

WHY 5G IN LEEDS?

BEING A PILOT CITY FOR 5G WILL
HELP LEEDS BE THE BEST PLACE IT
CAN BE TO LIVE, WORK AND PLAY

INTRODUCTION

5G technologies offer Leeds the perfect opportunity to open a new chapter in our exciting story. And in a world where digital connectivity is essential, the benefits of 5G networks cannot be underestimated. Leeds is perfectly placed to be at the forefront of the fantastic opportunities that 5G roll out offers. From business improvements to how we live our daily lives, 5G is a catalyst for growth and opportunity.

The city has a mixture of ingredients which taken together give us the right recipe for making the most of 5G. These include: a compact and dense city centre; a positive mix of existing telecoms networks, including a major internet exchange point; a range of innovative companies and operators; and a wider ecosystem of support, data governance and innovation curated by Leeds City Council, University of Leeds, and the health and social care system.

5G also offers a unique opportunity to explore how this transformational new technology can support delivery of services to, and improve outcomes for, some of our most vulnerable and disadvantaged people. Alongside this, Leeds is already committed to developing 21st century infrastructure, working with organisations to integrate digital, transport, and energy infrastructure for the benefit of the city.

Being a pilot 5G city will enable Leeds to continue to build our digital infrastructure, leading to long term economic growth and creating the best possible place for people to live, work and play.



CONTEXT

The UK Government has set an ambition for the UK to be a global leader in the future of mobile technology. By this we mean 5G. An umbrella term to describe the next generation of mobile communications technologies, 5G is not yet fully developed or a standard. It's presently an expression of an aspiration of how a range of technologies can be made more seamless to the end user, supporting ever larger data requirements. Promising a step-change in mobile connectivity, 5G has the potential to not only boost productivity but also grow the economy.

This next generation of mobile communications technologies includes the enabling of an increased number of connected devices.

These include the introduction of the use of smarter antenna (beam forming), leading to lower power, less radio noise, less error correction and data being relayed and

processed more efficiently and directly. 5G also means the use of smarter frequencies - lower frequencies for lower bitrate applications - like smart bins and meters. Lower bitrate also means lower power generally. In short, the right technology can be used for the right application, improving efficiency and effectiveness. 5G also means using higher frequencies in areas of higher confinement, such as cities. This leads to higher bandwidth to end devices, improving services and usability for the user.

With all of these native technologies, we also have the opportunity for smarter routing through 5G. Old telecoms networks didn't have the opportunity for granular routing. However, technology advances mean that large quantities of data can be relayed, processed and authenticated in real-time.

Leeds is well placed for 5G by virtue of having a city centre data centre hub -

provided through communications solutions provider aql - as well as the IX Leeds internet exchange point (IXP). IX Leeds enables multiple providers to interconnect and peer with each other, giving Leeds an asset that sets us at a major advantage. In the context of 5G, the IXP could potentially support the necessary and effective end to end throughput of traffic to the myriad of service providers on the internet. Plugged into this asset is the main Northern hub for the academic network in the UK. The JISC network provides organisations such as teaching hospitals, universities and colleges with shared digital infrastructure and services, such as the superfast Janet Network.



OUR OFFER

OVERVIEW

Leeds's offer as a 5G pilot city is based on strong use cases and ease of engagement.

In simple terms, trialling 5G means 'finding clever things to do with it'. As such, early applications are likely to involve pilots that demand low latency and low jitter, such as driverless cars and remote surgery.

Leeds already has the network infrastructure in place within our three major universities; the Leeds Teaching Hospitals NHS Trust – the UK's largest and a central internet exchange and

hub, to allow effective deployment of 5G. Allied to this, forward thinking technology businesses such as car parking operator CitiPark are both engaged and in a position of strength to support this initiative.

Agile companies such as aql have private fibre assets across the city (with another 6km being deployed as part of the district heating system), allowing deployment of 5G infrastructure on street furniture or deployed below the carriageway in radio-frequency transparent manhole covers.

We believe that the best approach to catalyse innovation across Leeds and the wider Leeds City Region is to allow open-access to radio networks of this kind to the different communities that will benefit from them in the city and beyond.



CITY AS A PLATFORM

5G is evolving. As such Leeds City Council will work with members of The GSMA Association – which represents the interests of mobile operators worldwide – such as aql, to drive new use cases and explore open access technology to maximise the 5G opportunity. Our approach is to provide co-existing technology which will dovetail with existing 3G and 4G infrastructure, delivering a solution that provides economic growth and benefit for all our communities. Coupled with this, Leeds’s leading innovation network, allied with the artificial intelligence capabilities within our universities, will help drive intelligence and build business resilience.

Our approach will be in line with our strategy for Leeds to be a Smart City. We will make our infrastructure available to investors who want to trial, test and innovate with new technology and data projects which benefit the economy and society. We will collaborate with partners

across the public and private sectors on these projects. We will do this on the basis that these smart city technologies adhere to some common city-wide standards around systems, protocols, and open data. This is in contrast to many other cities whose smart city strategies are based on single technology providers and closed systems.

We will pursue the goals of 5G with the aims of:

- providing a seamless ‘one network’ experience to users.
- allowing all telecoms operators to roam freely and leverage any pilot assets deployed in the city.
- specifying clear a standards for 5G technologies, ensuring different parts of the system interface together, and with supporting infrastructure such as data-centres and internet exchanges.

If successful, Leeds will work the Department for Digital, Culture, Media and Sport (DCMS) to generate a good understanding of 5G and test the applicability of different approaches including tower design, cell sizes, and different frequencies. In turn we will provide free open access to the majority of the city’s street furniture and buildings to enable 5G roll-out. Private sector partnerships will also be established to test the technology available and its applications in Leeds.

We are looking at expanding the availability of fibre networks and providers in Leeds, while in turn disaggregating the fibre provision from the services that run on top of this that could be important to underpinning a 5G network.



LEEDS AS A CO-ORDINATING POWER

We have a strong capability and experience in co-creating new innovations using open and closed data, through bringing together people, the business community, academia, professionals and the digital sector.

Successful examples to date in Leeds include: ODI Leeds, Co>Space North, Data Mill North, NorthInvest, and the new tech hubs Leeds is supporting with funding from DCMS.

Leeds City Council is also exploring the opportunity to join up with partners in the

public and private sectors as 'anchors' around aggregated network provision.

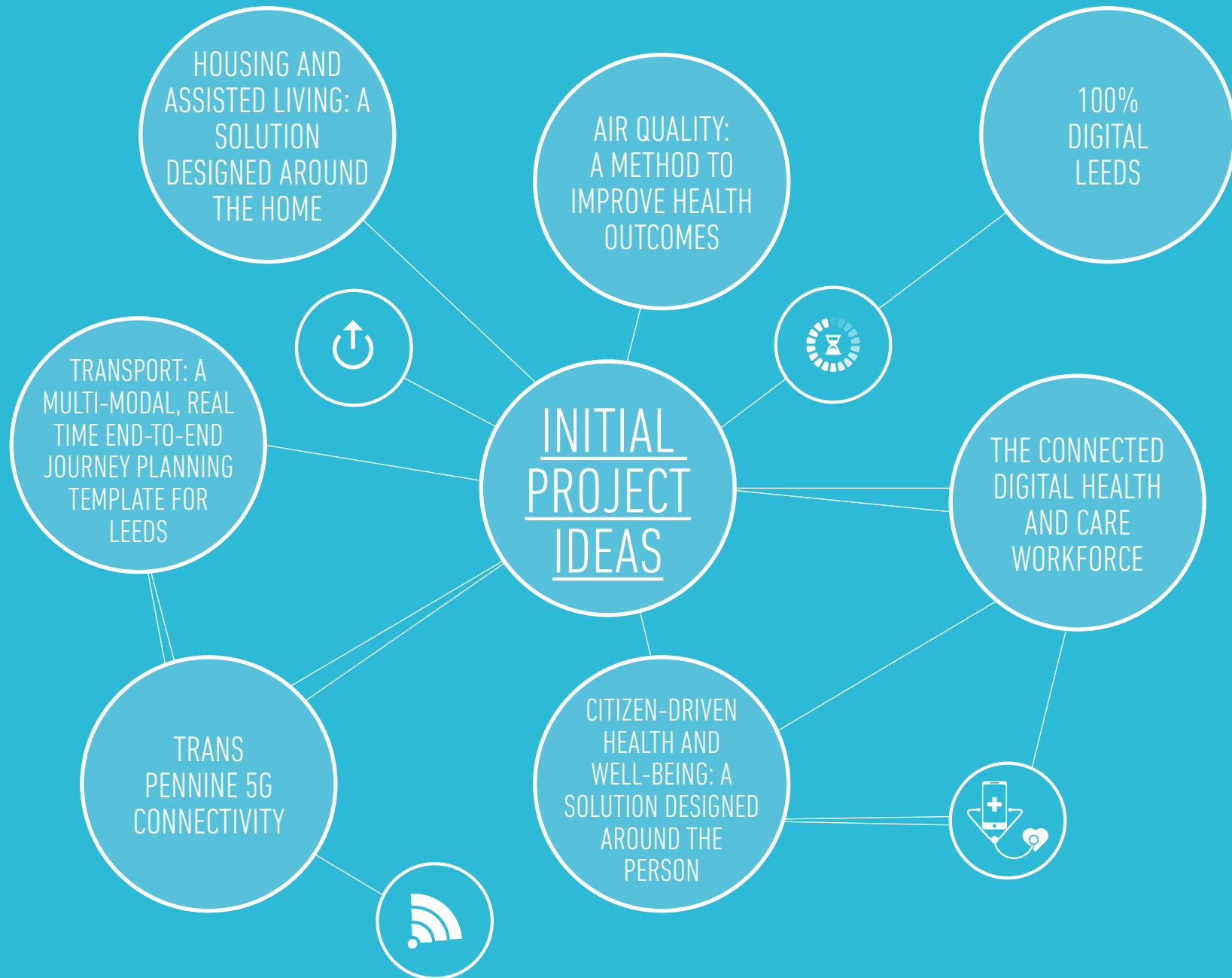
We are also keen to make 5G an integral part of the city's planned heating network infrastructure.

A 5G network would generate a huge increase in real time data. In turn, an enhanced data platform would be required to be developed to service this. Partnerships with the University of Leeds, particularly its leading Leeds Institute for Data Analytics, will be created to maximise

the research and innovation benefits of 5G. The University of Leeds is developing links with the University of Surrey in relation to expertise in 5G which we believe can be capitalised and maximised.

We would also explore with DCMS how we could secure additional resources and expertise to help co-ordination of all these initiatives.

5G: A CLEVERER WAY TO
COMMUNICATE



TRANS PENNINE 5G CONNECTIVITY

The creation of a 5G capability along the TransPennine rail route to develop collaboration and strengthen communications between Leeds and Manchester. This would also improve WiFi connectivity for rail users.

100% DIGITAL LEEDS

Leeds has an ambition to become a 100% city, to get 100% of people and businesses online and using the five core basic digital skills.

The 5G work in Leeds will be done under this banner and brand which is aligned to both the DCMS ambitions and its UK Digital Strategy.

Part of this will be to consider the optimal mix of fixed line and mobile for high population areas including social housing stock and business areas. 5G may be sufficient to negate the need for fix lines in some places where it is difficult to reach, enabling more people to get online to access jobs, business opportunities and financial and public services.



CITIZEN-DRIVEN HEALTH AND WELL-BEING: A SOLUTION DESIGNED AROUND THE PERSON

This proposal would seek to connect those living in social isolation particularly the elderly and vulnerable to support networks. Biometric and kinetic sensors deployed within the home and via body wearables would allow remote monitoring of health conditions and unusual activity patterns to trigger emergency responses when required. For example, our Horizon 2020 ACTiVAGE project is working with Samsung - a major 5G player - to deploy Internet of Things (IoT) devices and support up to 1,000 people at risk. Enhanced digital connectivity is essential for these types of projects.

CHALLENGE: Meeting the needs of growing ageing populations and increased citizens' expectations of healthcare services at times of

substantial funding shortfalls in health and care budgets.

SOLUTION: Technology and data enables development and delivery of new models of health and social care to support self-care and self-management of conditions, empowering citizens to participate in their own health and care.

BENEFITS – CITIZEN: Assisted self-care enables citizens to retain their independence within their own homes, provides reassurance that support is available at times of need and empowers people to participate and make decisions in their own health and care. Connecting individuals to friends, family, neighbours and carers builds stronger bonds for a better quality of life.

BENEFITS - BUSINESS: Business opportunities for SMEs in the development of healthcare innovations and large companies in the provision of wide scale IoT infrastructure.

BENEFITS – ENVIRONMENT: Fewer healthcare related journeys (for example, the NHS accounts for 5% of all road traffic in England).

BENEFITS – PUBLIC SERVICES: IoT enabled self-care and prevention reduces the dependency on intensive services alerting to opportunities for early interventions in the management of conditions and provides intelligence for the effective planning and co-ordination of targeted, quality personalised services.

THE CONNECTED DIGITAL HEALTH AND CARE WORKFORCE

CHALLENGE: To provide more integrated, faster and efficient ways of providing healthcare to improve health outcomes for people and to deliver cost savings to the NHS.

SOLUTION: Leeds's health and care systems are joined up in developing the capability of multidisciplinary teams who are located in localities made up of a mix of resources, ranging from community services to hospitals, which

need the equipment and ability to administer health and care services remotely and in the localities they serve. High speed, low latency for video consultation, diagnosis management and care is a necessity for this.

This includes work we are doing with Yorkshire Ambulance Service to improve real-time communication and data processing between ambulance paramedics and clinicians in

hospitals. This could enable better and faster diagnostics and treatment for patients.

5G also has the ability to allow simultaneous language translation in the context of the 86 nationalities of people living in Leeds and the other services that best support direct interaction amongst these communities without the need for travel.

HOUSING AND ASSISTED LIVING: A SOLUTION DESIGNED AROUND THE HOME

CHALLENGE: To ensure citizens are provided with safe, warm, well managed homes that assist them to live independently.

SOLUTION: A home gateway capable of aggregating data from multiple sensors within the home. These would include: activity sensors such as smart thermostats; energy monitors, boiler monitors and air quality conditioners; and an in-home user interface capability via television sets with a health control dashboard and support for display of alerts, notifications, calls, video and audio clips, turning the

television into a two-way communication device bringing social networking to the previously digitally excluded.

BENEFITS - CITIZEN: A reduction in the time informal carers have to spend on remedial activities connected with a resident's living environment, with the outcome being reduced isolation through connected living. Allied to this, the project would expect to see fall prevention and detection reductions.

BENEFITS - BUSINESS: Business opportunities for SMEs in the development of home

monitoring innovations and large companies in the provision of wide scale IoT infrastructure.

BENEFITS – ENVIRONMENT: Quite simply better energy management, in turn lowering CO2 emissions.

BENEFITS - PUBLIC SECTOR: Reduced costs to local authorities relating to social housing management and maintenance costs. Delaying or preventing admission to residential care by one year in 10% of the relevant population brings a saving of £8.1m to Leeds and more widely around £305m across England.

TRANSPORT: A MULTI-MODAL, REAL TIME END-TO-END JOURNEY PLANNING TEMPLATE FOR LEEDS

CHALLENGE: To reduce congestion through demand management and modal shift by enabling citizens and businesses to make better travel decisions based on real-time 'busyness' information. This would be achieved by also harnessing the potential of electric vehicles, autonomous vehicles, and 21st century energy infrastructure.

SOLUTION: Deployment of sensors to collect rich 'busyness' data from roads, car parks, public transport and end destinations. An app would be developed and delivered to assist travellers in making their travel decisions providing a mechanism for planning, booking, and executing their journeys. Sensors would be linked to electric vehicle charging infrastructure to investigate how widespread use of electric vehicles could assist in balancing grid loads and demands. We have identified Leeds-based

car park operator CitiPark to keen to work with Leeds City Council on this.

The connection of existing devices and systems already in deployment in Leeds, such as car park space management in the city's legal district, will be used as an infrastructure enabler for a project of this type within the 5G space.

BENEFITS - CITIZEN: Residents will be better informed about how and when to travel. Additionally, simpler booking of travel and parking will help to improved quality of life due to reduced congestion and air pollution.

BENEFITS - BUSINESS: Reduced economic impact of congestion including lost time and disrupted supply chains. There will be added business opportunities for SMEs in the development of smart transport and travel

innovations and for large companies in the provision of wide scale IoT infrastructure. With 5G, Cloud-based systems will be able stream software updates, music, traffic and driving information, conditions to driverless cars or public transportation systems.

BENEFITS – ENVIRONMENT: Reduced CO2 emissions and air pollution due to reduced congestion. Additionally, an improved use of existing infrastructure avoiding the need to build more, allied with a better take-up and increased benefits from electric vehicles.

BENEFITS - PUBLIC SECTOR: Reduced economic impact of congestion including lost time, pollution and environmental damage, health and welfare, accidents and injuries. Also, savings from unnecessary new infrastructure.



AIR QUALITY: A METHOD TO IMPROVE HEALTH OUTCOMES

CHALLENGE: To monitor air quality and pollution levels across cities, to intervene to reduce levels and impact and to inform citizens how to avoid it.

SOLUTION: To create an air quality citizen observatory supported by a deployment of a combination of strategic high quality sensors with a large number of home sensing kits. It will provide a fine-grained understanding of where pollution occurs and the factors which affect it. Insights into how air pollution is created will be gained by the bringing together of different data sets, road network data and weather reports

enabling a series of interventions directed at citizens, business and the local authority itself.

BENEFITS - CITIZEN: Real-time, relevant air quality data that will have a direct and positive impact on helping those with conditions exacerbated by poor air quality to avoid it and improve their health.

BENEFITS - BUSINESS: Helping businesses understand their environmental impact and how to avoid contributing to poor air quality. There will be business opportunities for SMEs in the development of air quality monitoring innovations and large companies in the

provision of wide scale IoT infrastructure.

BENEFITS – ENVIRONMENT: Efficient transportation coupled with air quality monitoring and intervention can transform air quality in busy city centres, thus helping to alleviate one of the biggest concerns to the city authorities.

BENEFITS - PUBLIC SECTOR: Reducing the costs associated with pollution and air quality, including fines and improving healthcare budgets, while helping to improve the quality of life in the locality.





