

North Wales Digital Connectivity Strategy  
Strategaeth Cysylltedd Digidol Gogledd Cymru

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Regional Strategy

North Wales  
18<sup>th</sup> March 2018

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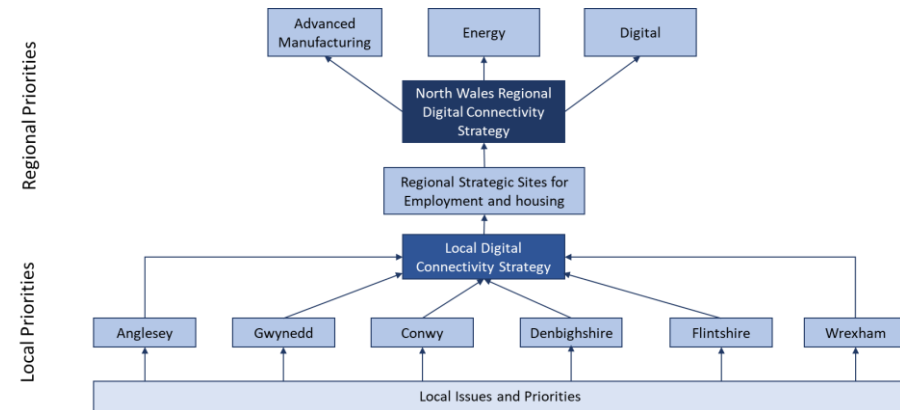
# 1. Introduction

Improved digital connectivity is identified as the most important factor in the ongoing economic and social transformation of North Wales. The *North Wales Digital Connectivity Strategy* details the rationale and the interventions for the development of digital connectivity to match this transformation to 2030 and beyond.

The digital strategy supports the *Growth Vision for the Economy of North Wales*<sup>1</sup>, with development funded through the North Wales Growth Bid and other sources of funding.

The *North Wales Digital Connectivity Strategy* is a regional collaboration of six local authorities and the private sector (through the North Wales and Mersey Dee Business Council). The regional strategy has been developed to complement local and national strategies to establish a 'joined-up' approach to ensure the maximum economic benefit will result.

The regional strategy concentrates on the vision for economic growth, the key sectors and the consequential spatial distribution of the actions required to make a difference. In addition, it targets the key strategic sites which have been agreed in the *Growth Vision for the Economy of North Wales*.



**Fig.1 Context of regional and local digital connectivity strategies**

The local strategies are broader; each local authority area benefits from and contributes to the regional priorities and seeks to address specific local issues in terms of local sector priorities and local priority sites.

Local and regional strategies benefit from, and seek to support and extend national strategies from Welsh and UK governments. These include the ongoing *Superfast Cymru*<sup>2</sup> programme as well as the Welsh Government *Mobile Action Plan*<sup>3</sup> and *UK Digital Strategy 2017*<sup>4</sup>.

Fig.1 illustrates the context of the activities and illustrates how the local strategies both address local issues and priorities but are also key to the delivery of the regional strategy.

## 2. Executive Summary

### 2.1 Digital Priorities

The *Growth Vision for the Economy of North Wales* identifies a number of key economic sectors and key sites that are central to the growth of the economy in North Wales. In addition, there are sectors and locations that are important locally. Key sectors identified in this report are:

- Energy Cluster
- Advanced Manufacturing
- Digital Cluster
- Construction
- Tourism and hospitality
- Health and Social Care

### 2.2 Requirements by Sector

Although all businesses have different specific requirements based on their size and operation, different sectors tend to have different characteristic needs that can guide interventions:

- **Energy Cluster** – The Energy Cluster supply chain needs to exchange large data files. Even relatively small companies may require high bandwidth, but are mostly focused in key locations. Ensuring full fibre connections for affordable services at these locations is required.
- **Advanced Manufacturing** – Like the Energy Cluster, Advanced Manufacturing needs to exchange large files throughout the supply chain, and between building facilities within companies. Small companies may need large bandwidth, and large companies may have locations where leased lines are not affordable.

- **Digital Cluster** – As with the other high growth sectors, the potential for high bandwidth file exchange is critical. However, the sector is more geographically dispersed – requiring high bandwidth services throughout the region.
- **Construction** – The need for effective document control means that main offices need good bandwidth capabilities, but there is also a need to communicate with remote sites. Improved availability of superfast and 4G throughout the region will benefit the sector.
- **Tourism and hospitality** – Tourism locations need to meet the aggregated connectivity expectations of several users at once. Increasing bandwidth expectations of individual users is leading to significant bandwidth requirements.
- **Health and Social Care** – the digital transformation of the sector, and the need for connected mobile workers means that superfast broadband for all is a key social requirement.

Sector	Digital Requirement
Energy Cluster	Full fibre at key locations
Manufacturing	Full fibre at key locations
Digital Cluster	Ultrafast and superfast widely available
Construction	Ultrafast and superfast widely available
Tourism & hospitality	Ultrafast and superfast widely available
Health & Social Care	Superfast available to all properties

## 2.3 Current Availability

The *Superfast Cymru* project has delivered significant improvement in superfast broadband across the region since 2013, and the *FibreSpeed*<sup>5</sup> network gives potential core strength in the north. However, the current digital connectivity in North Wales remains poorer than Wales as a whole and significantly lags the rest of the UK.

There are 'white' (un-connected) properties throughout the region. Limited reach of the FTTC access infrastructure causes most of the weakness in superfast deployment. Poor underlying core infrastructure means there is poor access to higher value services throughout the region.

Mobile connectivity also is significantly poorer than in the rest of the UK, with poor coverage and inadequate capacity.

<p><b>Strengths</b></p> <p>Shared leadership throughout the region gives the potential for greater overall benefit through greater capacity.</p>	<p><b>Weaknesses</b></p> <p>Poor existing core and access infrastructures, and low population density present commercial barriers.</p>
<p><b>Opportunities</b></p> <p>FibreSpeed, Network Rail Telecom and public sector connections present key opportunities to improve connectivity.</p>	<p><b>Threats</b></p> <p>Established 'digital divide' presents a long term threat of economic and social decline.</p>

## 2.4 Intervention Strategy

A number of initial key interventions have been identified to begin to deliver improved connectivity at local and regional level:

- **Full fibre passive infrastructure** – improved duct network to facilitate end-user access to full fibre gigabit services.
- **Affordable gigabit services** – development of high bandwidth contended FTTP services to meet business needs.
- **Improved backhaul** – development of the FibreSpeed, Network Rail Telecom and Public Sector connectivity routes to improve core connectivity.
- **SME Demand stimulation** – voucher based schemes to promote demand and support all initiatives.
- **Rural Broadband Deployment** – to support the *Next Generation Access Broadband Wales* project and improve deployment of superfast and ultrafast broadband in remote rural areas.
- **Social Housing Broadband** – digital connectivity to improve service efficiency and social outcomes.
- **Public Sector Anchor Tenant** – explore options to use fibre at schools and other public buildings to extend backhaul connections throughout the region.
- **Policy Support** – review and improvement of planning and similar policies to reduce policy barriers.
- **Market Intelligence** – establish effective communication channels for key market data to service providers.
- **5G Demonstrators** – development of 5G use-case demonstrators.

## 3. Digital Priorities

The North Wales Digital Connectivity Strategy has been developed to establish local strategies for each of the six counties in North Wales, and an over-arching strategy for the region. In this way, the regional strategy will address some of the key similarities and differences between the six counties, and how they contribute to the region. Locally, the six counties will benefit from the influence of the regional strategy, and maintain their local priorities.

### 3.1 Growth Vision

Central to the Digital Connectivity Strategy development is the *Growth Vision for the Economy of North Wales* and the Growth Bid, currently in development. The *Growth Vision* is a single joined-up vision for economic and employment growth for the region with a strong private sector involvement and a collaborative approach with surrounding areas. As well as the economic ambitions, the vision plans to address the social, environmental and cultural well-being of North Wales; to support and retain young people in the local economies; address worklessness and inactivity; and to support and enable private sector investment. A portfolio of strategic projects has been identified to address Infrastructure, skills and employment and support for business growth. Digital infrastructure has been identified as a key aspect of the infrastructure needed for growth and effective digital infrastructure and its widespread use will help to build on areas of strength as well as ameliorate some of the

disadvantages suffered by the more rural and remote parts of the region.

#### 3.1.1 Key Industry Sectors

The key industry sectors identified in the Growth Vision are:

- **Energy Cluster** – with a number of key locations throughout the region, energy presents a key strategic strength.
- **Advanced Manufacturing** – manufacturing is a key sector for the economy and employment of the region. particularly in Flintshire and Wrexham.
- **Digital Cluster** – the developing digital cluster has the potential for economic growth across the region.

Underpinning this, the *North Wales Regional Skills and Employment Plan* <sup>6</sup> identifies three priority sectors (energy, manufacturing and construction), and four growth sectors (creative and digital, health and social care, tourism and hospitality, food and drink).

The digital connectivity priorities presented by these sectors are different. While the three key industry sectors very high bandwidth in a few locations, the growth sectors require less bandwidth, but in locations throughout the region.

### 3.1.3 Strategic Sites and Premises

The *Growth Vision* identifies a number of key sites and premises (see Fig.3 on page 8). These sites primarily support the three key industry sectors, and present focus locations for economic growth for the region. These strategic sites for development are:

- Northern Gateway, Deeside
- Warren Hall, Broughton
- Wrexham Technology Park
- Wrexham Industrial Estate
- Wrexham Business Quarter
- St Asaph Business Park
- Bodelwyddan
- Abergele South East
- Parc Bryn Cegin, Bangor
- Parc Cefni expansion, Llangefni
- Parc Cybi, Holyhead
- Holyhead Port
- Ferodo Site, Caernarfon
- Centre for Energy Generation at Trawsfynydd
- Snowdonia Aerospace Centre, Llanbedr
- Menai Science Park

It is expected that all of these sites will see improved connectivity as a result of this strategy because they are the sites where significant growth is expected. Other important sites which support significant employment are expected to benefit similarly.

Mapping of the strategic sites across the region shows the majority are in the north, and close to the FibreSpeed network. This gives the potential for strong development of digital connectivity to these sites. However, the Centre for Energy Generation at Trawsfynydd, and the Snowdonia Aerospace Centre at Llanbedr present much greater problems for digital connectivity.

### 3.1.4 Infrastructure Plan to enable Growth – Digital

Three strategic projects to strengthen the regional digital infrastructure are identified in the *Growth Vision*:

- Promote and deliver projects that increase ultra-fast broadband and mobile coverage that enable our businesses to access new markets.
- Accelerate the roll-out of the connectivity infrastructure programme in the region.
- Support continued investment in the digital network and infrastructure, especially mobile connectivity, and promote activities to exploit the availability of superfast broadband. Monitor usage and promote the capacity provided.

These three projects require development to establish practical projects that can be delivered to provide specific benefits throughout the region.

### 3.1.5 Digital Options

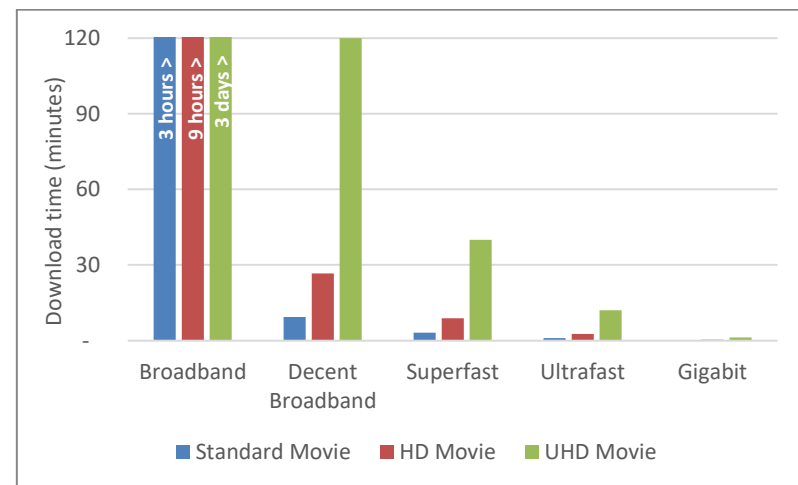
Current digital connectivity is provided through a number of different technologies, and with different capabilities. These present a number of different digital options that have different characteristics and benefits:

- **Leased lines** – provide the most advanced (and most expensive) digital connectivity. Used at key locations by the largest organisations, they provide symmetrical, un-contended (not shared) connections in a range of bandwidths.
- **Gigabit FTTP** – offering very high bandwidth contended services delivered over full fibre technology, they provide an affordable solution to meet the most advanced data requirements. Availability of these new services is poor.
- **Ultrafast** – similar capabilities to gigabit services, but slightly lower bandwidths allow delivery over different technologies, and hence greater availability.
- **Superfast** – typically delivered over FTTC (mix of fibre and copper) infrastructure, superfast services present a step change in broadband capability. They form the base level for a modern connected community.
- **Broadband** – original broadband services were delivered over copper lines from the exchange. They may be all that is available in 'white' areas (where Superfast broadband is not yet available). Speeds vary from 0.5Mbps. Ofcom currently specifies 10Mbps as 'decent broadband'.

- **Mobile Communications** – are constantly evolving. The 2G GSM networks are still important for voice services. 3G data networks are being superseded by 4G with better coverage and capacity. Soon 5G capabilities will complement 4G networks and Voice will move to VoLTE as 4G coverage extends as far as that of 2G networks.

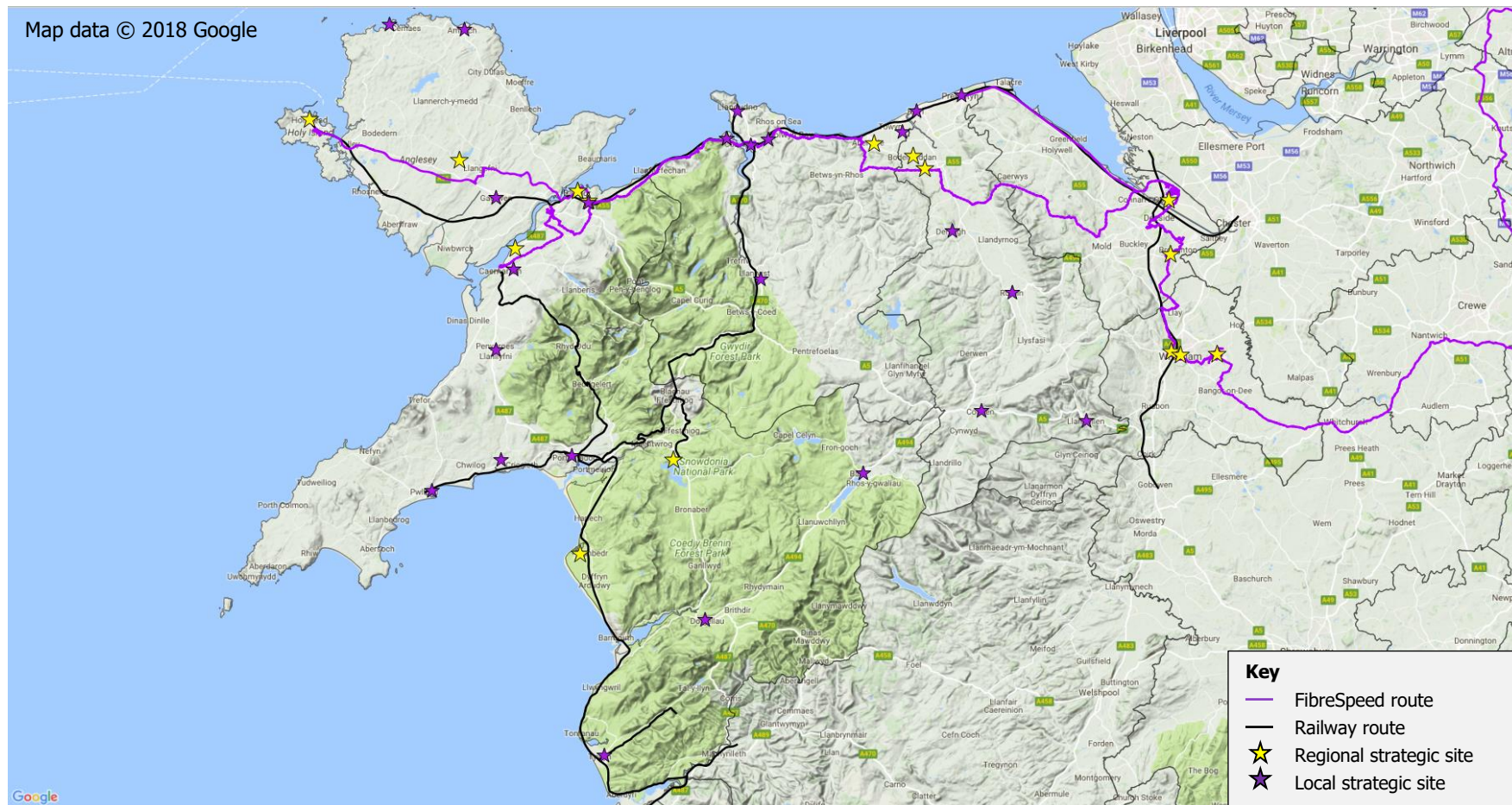
All current digital connectivity utilises optical fibres for at least part of the connection route. Optical fibre connections provide the greatest flexibility of bandwidth and distance – and are consequently seen as the most 'future-proof' connections as the digital requirements of all businesses and users continue to grow.

To provide a simple comparison, the impact of different broadband types on the download times for a typical two hour movie is shown in Fig.2.



**Fig.2 Film download times for broadband services**





**Fig.3 Mapping of Key Strategic Sites for North Wales with FibreSpeed and Rail routes**

### 3.3 Other Strategic Drivers

The business sectors identified in the *Growth Vision* are not the only priorities for the individual counties. This is made clear in the Gross Value Add (GVA) by sector for the region. Manufacturing is a very important sector for North Wales as a whole, though the majority of the GVA impact is in Flintshire and Wrexham.

Other sectors – in particular the public sector, and tourism related businesses (including retail) are important to the region and have a wider economic impact throughout the six counties.

Addressing the specific requirements of the different business sectors will be important, particularly at local levels. Addressing the societal requirements of digital connectivity must also be considered.

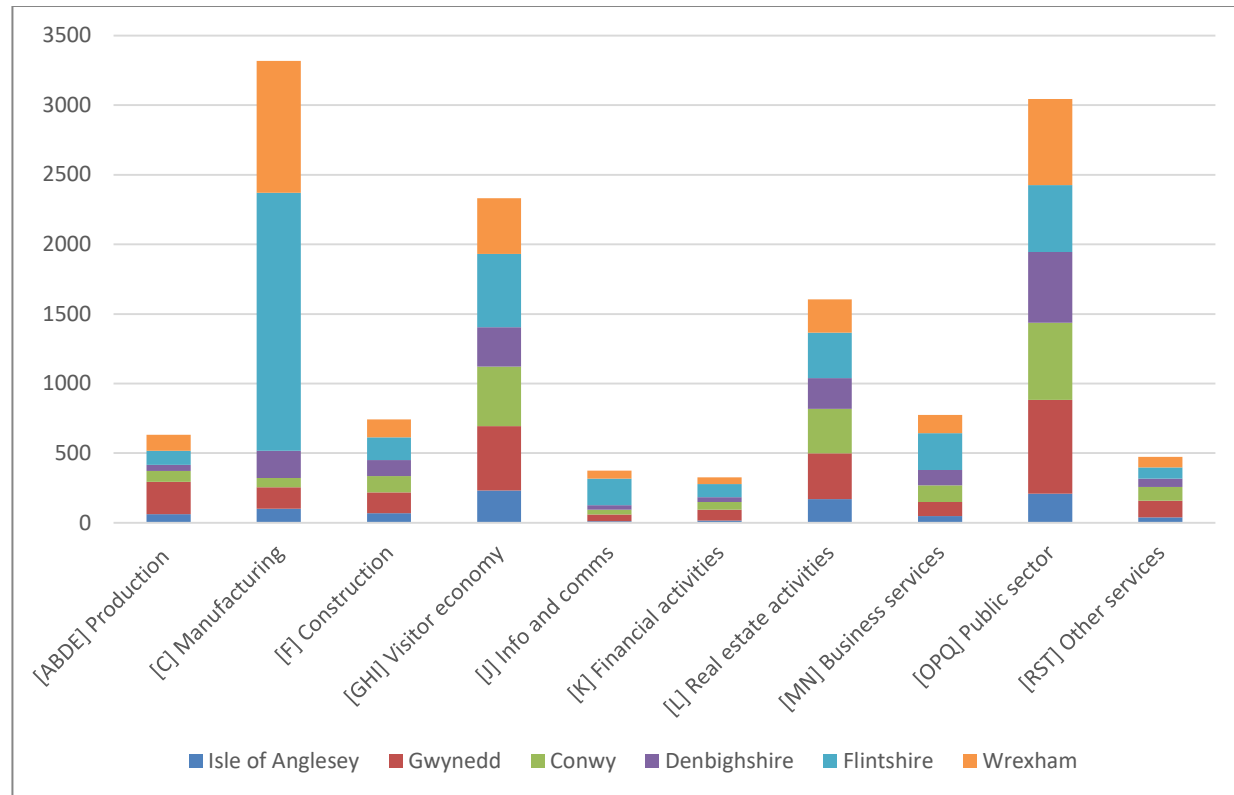


Fig.4 GVA by Sector 2016 (£ million)

Source: Office for National Statistics

## 4. Requirements by Sector

Digital connectivity requirements for different sectors are determined by the technical requirements and the geographic distribution of businesses.

### 4.1 Digital Requirements

Different industry sectors have different demands for their digital connectivity. Understanding the different requirements by sector, and the relative priorities of each sector is central to the *Digital Connectivity Strategy*.

<b>Sector</b>	<b>Key Digital Connectivity Requirements</b>	<b>Intervention</b>
Manufacturing and Energy	Large manufacturing facilities use high bandwidth leased lines – which are widely available. The need for high bandwidth connectivity is now well established in the more advanced manufacturing businesses – consequently ultrafast and full fibre are required to support growth in the sector, particularly in the supply chain.	Support for full fibre connectivity in key areas for the sector.
Digital	The digital sector is an early adopter of high bandwidth services. The sector is characterised by SMEs in geographically dispersed clusters with some larger businesses (with more employees and greater data requirements) in the main industrial centres.	Support for ultrafast connectivity to be as widely available as possible with full fibre for larger digital businesses.
Tourism and Hospitality	The tourism and associated sectors increasingly need to accommodate the 'always connected' expectations of their customers, as well as the ability to communicate with customers online, including booking online. Although the individual connectivity requirements and online booking of individuals are easily met with superfast broadband, the aggregated bandwidth demands of several users represents a greater challenge. Ultrafast broadband is becoming a necessary requirement for all tourism businesses.	Support for widespread ultrafast and superfast broadband connectivity for tourism business locations. Increased superfast and mobile connectivity throughout the region to improve visitor engagement.
Public sector, health and social care, real estate	The public sector, including health and social care sector has demands for digital transformation development and adoption. Developments can be expected to be undertaken in strategic locations with existing connectivity. Adoption of digitally transformed services, however, require superfast connectivity at the care service user's premise, and data and voice connectivity for a mobile workforce.	Support for superfast and ultrafast connectivity at end care service user premises (ubiquitous superfast broadband). Improved mobile and WiFi connectivity for mobile workers.

## 4.2 Key Business Requirements

Interviews were held with representative businesses from the key sectors across North Wales. These provide a valuable insight to the requirements of these sectors for all counties in North Wales.

### 4.2.1 General Mobile Improvement

In addition to the following specific business requirements, there was widespread agreement among all businesses that poor mobile coverage for voice calls along the main communications routes was a barrier to business efficiency.

***If we have an engineer leaving here to a job in north west Wales, then once they are 10 minutes from here, they are regularly out of touch until they reach civilisation at the other end.*** (MWL Systems)

***Any issues engineers have with mobile coverage on client sites can be resolved by Wi-Fi calling.*** (MWL Systems)

### 4.2.2 Manufacturing and Energy

Businesses in the strategic manufacturing and energy sectors are struggling because of poor affordable digital connectivity. Even relatively large businesses have a problem because they tend to use a number of smaller buildings, rather than one single manufacturing facility. There is a widespread and un-met need for ultrafast FTTP infrastructure and services that can provide affordable high capacity, high reliability connections.

***Ultrafast would have a profound influence on the way we do business.*** (Reynolds International)

***Every minute counts and when a lot of time is wasted because of slow or broken connectivity, then it is harming the bottom line.*** (Carbon Zero)

***Our Quality Management System has 1000 policies. This has been supplemented with photographs to aid understanding. It is likely that video will become an integral part of the manual too over time.*** (Snowdonia Cheese)

***We need to be connected to Poland and Morocco in real time for database sharing. Poland and Morocco outstrip us in terms of their data communications.*** (Fibrax)

### 4.2.3 Digital and Professional Services

Digital and service companies have benefited from the efficiency improvements possible with affordable superfast broadband, though there are concerns over reliability and scalability.

***Small businesses are able to migrate to the cloud easier than large businesses and that makes their scaling up much more straightforward.*** (MWL Systems)

***It's more about service reliability than absolute speed. I rarely find myself worrying about the speed.*** (Salisburys)

### 4.2.4 Tourism and Hospitality

Tourism and related businesses span a wide range of business types and sizes, and they are closely inter-related. People visiting North Wales provide the principal target group for many other hospitality businesses. The connectivity requirements include the

requirements of the businesses themselves, and the ability for visitors to connect with them during their stay. Superfast and ultrafast connections are needed by businesses, with better overall connectivity in the region also important.

***We use technology to build the customer relationship at three levels. We use our online presence to make people aware of us. We then use it to build trust and when the trust is there, to make a booking in the smoothest manner possible. Without that on-line presence we wouldn't be able to employ the people that we do.*** (RibRide - Adventure Boat Tours)

***The majority of our customers book less than 48-hours before the activity... When they are sat in their holiday cottage and they cannot get online – that's when we are not getting them.*** (RibRide - Adventure Boat Tours)

***People sat in B&Bs and hotels around need to be able to get on line and see what's going on – what can I do?*** (Surf Snowdonia)

#### 4.2.5 Construction

The construction industry is undergoing a transformation through the development of Document Management Systems (DMS), and the need to communicate detailed construction drawings and documents within the business and with clients. Superfast (FTTC) connections are being used for main sites, and upgrade to FTTP would be beneficial – leased lines are too expensive. Communication with sites remains a problem. Satellite services are used currently, but are not well suited to DMS. 4G mobile and widespread superfast connections are needed.

***Having better communications will have a huge impact on us as a company. For instance, accidentally using the wrong version of a drawing could cost the company millions. A modern DMS will reduce that risk – but it needs good communications at HQ and all sites to work effectively.*** (Jones Brothers Engineering)

#### 4.2.6 Public Sector, Education

Public sector sites, including schools and colleges have varied connectivity requirements, and these are developing rapidly to meet the demands and opportunities of digital transformation. The provision of digital connectivity to public sector buildings could enable wider connectivity to surrounding businesses and communities.

***PSBA has been brilliant for us. It took them a little while to understand our requirements, but they were very responsive.*** (Grwp Llandrillo Menai)

## 4.3 Spatial Requirements

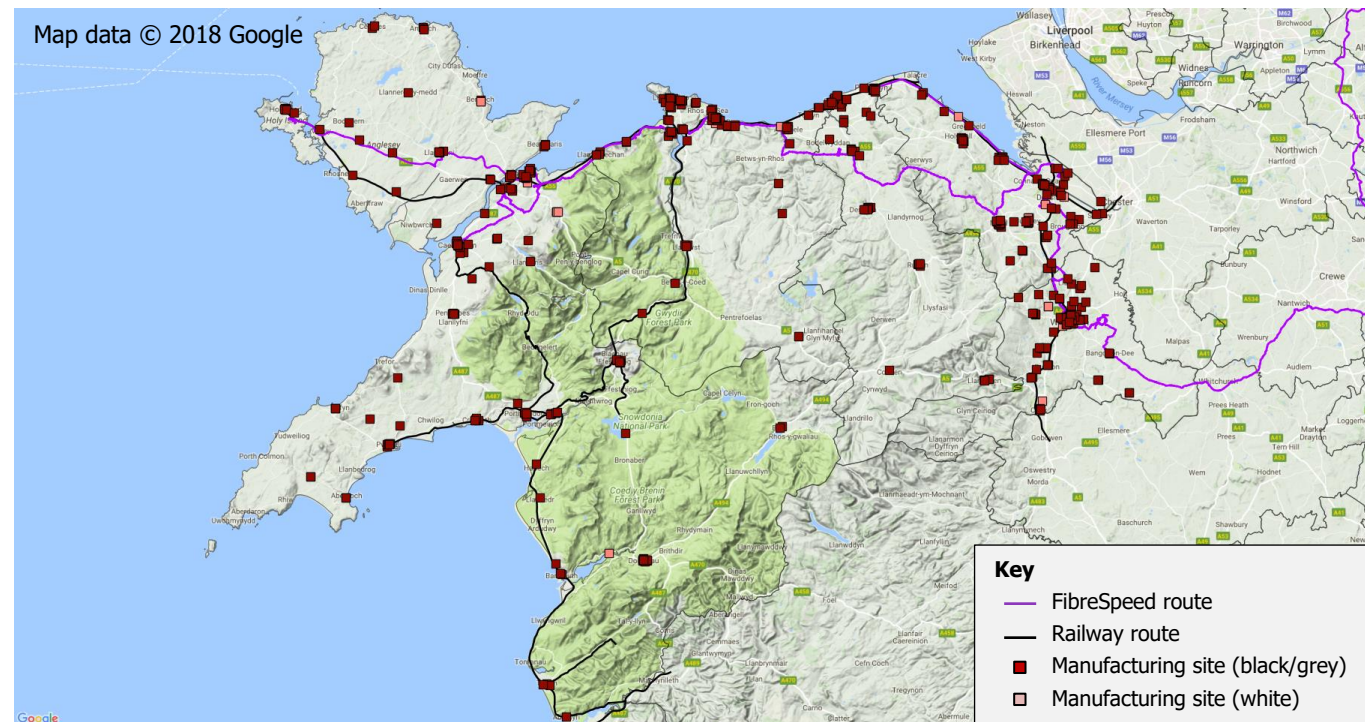
There are some important differences between the different industry sectors in the way businesses are located that makes a significant difference in the development of interventions.

### 4.3.1 Manufacturing

There are some important differences between the different business sectors. Manufacturing businesses, for example are located in clusters – the great majority of the physical clusters adjacent to the FibreSpeed route, or along rail routes.

The manufacturing sector in North Wales is characterised by a relatively small number of typically large businesses. There are very few ‘white’ manufacturing businesses (with no current or planned superfast connectivity) as illustrated in Fig.5 by the lighter coloured squares.

The spatial variations in requirements are driven largely by the different geographies across the region. There is considerable clustering of businesses and properties along the coast, for example, and significant challenges posed by remote rural areas.

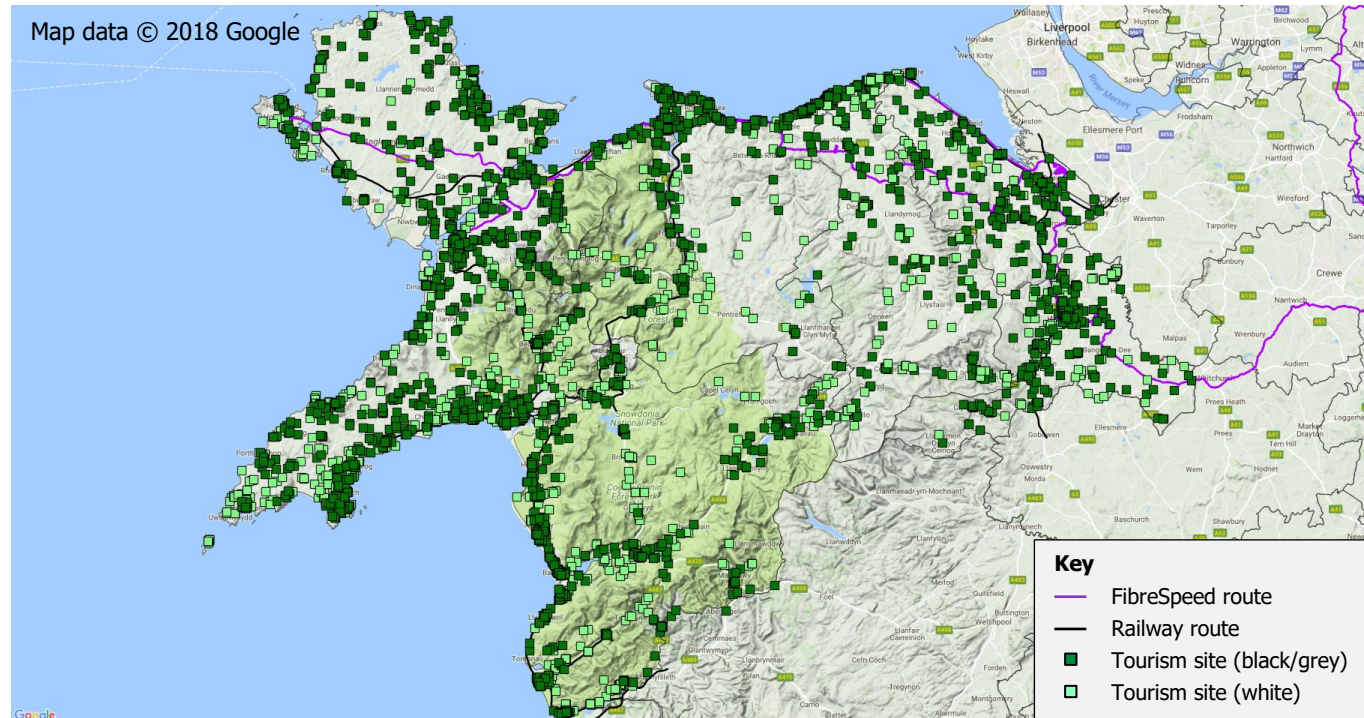


**Fig.5 Mapping of Manufacturing Businesses in North Wales**

### 4.3.2 Tourism

By contrast with manufacturing, tourism presents a far more complex picture.

There are many more tourism businesses, widely distributed across the region. The businesses are smaller, and there are many 'white' tourism businesses as illustrated by the light coloured squares in Fig.6.

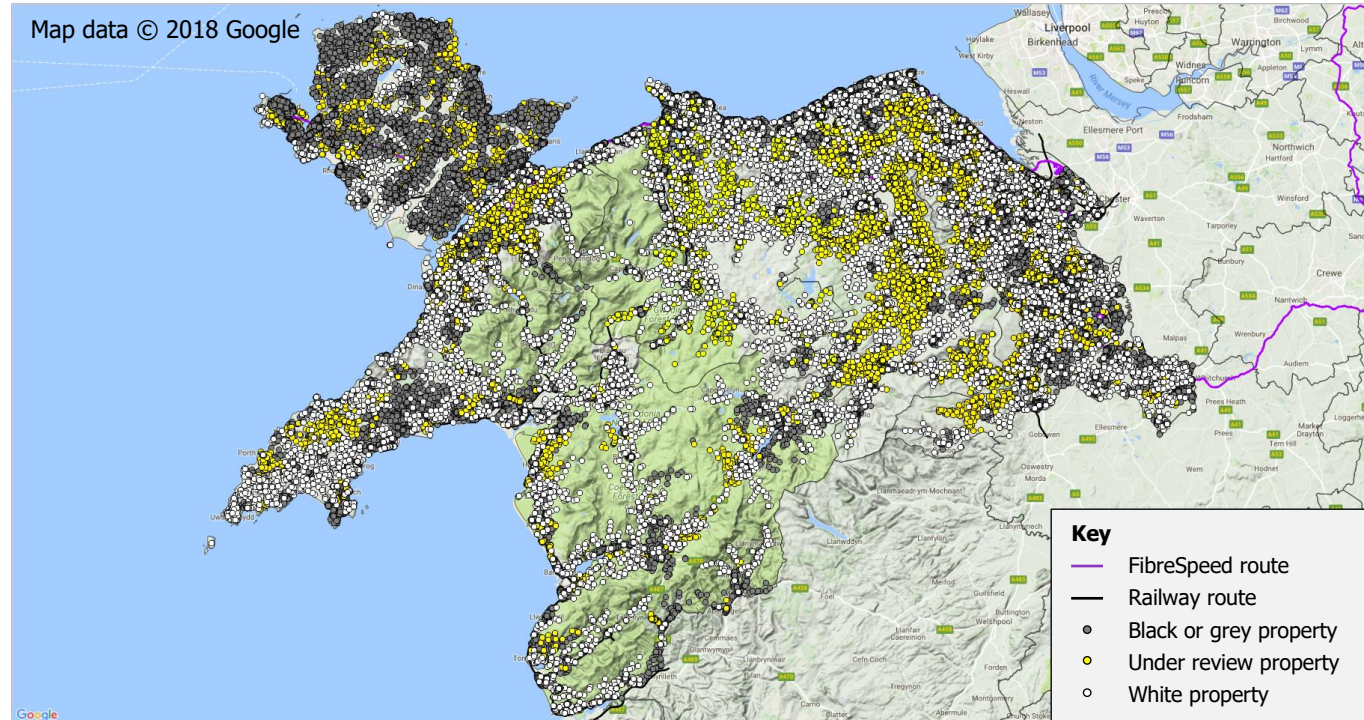


**Fig.6 Mapping of Tourism Businesses in North Wales**

### 4.3.3 Connected Community

Many sectors, including health and social care, and tourism require an effectively connected community – either to engage with customers, or as an internal element of digital transformation.

Ensuring widespread availability of superfast broadband throughout North Wales will be an essential enabler of this digital transformation. Mapping of the remaining 27,000 'white' residential properties shows there is a significant task remaining across the region to increase the deployment of superfast connectivity.



**Fig.7 Mapping of 'white' residential properties in North Wales**

Ensuring a fully connected community, with access to superfast broadband for all is a key requirement across the region. However, this is a challenging requirement, and prioritisation of deployment may be required in the short term.

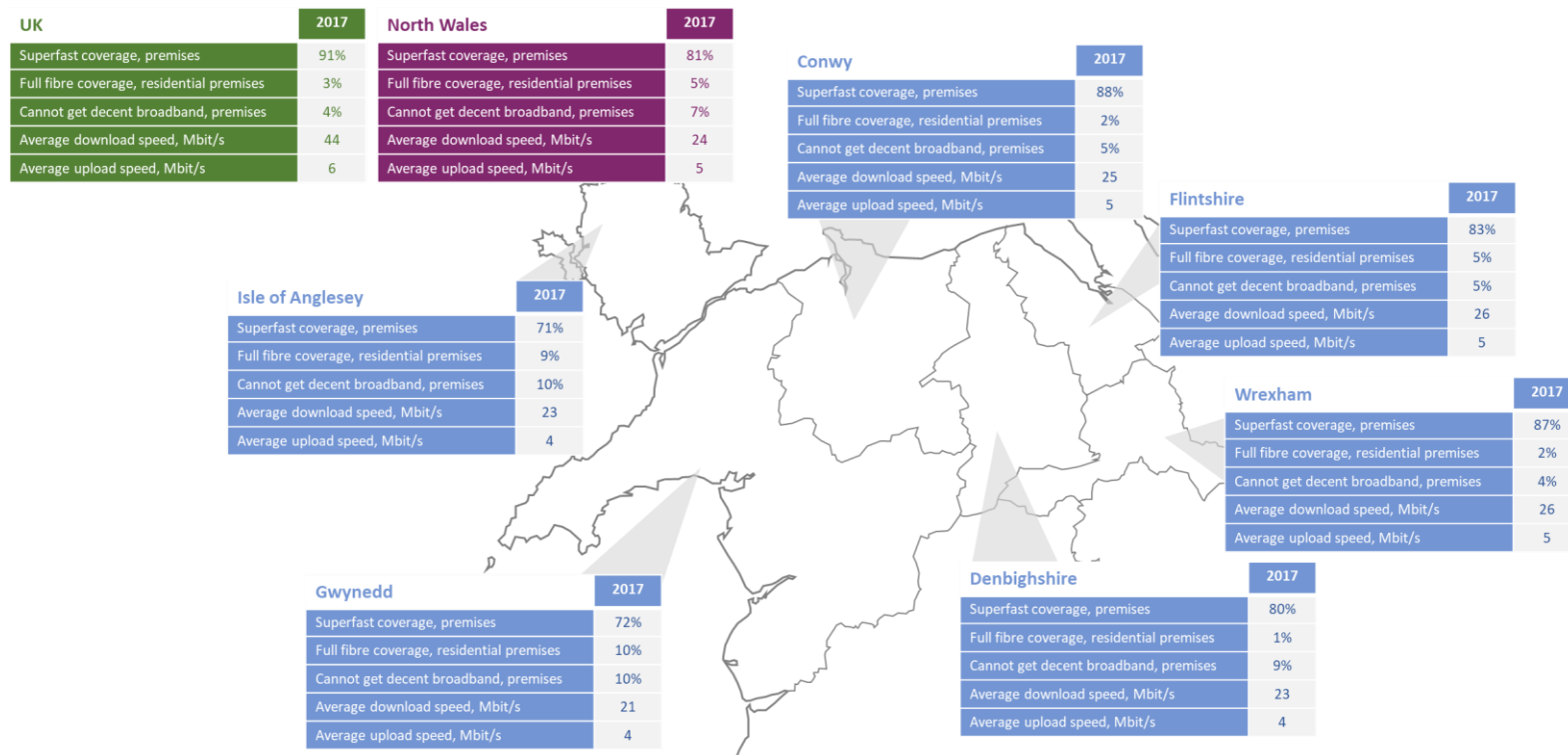
Social housing, care homes, and other residences for vulnerable people have typically higher demand for health and social care services. Prioritising these properties may be an effective way of supporting the digital transformation of key public services.



## 5. Current Availability

The *Superfast Cymru* project in Wales, and similar projects across the UK mean that the position regarding fixed broadband availability is changing rapidly, making comparisons difficult. The most effective comparison for the UK is provided in the Ofcom *Connected Nations 2017*<sup>7</sup> report and analysis. This is based on data for May/June 2017.

Current fixed broadband availability in North Wales lags behind the UK and Wales as a whole. Although there is unusually high availability of full fibre broadband in Anglesey and Gwynedd, there is generally poor availability of superfast broadband, and lower average speed than national comparisons.



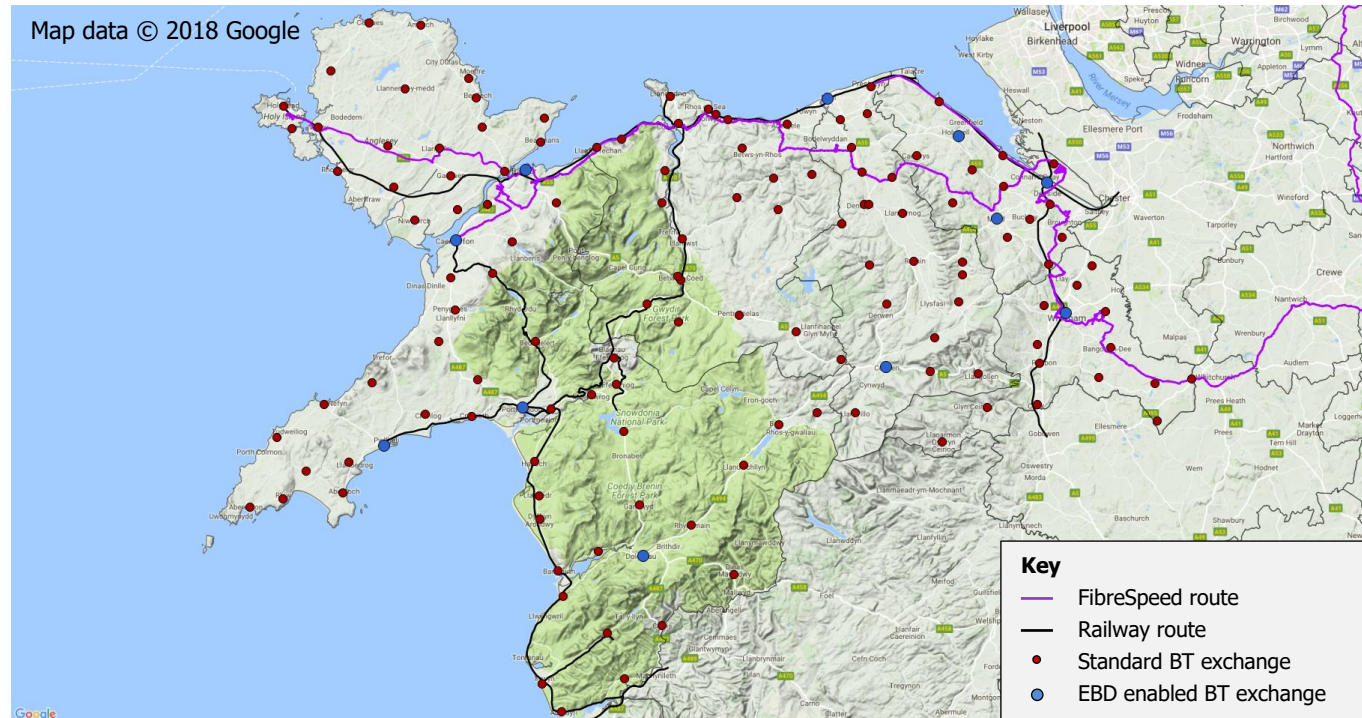
**Fig.8 Fixed Broadband Availability in North Wales (Ofcom data)**

## 5.1 BT Group Core Infrastructure

The great majority of superfast connectivity in North Wales is provided over the Openreach network. All exchanges are FTTC enabled, with FTTP also used in some locations.

The remaining white properties in the region can be assumed to be beyond the reach of FTTC access networks. To address this problem, improved access networks will be required, and they in turn will require backhaul connections. Backhaul is usually provided from a BT exchange enabled to provide EBD (Ethernet Backhaul Direct) services.

There are very few EBD enabled exchanges in North Wales. Although current developments to the core infrastructure is improving this position, particularly on Anglesey, the lack of backhaul availability continues to present a strategic problem for the development of improved connectivity.



**Fig.9 Mapping of BT exchanges in North Wales**

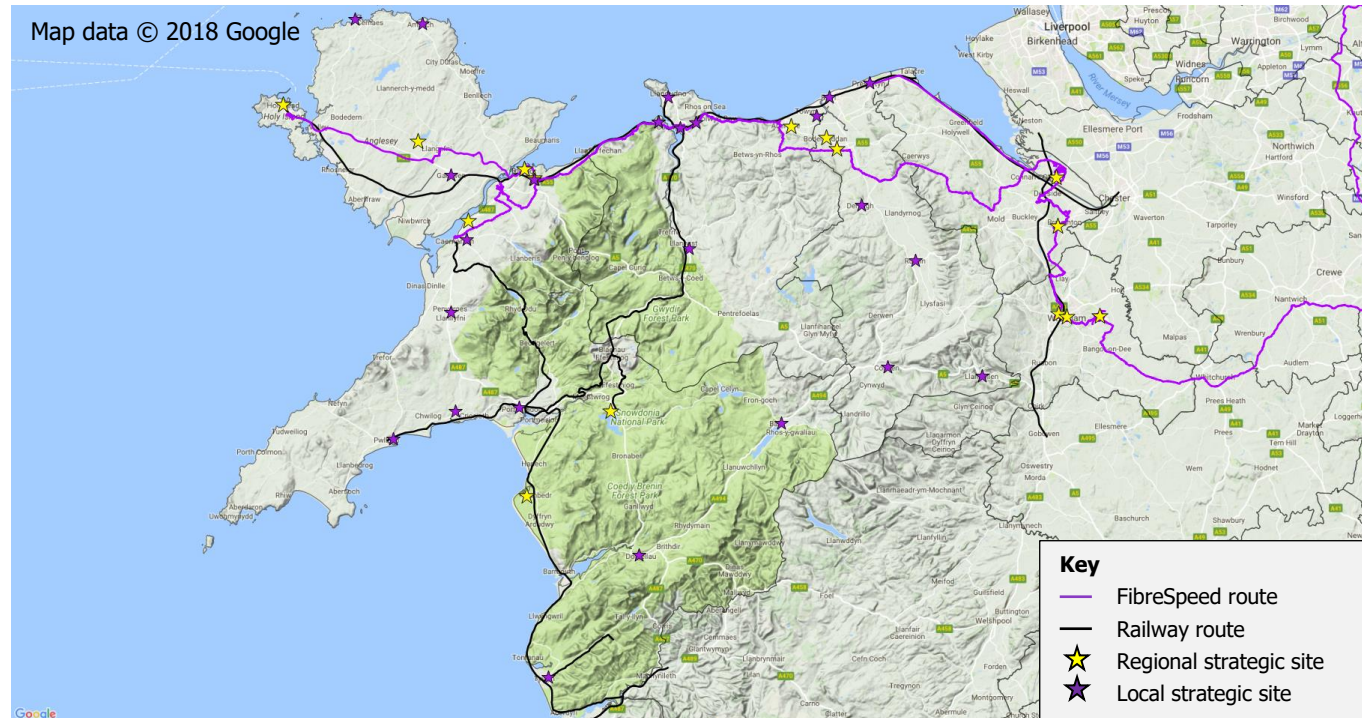
### 5.1.1 BT Group

Openreach is currently a part of the BT Group, and responsible for the operation of the infrastructure delivering telephony and data services. Openreach services are used by communications providers to deliver services to end business and residential users.

## 5.2 Other Digital Infrastructure

There is relatively little digital infrastructure in North Wales beyond the BT infrastructure. The FibreSpeed network operated by Zayo Networks is the most significant, with some additional commercial footprint provided by Zayo Networks. The networks follow the path shown by the purple line in Fig.10.

The networks deliver wholesale capacity used by other service providers to deliver services to end users.



**Fig.10 Mapping of Independent Core Digital Infrastructure in North Wales**

The FibreSpeed and Zayo networks provide the potential for very high bandwidth connectivity, and pass very close to the majority of strategic sites in the region where high bandwidth connectivity is required to support economic growth. However, as the networks currently only provide high-cost leased line services, they are little used.

The FibreSpeed and Zayo networks also have no footprint beyond the coastal area in the north. Rail routes (black lines in Fig.10) however, do extend to more remote areas throughout the region. Some of these routes support Network Rail Telecom infrastructure that may be able provide commercial services, in accordance with the *Network Rail Telecom Strategic Plan*<sup>8</sup>.

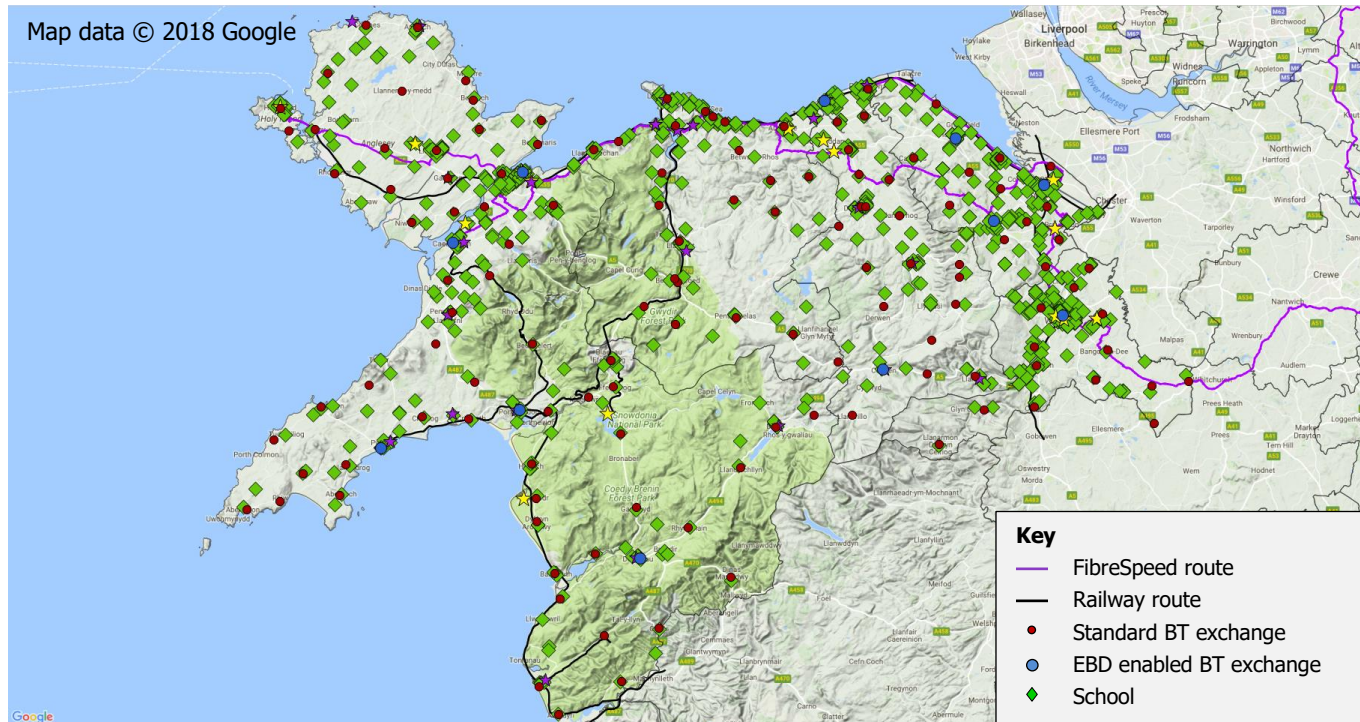
### 5.3 Public Sector Connectivity

Areas of poor broadband connectivity exist across the region (Fig.7, page 15). Effective interventions will require the presence of high bandwidth connectivity to allow the build-out of broadband access to these un-served areas.

Although FibreSpeed has the potential to support backhaul connections for the north of the region, and the possible use of Network Rail Telecom may extend this further, many areas are still beyond the reach of backhaul connections.

However, all schools in North Wales will soon have fibre connectivity and are widely distributed (see Fig.11).

The majority of digital connections for schools in Wales are provided through the Public Sector Broadband Aggregation (PSBA) project. The location of schools in almost all communities throughout the region means this could have a significant impact on the ongoing availability of backhaul for local access networks.

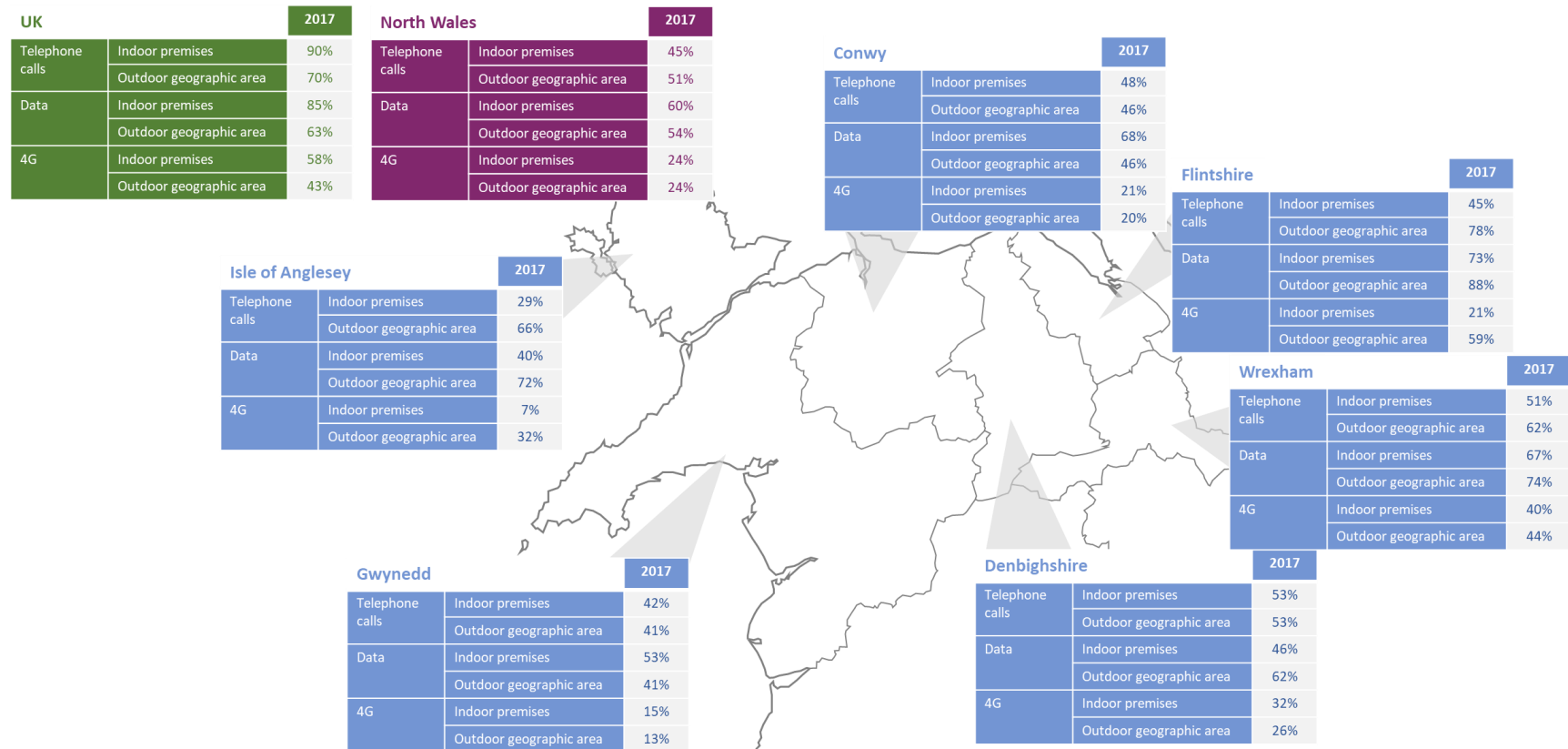


**Fig.11 Mapping of schools in North Wales**

Options will be investigated to allow the presence of digital connectivity at public sector buildings to support the provision of wider digital connectivity to nearby businesses and homes.

## 5.4 Mobile Connectivity

Data in the Ofcom *Connected Nations 2017* report shows that mobile connectivity in North Wales is also significantly poorer than the UK and Wales as a whole. Capability for both voice and data is poorer than the UK, particularly within premises.



**Fig.12 Mobile Connectivity in North Wales (Ofcom)**

### 5.4.1 Constant Evolution

Mobile connectivity is constantly evolving, with new technologies introduced regularly. This provides an opportunity to overcome previous weaknesses. For example, 4G coverage has already outstripped 3G, so that we no longer need to consider 3G deployment.

## 5.4.2 Connectivity Requirements

The different uses of mobile devices (for voice and data) presents two different connectivity requirements:

**Remote access** – the need to make calls and access data at remote locations (away from the home or office location). This presents a requirement for maximum overall coverage.

**Mobile calling** – the desire to make and receive voice calls while travelling. This presents a requirement for maximum coverage *along the road routes*, particularly the major road routes. However, coverage alone is not sufficient. There are capacity issues along the major routes, which are exacerbated in the summer when visitors greatly increase traffic on the major routes.

It is becoming clear that WiFi access to superfast or ultrafast connectivity is the preferred approach for remote access. This is clearly the case for data access, and also becoming the accepted preference for voice calls (with WiFi calling supported by all mobile operators). The key business requirement for mobile connectivity is to support mobile calling. The priority is for full connectivity (coverage and capacity) along major road routes.

## 5.4.3 Key Technologies

The deployment and evolution of mobile technologies means that it is important to focus on the most appropriate technologies for the region, rather than necessarily considering the sequential development of each technology.

- **2G** – still has the greatest coverage and availability within premises. It is still the most important coverage for mobile voice calls. Maintaining widespread coverage and adequate capacity remains important.
- **3G** – Introduced stronger data capabilities, but is no-longer strategically important following widespread deployment of 4G. We do not include 3G in this strategy.
- **4G** – Important for data and voice. Supporting maximum deployment of 4G services is the priority for mobile connectivity.
- **5G** – A new and evolving standard that promises a new level of connectivity supporting a vast range of new applications.

## 5.4.4 2G Deployment

2G coverage along the A55 is good with most of the length covered by all three networks. The other major routes have good coverage generally, but network availability deteriorates badly in the middle and the south of the region. Gwynedd, Conwy and Denbighshire have the worst coverage problems.

In total, 50% of the land area of the region has coverage from all three 2G networks with 18% having no coverage.

## 5.4.5 4G Deployment

As 4G is much newer technology which is currently being rolled out, it is not surprising that coverage is much sparser than 2G. Only around 24% of the geographic area of North Wales has coverage from all four 4G networks. What coverage there is, is concentrated in the north of the region leaving the south and

central parts of the of the region with very poor coverage. The areas served by no operators are extensive with 26% of Denbighshire being without any 4G coverage.

Coverage of the A55 is reasonably good with very little with coverage from no operators. However, there are stretches in Flintshire, Conwy and mid-Anglesey where coverage is not available from all operators

The other A roads which reach southwards face considerable difficulty with little coverage by all four 4G networks.

#### 5.4.6 5G Development

The evolving 5G networks represent a step change in mobile connectivity, and a convergence of mobile and fixed broadband networks. The resulting networks are expected to enable a huge range of new applications, including autonomous vehicles, real time health monitoring and advance manufacturing applications.

The expectation is that 5G will provide mobile access to very high bandwidth connectivity. However, the 5G wireless networks have very short range. There is little understanding of how they will be deployed and used in remote and rural areas, where significant gaps in coverage can be expected.

Current UK and Welsh government priorities are to develop and understand use-cases to guide the ongoing development and deployment of 5G networks. There is an opportunity for North Wales to contribute to the development of use-cases in key sectors, and across a range of deployment geographies.

#### 5.4.7 Other Developments

The Internet-of-Things (IoT) presents a myriad of opportunities for organisations from security monitoring of remote farm assets to sophisticated augmented reality experiences at major tourist attractions and urban centres. It will be important for North Wales to remain informed on the development of supporting technologies, and access opportunities as they arise.

Continued engagement between private and public sector, and possible inclusion of universities on the North Wales Economic Ambition Board will support the ongoing monitoring of developments and opportunities.

## 6. Intervention Strategy

The following intervention strategy has been developed to address the remaining digital connectivity issues and help to deliver the *Growth Vision for the Economy of North Wales*.

### 6.1 Key Comparisons

National interventions are based on a number of key policies and strategies that have developed over time to address different aspects of digital connectivity. The *North Wales Digital Connectivity Strategy* is informed by a comparison of the current position in North Wales, and an understanding of current interventions elsewhere.

Best practice approaches to increase deployment of improved digital connectivity vary significantly from area to area. For example, interventions in urban areas and business parks will be very different from remote rural areas. Approaches aim to accommodate current and developing best practice.

#### 6.1.1 Fixed Broadband Development

It appears clear that there is a need to develop regional and local support initiatives to increase the availability of superfast broadband in North Wales, and that this must be balanced against the need to support greater economic growth through the development of more advanced gigabit and ultrafast connectivity.

Early developments of the Local Full Fibre Networks (LFFN) programme are identifying best practice approaches for

increasing deployment of gigabit capable full fibre networks; these are accommodated in the full fibre passive infrastructure and improved backhaul interventions.

The *Superfast Cymru* project has delivered a significant increase in the availability of superfast broadband across North Wales. However, low average broadband download speeds and large numbers of people unable to access a decent connection suggest there is greater underlying weakness in digital connectivity that risks a significant long term 'digital divide' holding back the economy and development of a vibrant connected community.

UK Government interventions are shaped by the *UK Digital Strategy 2017*. This provides a focus to the development of advanced full fibre and 5G services, but also underpins this with the Universal Service Obligation (USO) 'giving every individual, business and public premise across the country the right to request an affordable high speed broadband connection'. The USO is currently expected to provide a connection of 10Mbps or faster, though the method of delivery is not yet clear.

In Scotland, the desire to ensure the digital inclusion of all has led to *Reaching 100% - Superfast Broadband for All*<sup>9</sup> giving a commitment to provide superfast broadband (30Mbps or faster) to every home and business in Scotland by 2021.

Ofcom 2017 data states that in England, 3% of homes cannot get a decent broadband connection (at least 10 Mbps). In Scotland it is 6%, Wales 5%, and North Wales 7%.



The Scottish Government has committed £600 million to the Reaching 100% project. The Welsh Government has recently published the procurement for the *Next Generation Access Broadband Wales* project, with £62 million funding committed and the possibility to increase to £200 million.

Interventions for remote rural areas are informed by community developments such as the B4RN group<sup>10</sup> in Lancashire, and Community Broadband Scotland<sup>11</sup> projects – where direct community involvement has enabled improved broadband networks in remote rural areas.

### 6.1.2 Mobile Connectivity Development

The national comparison presents a worse picture for mobile communications. The geographic coverage for voice and data is significantly behind the UK average. Poor availability of voice and data services within buildings suggests a capacity weakness beyond the poor geographic coverage.

Direct intervention to improve mobile communications is much less common than for fixed broadband networks. However, the *UK Electronic Communications Code*<sup>12</sup> identifies a range of changes designed to improve the availability of fixed and mobile communications. These changes are supported in Wales by the *Mobile Action Plan* with a range of actions aimed at supporting the mobile operators in increasing their investment in infrastructure to improve service delivery.

Regional and local support for the *Mobile Action Plan* is required to ensure support for North Wales by the mobile operators.

## 6.2 Key Requirements

The following key requirements have been identified to meet the economic and societal needs of the region.

### 6.2.1 Full Fibre Manufacturing and Energy

The key regional economic sectors of manufacturing and energy require gigabit capable full fibre connections. In North Wales, these sectors are generally restricted to clusters in key locations throughout the county. Even relatively small businesses need high bandwidth, but may not be able to support leased line costs. Affordable, high bandwidth contended broadband services are required.

### 6.2.2 Ultrafast Tourism, Digital and Real Estate

The high growth digital sector, and the vital tourism and real estate sectors in North Wales require superfast, and ultrafast connectivity wherever possible. These sectors are distributed throughout the region, though they are clustered in a small number of key locations. The sectors have high demand for bandwidth – either due to aggregated demand of many users, or specific need for large file transfer.

### 6.2.3 Connected Travel

Poor mobile connections are a problem throughout North Wales – providing personal inconvenience and disrupting businesses. Effective mobile communications to support voice calls on all major transport routes is a minimum requirement.

#### 6.2.4 Superfast Society

All businesses and communities require superfast broadband as a minimum – for example to support self-employment and home working, for the efficient delivery of health and social care, operation of local retail businesses, or simply for family entertainment. The remote rural and upland areas throughout the region have particular need for improvement.

### 6.3 Key Interventions

Key interventions are needed regionally to improve digital connectivity, in particular to support the key economic sectors, and to close the gap between North Wales and the rest of the UK.

#### 6.3.1 National – Regional – Local Approach

The regional interventions required will have a range of different impacts and levels of complexity. This regional development is also undertaken in the context of wider national and more focused local activity:

- **National developments** – The *Superfast Cymru* project has already made a significant impact on the availability of superfast and ultrafast broadband. The second phase of the project will continue to improve superfast availability but is not expected to achieve 100% coverage. The development of networks and assets with national significance and scale will require Welsh Government leadership and coordination.
- **Regional developments** – The development of improved backhaul and affordable gigabit services, for example, will affect many areas across the North Wales region. Regional

developments will be commissioned by the Regional Growth Board, with lead authorities accountable for delivery for the region as a whole.

- **Local developments** – The coordination of all projects locally will be required to ensure maximum impact. This will include the local support of national and regional interventions as well as the development and deployment of local interventions to deliver requirements beyond the scope of national and regional programmes. Local developments will also be required to enable regional and national developments – for example development of local planning and policies to remove barriers to digital infrastructure deployments.

Together these layers of interventions will help to realise the *Growth Vision for the Economy of North Wales*. Within each county, some will be more relevant for local conditions than others.

- **Full Fibre passive infrastructure** – Building a comprehensive access duct network, and ensuring backhaul provision to facilitate end-user access to advanced full fibre services provided at the identified key sites. With appropriate planning of duct infrastructure, this will support the key manufacturing and energy sectors.
- **Affordable gigabit services** – Businesses in North Wales need affordable high bandwidth services to ‘fill the gap’ between FTTC broadband and leased lines. Service providers should be encouraged to ensure suitable services are available over their networks.

- **Improved backhaul** – The development of the core infrastructure will benefit the development of all digital connectivity in North Wales. The development of the FibreSpeed network and other infrastructure assets present opportunities to improve core connectivity.
- **SME Demand stimulation** – Encouraging the use of higher bandwidth connectivity, particularly in key local business sectors (including hotel and leisure). Connectivity delivery initiatives can only be successful if demand is present – a range of targeted demand stimulation activities will be required to support all interventions. Voucher schemes for SMEs have proven successful in the past and provide a basis for demand stimulation.
- **Rural Broadband Deployment** – The availability of superfast and ultrafast connectivity to all businesses and communities in North Wales is important to the sustainability of the region. Engagement and interventions to extend the deployment of *Superfast Cymru*, *Next Generation Access Broadband Wales* and other national initiatives into rural areas are required. A range of approaches including gap funding, voucher schemes and direct community build may contribute to the extended coverage.
- **Social Housing Broadband** – Social housing presents areas of high need for a range of health and social care services, and typically areas of poor availability and use of digital connectivity. Direct provision of digital connectivity can improve service efficiency and social outcomes.
- **Public Sector Anchor Tenant** – The use of connectivity to public sector buildings can extend the core network. This effect can be maximised by ensuring appropriate connectivity to all public sector sites, particularly in areas of poor local connectivity.
- **Policy Support** – Direct intervention is not always possible or appropriate – for example to improve mobile coverage. However, reducing the barriers to investment that complex planning and similar policies can impose will support greater investment and deployment. A review and improvement of planning and similar policies can be undertaken to reduce policy barriers. A national review<sup>13</sup> has been undertaken by Analysys Mason for the Broadband Stakeholders Group, and can guide development.
- **Market Intelligence** – Service providers (fixed and mobile) do not always know the local demand requirements. Where there are key factors that may affect demand, the information should be provided, and effective communication channels established to service providers.
- **5G Demonstrators** – The development of 5G services presents another important development. Demonstrations within the region will help stimulate further development and deployment.

## 6.4 Application and Funding

The different projects have different target groups, and different funding streams will be appropriate (darker shading is denotes greater relevance):

Project	Target Groups					
	Energy Cluster	Advanced Manufacturing	Digital Cluster	Construction	Tourism & hospitality	Health & Social Care
Full Fibre passive infrastructure						
Affordable gigabit services						
Improved Backhaul						
SME demand stimulation						
Rural broadband deployment						
Social Housing broadband						
Public Sector anchor tenant						
Policy support						
Market intelligence						
5G Demonstrators						

## 6.5 Delivery and Impact

The aim of the *North Wales Digital Connectivity Strategy* is to deliver economic and social development, particularly in key areas and sectors identified in the *Growth Vision for the Economy of North Wales*. In targeting these sectors, interventions have been identified to support ambitious growth targets in key sectors, stimulate organic growth throughout the region and create new opportunities for business and learning throughout North Wales, irrespective of location.

To ensure an effective impact, targets have been identified to guide the scope and timescales for intervention. Progress against these targets will ensure that the digital needs of the high growth sectors are met, and deliver the stretching economic, social and cultural objectives of the *Growth Vision*.

Initiative	Target	Delivery
Full fibre passive infrastructure	80% of the premises on the strategic sites identified are passed by duct infrastructure.	End 2021
	100% of the duct Provided is accessed by at least one network provider	End 2021
Affordable gigabit services	Competitive provision of affordable full fibre broadband services from at least three operators.	End 2019
Improved backhaul	Removal of all backhaul constraints to all communities in the region.	End 2021
SME demand stimulation	20% adoption of Ultrafast broadband by tourism businesses. 5% adoption by businesses from other sectors.	End 2022
Rural Broadband Development	Superfast broadband available to 99% of premises.	End 2021
Social Housing broadband	99% of social housing and care homes connected to superfast or ultrafast broadband.	End 2021
Public Sector anchor tenant	Fibre access to all appropriate public-sector sites in the region.	End 2021
Policy Support	Policy review to identify possible obstacles to digital deployment	End 2019
	Removal of identified obstacles	End 2020
Market Intelligence	Establish a communications mechanism with fixed and mobile operators to communicate significant unmet need and likely changes in demand profile.	Mid 2019
5G Demonstrators	Establish North Wales participation in at least three separate major 5G initiatives at Wales or UK level	End 2020

## 7. Technical Background

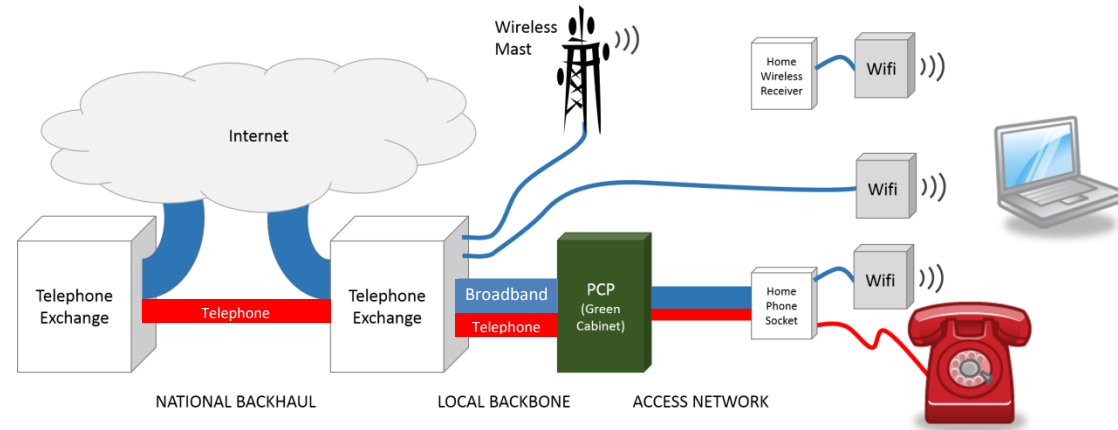
Digital connectivity is provided through a range of technologies, with different technologies at different parts of the network.

The network is in three main parts:

- **National Backhaul** is required to bring internet access to the local BT exchange.
- **Local Backhaul** brings internet access to the specific project areas.
- **Access Network** provides the final distribution to individual properties within the project area.

Modern digital networks use optical fibres throughout much of their construction. The aim of the development of superfast and ultrafast networks is to maximise the use of fibre in as much of the network as possible.

For superfast and ultrafast networks, fibre must be used for the backhaul connection to the local area. There is an expectation that fibre will also be used for the local backbone – leaving only the ‘last mile’ access network connection.



**Fig.13 Schematic of the broadband network structure**

The replacement of the access network connections to individual end users’ properties represents the largest potential cost. Fibre to the Cabinet (FTTC) or Fixed Wireless Access (FWA) networks provide cost effective connections, but with performance limitations. Fibre to the Property (FTTP) networks provide the best performance and are considered the most ‘future-proof’ – but are significantly more expensive to deploy.

## 7.1 Glossary

<b>4G</b>	The fourth Generation of Mobile Technology, currently extensively deployed and rolling further out across the UK
<b>5G</b>	The fifth generation of Mobile Technology. The standards for this are still in definition but deployments are happening internationally ahead of full standards definition
<b>Backhaul</b>	The intermediate links between local access networks which connect the customer and the core backbone networks which distribute communications traffic more widely
<b>Black / grey / white properties / sites</b>	Black/grey/white definitions relate to state aid definitions of availability of superfast broadband: <ul style="list-style-type: none"> <li>▪ Black: properties able to access Superfast Broadband from more than one service provider</li> <li>▪ Grey: properties able to access Superfast Broadband from at least one service provider within next three years</li> <li>▪ White: not in any current plans (next three years) for superfast broadband</li> </ul>
<b>Ethernet Backhaul Direct (EBD)</b>	A service offered by BT at particular exchanges where an ISP can buy backhaul to their chosen location.
<b>Fibre to the Cabinet (FTTC)</b>	A fixed broadband technology whereby traffic to and from a customer is delivered by optical fibre as far as the local street cabinet and thence over a twisted copper pair using VDSL technology.
<b>Fibre to the Premises (FTTP)</b>	A fixed broadband technology whereby traffic to and from a customer is delivered by optical fibre all the way to the customer premises.
<b>Gigabit broadband</b>	Broadband communications which offers speeds in excess of 1000Mbit/s for download.
<b>PSBA</b>	Public Service Broadband Aggregation: PSBA is a Wales-wide network which connects public sector organisations in Wales to a private secure Information and Communications Technology (ICT) Wide Area Network (WAN)
<b>Superfast broadband</b>	Broadband communications which offers speeds in excess of 30Mbit/s for download.
<b>Superfast Cymru</b>	A Welsh Government initiative to ensure the roll-out of superfast broadband in areas where commercial deployment is unlikely.

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