedicated point-topoint connection.

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External Termination Box

The external fibre is routed through this external termination box. The fibre is routed in a direct line from the service point or "Toby" – the connection point to the full fibre network – near the premise to be connected.

User examples



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Stream a UHD live event (Netflix, YouTube, Prime Video, etc)



conferencing while working from home (e.g. Zoom, Teams, Google Meet)



watching videos, educational resources online (Google Scholar, YouTube)



Online and cloud-based gaming (Microsoft, Twitch, PlayStation)



Cloud Office - Multiple-users high bandwidth / collaborative cloud-based working applications between employees, suppliers and



clients



Online GP and Triage Services

The Analogy

A very similar precedent occurred when App stores were introduced, unlocking the full potential of smartphones on a level playing field with low barriers to entry for developers. The explosive growth in smartphone take-up was a direct consequence of the open application platform enabling innovators to deliver a wide variety of new services via Apps in a highly competitive market.

The Active Open Access approach is designed to unlock the full potential of broadband networks, leading to rapid services development, and driving rapid growth in subscriber take-up. Subscriber empowerment is key to this growth, with the platform providing the freedom to pick and choose whatever services subscribers want through a powerful and intuitive multi-service and support interface – all in one place.

With VX Fiber's Active Open Access networks, predominant broadband services (e.g. Internet, telephone and streaming TV) will be joined more prominently by a wide range of new and innovative services. These will include Online Health Services, Distance Learning, Smart Home, Private Clouds, Smart Grid, Smart Transport, Emergency Communications, the Internet of Things (IoT) and Smart City Applications.

There are no limits to how many more new applications and services can be introduced. VX Fiber's Active Open Access FTTP infrastructure is unrestricted and future-proof.

Subscribers are firmly in charge of how they use their new full fibre broadband network and will be able to switch between Service Providers and plans as quickly as their contract terms allow. In fact, switching between Service Providers or provisioning new services onto the network can be automatically activated within seconds of a subscriber making their choice. This subscriber empowerment forces Service Providers to up their game when it comes to the quality of service and support. VX Fiber's Point-to-Point approach to Active Open Access also delivers better security. With VX Fiber's automated virtualisation, subscribers can now slice their broadband connections into multiple private networks independent of their Service Provider.

Via VX Fiber's Service Demarcation Device (SDD), users can decide on the fly, whether they want to access a service over the public internet or over a private network for security, privacy, or quality of service reasons. With the Point-to-Point nature of a full fibre provision, there's no sharing of information with neighbours. Imagine being able to establish a secure private connection for online banking transactions or a private network between a home and a local school.

This approach also unlocks a whole raft of Smart Grid and Smart City applications that cannot currently run over the internet due to privacy and security concerns. All these constraints are removed with the Active Open Access model for broadband networks.

It's time for the era of closed networks to end.

In summary, digital transformation can be fully realised if access to high speed, robust and reliable communications networks and services is made available for all. An Active Open Access network infrastructure provides for a much healthier business ecosystem, one that is focused on improved service levels. This drives companies to innovate and compete with a wider range of applications and leads to rapid growth in subscriber uptake. When all of these things are combined, costs can be driven down.

VX Fiber's innovative Active Open Access model is the future of broadband networks and, crucially, it is designed for the benefit of subscribers not large corporations. With access to the best state-of-the-art technology and services, both individuals and communities can thrive and realise their full potential.



 "Active Open
 Access can unlock
 the full potential of broadband networks today."

4.0 VX Fiber – How Do We Do It?

38. Our Story



4.1 Build: Future-Proofing Communities

A multi-gigabit city infrastructure is customised to suit that city's unique requirements. It is essential that Fibre Operators work collaboratively with local authorities, landowners and property developers, and that they all adopt the best practice within the current legal framework.

Once a citywide deployment begins, installation of the fibre optic cables and connection of a city's key sites progresses at speed. With new deployment technology, this can typically take as little as one to two years.

Priority would normally be given to connecting those public sector and commercial sites with the most pressing demand. This would include: council offices, libraries, schools, emergency services, care homes, hospitals, surgeries, and large enterprises. Once connected, a wave of business connections follows – data centres, innovation hubs, business parks and industrial estates – all of which rely on data in any form for their commercial existence.

Ultimately, the full fibre network can function as a backbone for deployment of fibre to individual properties, providing subscriber access to ever-richer forms of digital services and entertainment.

Once the first sites are connected, Service Providers can begin offering services over the network, bringing new applications, services and content to run over the nearinfinite capacity provided by the full fibre technology.

Multi-Gigabit Cities

Subscribers	Subscribers can receive and choose from multiple types of services delivered by multiple Service Providers simultaneously. E.g. they can purchase broadband from one company, phone and TV from another, as well as access other services, including: healthcare, education, public safety and emergency services.	
Residential SPs (Gigabit full fibre to homes)	With an upgraded high-capacity backbone capable of serving a large residential market, this provides the perfect opportunity to build right into each home on a more economical basis – delivering Residential SPs an AON-based distribution network under highly attractive contractual terms.	
SME SPs (Gigabit full fibre for small and medium-sized businesses)	The majority of businesses are SME/SOHO. SME-focused Service Providers are able to deliver digital services to these businesses via VX Fiber's Active Open Access network, a full fibre AON-based distribution network and open market platform for digital services.	
Mobile Operators	Full fibre has a vital role in underpinning the rollout of wireless and 5G networks - all will require full fibre backhaul. A well-planned and optimised network is routed past the majority of mobile cell sites to provide maximum future flexibility.	
Business & Enterprise Market	Aggregated business demand across Office Parks and Commercial Districts provide asset reuse connectivity opportunities as well as serving larger Enterprise level companies with 10 Gbps+ supply.	

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Dark Fibre Monetisation

Real Estate / Landowners / Developers /Housing Associations	Access to broadband is now likened to essential utilities such as electricity, gas and water. In Residential Developments, the provision of gigabit-capable full fibre broadband will make the properties more attractive to buyers. For Commercial Developments, having the right level of connectivity is crucial to ensure businesses are competitive. While Housing Associations can digitally include more tenants to improve lives and also to improve a housing providers' own performance.		
Additional Public Sector: CCTV, Traffic Control, Electric Vehicle Charging, Wi-Fi etc.	Additional Council Sites (public Wi-Fi, CCTV, Traffic Control, Blue Light services) are added to the core metro local access network via integrator partners.		
Public Sector Network Providers (Local Authorities, City Councils, Public Sector Partners, e.g. Health, Education, Transport, Police)	Typically public sector sites (schools, libraries, data centres, etc.) are connected as part of a wider Public Sector Asset Reuse delivery method for the deployment of full fibre networks. The Private Optical Network serves as a strategic motorway of fibre throughout a city/project area connecting public sector buildings on route, from which the local access 'premises/homes passed' infrastructure is built.		

4.2 Selling to Subscribers

VX Fiber's sister company and FTTP fibre-deployment business puts choice and flexibility into the hands of its subscribers (the 'end-user') by providing the capability to connect directly to its full fibre network and gain access to all the services they require. This means that each resident or business gets a dedicated fibre connection all the way into their premises.

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As the average UK consumer does not yet see the difference between the fibre and the service, residential and SME business customers can buy both a fibre connection and service as a single proposition from LilaConnect (until we begin to reach a level of "fibre maturity" seen in other European countries). Subscribers will have the choice to be able to take their internet service directly from LilaConnect or to choose from a selection of its verified Internet Service Provider partners. Additional services such as Phone (VoIP) and TV can also be purchased if required, depending on needs and budget. For Business customers, bespoke packages are available depending on service and SLA requirements.

The network will facilitate additional services in the areas of healthcare, education, public safety, emergency communications and many other applications that will be delivered by different Service Provi ders, whether they be ISPs, ASPs or OTT ('over-the-top') Providers.

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LTIMATE CHOICE





4.3 Engagement with Local Authorities

Local government faces a challenging future with reductions in core funding. By 2020, local authorities will have faced a reduction to core funding from the Government of nearly £16 billion over the preceding decade. This means that councils will have lost 60p out of every £1 that the Government has provided to spend on local services since 2010.

Councils have responded to the financial challenge by streamlining services and finding new and innovative ways of operating, while still delivering the vital services their residents rely on. However, the stark reality is that local services face a funding gap of £7.8 billion by 2025. Despite councils' extensive work to make services more cost efficient as they attempt to make substantial savings and increase revenue by becoming more commercial, many local authorities are at tipping point.

Local authorities can make substantial savings by re-engineering their processes and adopting a digital transformation strategy. This can result in employees becoming more efficient and productive, improving services for citizens and businesses, whilst achieving substantial savings and generating new revenue streams at the same time.

However, **digital transformation** can only be fully realised if access to high speed, robust and reliable communications networks and services is made available at affordable prices for all citizens and organisations no matter who they are or where they live. This involves investing significantly in upgrading communication infrastructures to address the increasing demand for data generated by the billions of devices coming online in the near future. Increasing competition and making it easier to roll out the needed infrastructure will encourage this investment. At the same time, effort needs to be made to allow all parts of society to take part in digital transformation.

Local authorities have the solution beneath their feet...

When we look at alternative owners of the fibre infrastructure, we see private investors, landlords and property developers. But we also see Councils as the key tenants in the deployment of fibre, using existing assets such as cable or ducting laid down for security cameras, traffic management, district heating etc. Contributing to that, as well as enabling private investors to leverage existing infrastructure, will lower costs and speed up deployment. In a municipal setting, the use of Active Open Access [3LOM] enables the delivery of services to enhance or deliver the outcomes sought by the municipality. This is in conjunction with the residential and business services delivered over the same platforms and networks.

Multiple Fibre Owners can co-exist in the same location, including fibre owned by the Local Authority. It does not exclude new entry Fibre Owners or indeed vertically integrated operators, but would encourage new entrants to embrace Active Open Access for mutual benefit. A variety of Service Providers can utilise the network, from ISPs to IoT to ASPs. The applications, even if device-dependent can co-exist on the same fibre, in for example, a citizen's home. **Applications can be delivered 'free at the point of use' where required.**

Implementing an Active Open Access [3LOM] full fibre network enables local authorities to generate revenue and regain control of a very lucrative asset. It signals a dynamic new approach to delivering gigabit broadband across the UK putting communities in command of their digital destinies, and ensuring that even the most vulnerable and isolated in our society benefit rather than get left behind.

VXFIBER'S ACTIVE OPEN ACCESS FTTP NETWORK IS AN ENABLER OF THE MUNICIPAL MARKETPLACE





"As a municipality, we must make it as easy as possible for people to participate in the digital economy..."

4.3.1 Municipal Broadband Infrastructure

When considering future improvements to their municipalities, local authorities must now take into account the significant role that Broadband Networks play in the digital economy. This new economy drives innovation and efficiencies via digital applications across a range of areas including: transport, shopping, payments, entertainment, learning and even farming.

If a municipality falls short of delivering affordable, highspeed and robust communications networks, then the community is held back from realising its full potential:

- Businesses are not able to fully participate in the digital economy, stifling their growth and ambitions
- A child whose family cannot afford a fast and reliable connection will not be able to perform at their best, as they struggle with online learning facilities
- A community's economic growth will stifle as it will not be able to attract businesses or workers destined to thrive in the digital economy

It's now well understood that broadband network infrastructure is essential to everyday life. Open networks

also lead to innovation, increased competition, lower prices and faster network speeds. Local authorities striving to make it easy for people to participate fully in the digital economy now have an easier path to enable this mandate.

Local authorities are now able to operate broadband networks in the same way that they operate their roads. In other words, the principal that a municipality builds and maintains the roads, and allows everyone to drive on those roads, can apply equally to broadband networks. Local Authorities can provide broadband infrastructure just as they would a public utility such as water supply, sewerage and power connections.

The UK is almost unique in Europe in that most consumers don't yet fully appreciate the distinction between fibre and service. Current broadband Service Providers own and operate both – in other words, controlling both the digital roads as well as access to those roads. And they use this control to stifle competition and keep prices inflated.

Local authorities now have the ability to provide a municipality's digital infrastructure in the same way as a utility, with the costs of the physical infrastructure dealt with separately and upfront. The Local Authority can then leave the private sector to compete within the open access operating environment, which creates real competition between Service Providers driving down the cost of internet access for the subscribers.

In addition to cost savings, subscribers also benefit from increased choice and better service. Those who choose to participate in this municipal fibre network model can switch between Service Providers and plans as quickly as their contract terms allows. Subscribers have the freedom to choose from a list of Service Providers based on their specific needs – if a Service Provider isn't working out, then there are plenty more that will! This forces Service Providers to focus on higher quality service provision as a primary reason for subscriber retention.

Local authorities will also be able to deliver more of the vital services that their communities rely upon. The cost efficiencies of the municipal fibre network model can help to facilitate more services to more people with reduced budgets across areas including: healthcare, education, public safety, and emergency communications. When a Local Authority decides to embrace delivery of an open access municipal fibre network, it's also delivering a new digital marketplace for the private sector. This enables an expansion of the local digital economy and helps to stir and drive economic growth that ultimately benefits everyone in the community.

In this new Municipal Marketplace, the goal is to transform internet access from a system designed for the benefit of large corporations who currently control broadband networks, to a system designed for the benefit of all subscribers. It is a system designed to support municipality goals for the wider community in the areas of economic, social (bridging the digital divide), environmental and spending efficiencies.

4.3.2 Engagement Model

As a fully active neutral operator (FANO), VX Fiber is able to work with municipalities and other Fibre Owners to deliver the desired economic and social outcomes via a mutually beneficial fibre and services market, for all stakeholders.



VXFIBER 'FANO' PLUS DIGITAL TRANSFORMATION ENABLED

DTI: Digital Transformation Initiative

- Technical
- Commercial (£)

FPD: Fibre Planning and Design

- Detailed Design/Bill of Quantities
- Procurement Packaging
- Investment Prospectus

MAS: Managing Agent Services

- Procurement Management
- Delivery of Infrastruture Contracts

OM: Operations and Maintenance

- Construction Deviation Works
- Restoration and Maintenance

5.0 A Unique and Collaborative Approach

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A powerful combination of market knowledge, project experience and vision for the future have been the driving forces behind VX Fiber's pioneering Active Open Access Model and its partnership approach in the UK.

VX Fiber enables smarter digital transformation by bringing two key elements to every project:

- **A unique philosophy** centred around creating value in the community, working collaboratively with Fibre Owners to help individuals, businesses and the community as a whole to gain their digital freedom.
- **A structured partnership** approach with cities and municipalities based on their vision and objectives, leveraging existing assets, delivering specific outcomes and achieving desired benefits and value.

These foundations have been at the heart of discussions with UK stakeholders looking at alternative options for getting their communities connected. VX Fiber's partnerships with Stoke-on-Trent City Council, Grosvenor Britain and Ireland, and with Colchester Borough Council, amongst several others, signify the growing recognition of VX Fiber's game-changing, collaborative approach to fibre connectivity in the UK.

Our Story. 47

VXFIBER

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VX Fiber is an international fibre operator

with extensive experience building and operating Active Open Access, full fibre networks in multiple countries around the world.

Headquartered in Sweden, VX Fiber has operations in South Africa, the UK, Belgium, Austria and Germany. With over 20 years' experience, it has broadened its operations from acting solely as an Active Open Access neutral fibre operator to also being a fibre builder and investor.

Find us online: <u>vxfiber.com</u> Email us: <u>sales@vxfiber.com</u>