



Department for
Digital, Culture,
Media & Sport

5G Testbeds and Trials Programme

Urban Connected Communities

Project: Overview

Urban Connected Communities - Overview

1. Introduction

The UK Government plans to invest in a 5G Urban Connected Communities project across a large scale urban area in the UK. The funding for the project will come from the £200m of investment that has been allocated to DCMS's 5G Testbeds and Trials Programme from the National Productivity Investment Fund (NPIF). The purpose of the project is to use the latest mobile technologies to meet people's connectivity needs, trialling new 5G services and applications to individuals and businesses - with the aim of improving the quality of urban life and supporting local economic development.

The 5G Testbeds and Trials Programme is seeking expressions of interest from public sector authorities who wish to take a key role in the delivery of the Urban Connected Communities project. This will include development and leading delivery of the project, pro-actively encouraging participation from public sector bodies, and ensuring access to local infrastructure assets, services and data.

We are also seeking to engage with private sector organisations (e.g. wireless network operators, service providers and equipment suppliers) who are interested in partnering with the public sector in the Urban Connected Communities project.

New technologies and business models are changing the world we live in. New digital applications, data and services can transform the way cities function for the benefit of those who live and work in them, as well as for tourists and visitors. 'Connected Communities' means that citizens and service providers can expect an 'always-on' experience of the city, where an integrated mix of fixed and mobile telecommunications will support devices connecting to a wide range of services. The project will harness developments in artificial intelligence and the data-driven economy, the future of mobility and meeting the needs of an ageing society.

The project will design wireless infrastructure in a major city that delivers high quality connectivity, while enabling applications on 5G to be trialled. It will also allow industry to test different deployment models for 5G infrastructure and help to inform the development of policy and regulation to support 5G deployment.

The design will target 'pinch-points' with poor connectivity in cities, for example, in dense demand locations such as city centres, where heavy loading rather than lack of signal creates a not-spot. A holistic solution is to design a network with a mix of technologies including:

- In-building via Wi-Fi - for example, in public/council buildings with single sign-on roaming and public access to Wi-Fi in these buildings.
- In dense demand areas - this may require a dense network of small cells* or more macro-cells.

* 'Small cells' are designed to provide in-fill coverage and/or capacity in mobile networks.

Our consumer proposition is to demonstrate that 5G can create Connected Communities that are 'always-on', work better, faster, cheaper and deliver the right connectivity wherever it is needed to meet user demand. This will be achieved through improved consumer

broadband, as well as support for industrial and internet of things (like connected transport, waste and energy management applications on a wide scale). Such communities will be inherently safer, greener, more efficient to run, and more attractive places to live.

A connected community software platform will support developers in trialling new 5G applications and services. Real-time information about essential services in the area including bus, tram and train actual arrival times, parking availability and pre-booking could be made available to mobile and online applications.

The Urban Connected Communities project must be of sufficient scale to attract service providers as well as prove the sustainability of the 5G enabled applications and services they provide, and build user demand. To succeed, strong leadership, vision and commitment will be required from public authorities, working together with private sector and other public sector partners to develop and deliver projects.

We recognise that some local government geographies span urban and rural settings. Our objective in the Urban Connected Communities project is to test 5G characteristics, benefits and deployment challenges in distinctly urban locations for this project. A separate process will be undertaken to initiate a Rural Connected Communities project, and this is not covered in this document.

DCMS 5G Strategy

The 5G Testbeds and Trials Programme is a fundamental part of the Government's 5G strategy¹. The Programme is stimulating trials involving many different potential 5G use cases that will help address some of society's biggest challenges, such as those faced in health and social care, and will also fund deployment and technical projects that will help to address some of the practical and economic challenges surrounding 5G network deployment. Through the 5G Testbeds and Trials Programme we will:

- Help to establish the conditions under which 5G can be deployed in a timely way to drive efficiency and productivity, and maximise the chances of the UK being amongst the leading 5G countries.
- Foster the development of the UK's 5G ecosystem to ensure that the UK and UK businesses are well placed to maximise the efficiency and productivity benefits of 5G.

Document overview

This document sets out:

- The potential scope of the Urban Connected Communities project in section 2.
- The process for stakeholder engagement in section 3.
- A description of the characteristics of 5G in Appendix A.

¹ 5G Strategy:

<https://www.gov.uk/government/publications/next-generation-mobile-technologies-a-5g-strategy-for-the-uk>

Update to the 5G Strategy:

<https://www.gov.uk/government/publications/next-generation-mobile-technologies-an-update-to-the-5g-strategy-for-the-uk>

2. Scope

Vision

DCMS plans to invest in a 5G Urban Connected Communities testbed project across a large scale urban area, which will be led by a public sector authority. It will involve a range of other private sector organisations (for example, wireless network or service providers, and equipment suppliers) and public sector organisations. The project will provide the opportunity to use developing technologies in the innovative delivery of both public and commercial services to individuals and businesses, to improve the quality of urban living and working. It will also open the potential for economic development by stimulating the development of a 5G ecosystem involving multiple industry sectors.

Outline

This section provides an initial outline of the scope of the Urban Connected Communities testbed project. We wish to explore this further with interested organisations to identify key practical, commercial, governance and technical issues.

The 5G Testbeds and Trials Programme's aim for the project will be to address the following challenges in a large scale urban environment as part of fostering the development of the UK's '5G ecosystem':

- Exploration of the potential for 5G to enable benefits, cost savings and streamlining of services, including for the public sector.
- Test models for the cost effective deployment of 5G infrastructure in high density areas and remove barriers, as well as informing policy and regulatory developments alongside the Future Telecoms Infrastructure Review.
- Development of new applications and services that use 5G capabilities, test demand for 5G technologies, and understand skill set requirements.
- Development and exploration of new commercial business models around key 5G capabilities.
- Reduction of the commercial risks associated with investment in 5G and relevant technologies.
- Understanding of what it will take to create a sustainable operation for 5G enabled Urban Connected Communities, including developing a working model of the infrastructure, organisation, capability (people, process, technology) and investment required to deploy and operate applications and services.

In addition to the above, for the public sector partner/s we expect that the wider benefits of the project outcomes will include:

- Benefits to individuals and businesses through improving the delivery of public and private services, taking advantage of new 5G technologies.
- Benefits to the local economy from enhanced connectivity and taking an important role in the UK's developing 5G ecosystem. This will include stimulating activities and

investment by SMEs, other UK businesses and international businesses, and building on local strengths to attract development and trial activities.

Any public body that receives funding will be expected to demonstrate that it has broader policies in place that are supportive to the deployment of digital infrastructure as well as feeding into the work of DCMS's Local Connectivity Group.

Description

The various elements that we envisage will inform the development of the Urban Connected Communities project are summarised below:

Element	Description
Technology & Infrastructure	At a high level, the project will include network deployment, covering the convergence of networking technologies and approaches, including IoT capability, from widespread installation of connected sensors, right through to data provisioning and enabling software platforms.
Open architecture	The project will need to develop an approach to best deliver an open architecture with a suite of application protocol interfaces able to work with applications developed by other parties. The aim here is that any experimenter, from any sector, in any location, can access the testbed and provision their own slice of a network, get access to network capacity, sensor information/data, anonymised citizen and city data to trial their product, create new services, and roll out new solutions at scale.
5G focus	<p>The project will need to include a significant 5G element, including:</p> <ul style="list-style-type: none"> ● Allowing for trials of 5G use cases across multiple public services and vertical industry sectors. ● Allowing for the use of 5G core network capabilities. ● Consideration of options for a network connectivity deployment pilot that identifies the lessons to be learned for the deployment of large scale 5G radio access networks (including small cells) in high density areas. <p>We will expect the project to link into a particular area's local connectivity plans, including encouraging the widespread deployment of fibre networks to support 5G mobile connectivity.</p>

Network elements	<p>Our expectation is that the project will include (for instance but not limited to):</p> <ul style="list-style-type: none"> ● City management data and systems. ● Potentially a neutral core/City as a mobile virtual network enabler/operator. ● Specific sites with dense/small cells, fixed wireless access and integrated public wi-fi. <p>The project should include settings that require different technical solutions to provide coverage.</p> <p>The project might involve deploying 5G as an integrated network of networks rather, than simply be based on widespread deployment of 5G New Radio.</p>
Management platform	<p>The capabilities for the city to operate as a ‘management platform’ for applications and services together with a ‘programmable’ city infrastructure, open to organisations for the development of applications and services.</p>
Data stewardship	<p>A function for data stewardship, to address issues such as data collection, data access and usage rights, data governance and management and consideration of data related risks of the project. We are conscious of the potential complexity that could arise for existing asset owners and service providers, and that this project will need to resolve those matters through innovative organisational and contracting structures.</p>
Security and resilience	<p>Data, infrastructure and network security and resilience will need to be factored into the project from the design planning and scoping onwards.</p>
Public services and Industry sectors	<p>The project should:</p> <ul style="list-style-type: none"> ● Have an early focus on a range of vertical sectors that are highly relevant to city areas, and where there is local expertise relevant to the development and trialling of applications and services. We will agree these sectors with the project partners, but could include city services, transport, energy, health and social care. ● Be capable of expanding to include other vertical sectors as and when appropriate.

Geographic scale	The project should cover one or more city areas, which should include urban and suburban areas. This could comprise a single contiguous location, or, where there is a good local rationale, several separate locations across a region.
Innovation environment	<p>The project will create an innovation environment that can accommodate multiple private and public sector vertical industry sectors, potentially millions of connections, and many applications addressing multiple public and private connected locations, for example, public buildings, hospitals, transport hubs and networks, and factories.</p> <p>It will require a clear vision and strong leadership from the project partners and other stakeholders which will have to include new ways of thinking and working for all parties. Governance and commercial risks will have to be managed carefully, and steps taken to build commercial confidence.</p>
Delivery vehicle	<p>The project will need to be delivered and managed through a vehicle involving a lead delivery partner which has the appropriate status and levers to drive through a complex programme of delivery, manage public funding and attract commercial investment and participation.</p> <p>The new dedicated vehicle or joint venture with the selected Local Authority partner/s will need to ensure clear accountability and governance with the Government's 5G Testbeds and Trials Programme over the project.</p> <p>It may be appropriate to set up one structure for an initial period covering initialisation and delivery, and then transition to an ongoing operating entity to ensure longer term sustainability. This could help free each vehicle from the delivery issues in the other, and create clarity over where responsibility lies for resolving specific challenges.</p>

Timescales

We currently anticipate that the timescales will be as follows:

- We will engage interested organisations in developing this outline of the project from now until Summer 2018, and potentially with further input beyond this.
- We are also initiating the process for the application and selection of a public sector partner who will be responsible for delivery of the project. Selection will take place by early July 2018 We will consider applications from multiple public sector bodies acting under a lead Local Authority.

- We will work with the selected public sector partner/s to develop the project in more detail, including developing the approach to selecting private sector organisations to participate in the project. This will take place by late 2018 / early 2019.
- Project delivery will start from late 2018 / early 2019. Funding from the 5G Testbeds and Trials Programme is currently envisaged to be available up to the end of March 2021, although we will expect the project to have a longer duration than this and to move over time into sustainable delivery.

Project delivery phases

We anticipate that the project will consist of the following overall delivery phases following selection of the key partners:

- A initialisation and deployment phase, involving initial mobilisation, network connectivity deployment, management organisation setup, detailed development of the testbeds and trials approach and any 'quick win' activities. The early part of this phase should allow time and focus for the project team to develop strong use cases and detailed delivery approaches.
- A service delivery and trials phase, during which the development and trialling of services will occur.

The phases are likely to overlap in part.

Funding

The 5G Testbeds and Trials Programme will make funding from the National Productivity Investment Fund (NPIF) available for the Urban Connected Communities project. Early funding will provide a contribution to the costs of project initialisation. Additional funding will be available for subsequent project activities as agreed with the 5G Testbeds and Trials Programme. The criteria for the application for funding will be agreed with the public sector partner/s, and the availability of funding will be dependant upon the successful setup of the management organisation and development of a full business plan for the delivery of the project.

NPIF funding will be in the form of capital funding for activities which are capitalisable (including as part of research and development activities). We envisage that funding could be available in the form of grants, co-investment, and/or loans.

Significant additional funding will be expected from other partner organisations, both public and private sector organisations. Some of this could be funding-in-kind. It is expected that the ongoing operation of the resulting project environment and assets will be self-sustaining, so developing a sustainable business model is an important deliverable from the project.

The project will need to comply with State Aid regulations and Public Procurement Rules, as applicable, and this might entail different approaches for different aspects of the project.

Project delivery

The proposed delivery model is that the public sector partner/s will lead on all aspects of the delivery, with other organisations contributing as laid out below. We will require that the lead

public sector partner agrees a delivery vehicle with DCMS to provide programme governance and oversight:

- Public sector partner/s: Local government bodies are responsible for the delivery of the project and the achievement of the outcomes. There should be a lead public sector partner where multiple local government partners are involved. We expect a collective agreement to be signed ensuring that all the key benefactors and enablers of connected city services are in full agreement of what it will take to deliver together. This should provide commitment to take part, unlock data and assets, to deliver connected services under a shared and agile governance structure, and to work towards the sustainable long term delivery of the project.
- DCMS: We expect to contribute financial support (in the form of funding) and non-financial support to the project. This non-financial support will include providing direction and advice on 5G policy, facilitating linkages with other relevant projects and government stakeholders, and assisting in the identification and resolution of issues that arise during delivery and ensuring consistency with the 5G Testbeds and Trials Programme objectives
- Development partner/s: One or more private sector partners who will work in partnership with the local government bodies to co-lead the development of the Urban Connected Communities project. The partners are likely to undertake delivery activities potentially including city operating platform development and data management. There should be agreement on whether there is a lead partner, or joint partners (but with a clear understanding of roles, responsibilities and the allocation of risks).
- Network connectivity provider/s: One or more private sector partners who will undertake the provision of infrastructure deployment activities and/or the operation of network connectivity.
- Other organisations involved in the delivery of activities and/or involved in the development, trialling and usage of applications and services. This could include SMEs and larger companies including as part of the supply chain. It could also involve other public, academic and research, and third sector organisations.
- Organisations involved in the facilitation of the development and delivery of a Urban Connected Communities project. This could include specialist support and/or to provide linkages to standards bodies and to relevant experiences from other UK and international initiatives and projects.

The involvement of any private sector organisations in the project will be in compliance with Public Procurement Rules as appropriate.

3. Engagement

We are inviting the following organisations interested in the project to engage with the 5G Testbeds and Trials Programme:

- Public sector authorities (or groupings of organisations) with an interest in taking a key role as the public sector delivery partner/s should register an expression of

interest. Further details are set out in the Expression of Interest Registration document.

- Private sector organisations with an interest in taking a key role as the development partner/s or network connectivity provider/s should provide contact details as set out in the Market Engagement document.
- Other organisations, either from the public or private sector, who wish to be kept informed of progress in our development of the project should also provide contact details as set out in the Market Engagement document.

If you have any further queries in relation to this overview document please email 5Genquiries@culture.gov.uk. If you are not able to contact via email, please respond to:

5G Testbeds and Trials Programme
Department for Digital, Culture, Media and Sport
100 Parliament Street
London
SW1A 2BQ

This document is available in text format on the Department's website. Should you require access to this document in another format (e.g. Braille, large font or audio) please contact us on 020 7211 6000 or 5Genquiries@culture.gov.uk.

Information provided in response to this document, including personal information, may be published or disclosed in accordance with access to information regimes, primarily the Freedom of Information Act 2000 (FOIA) and the Data Protection Act 1998 (DPA) (and from 25 May 2018, Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119/1, 4.5.2016 (GDPR)).

If you would want the information that you provide to be treated confidentially, please be aware that, in accordance with the FOIA, public authorities are required to comply with a statutory code of practice which deals, amongst other things, with obligations of confidence. In view of this, it would be helpful if you could explain to us why you wish that information to be treated confidentially. If we receive a request for disclosure of that information, we will take full account of your explanation, but we cannot give an assurance that confidentiality can be maintained in all circumstances.

The Department for Digital, Culture, Media and Sport will process your personal data in accordance with the DPA (and the GDPR once in effect) and, in the majority of circumstances, this will mean that your personal data will not be disclosed to third parties.

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Appendix A: Characteristics of 5G

For the purposes of this project, we will assume the following characteristics for 5G:

- It is largely a wireless system.
- It is mainly terrestrial.
- It will have capabilities significantly beyond today's commercially available 4G networks, although the capability to integrate existing technologies such as wifi, 4G/LTE and low power IoT networks into a managed 5G heterogeneous network are considered in scope.
- It will support a wide range of applications for industry sectors, in addition to mobile broadband and consumer applications.
- The usage scenarios for 5G are expected to include:
 - Enhanced mobile broadband (eMBB)
 - Massive machine-type communications (mMTC)
 - Ultra-reliable and low latency communications (URLLC).

5G radio access technologies

- This is a broad interpretation that 5G includes 3rd Generation Partnership Project (3GPP) "New Radio" (both below 6GHz and above 24GHz) and pre-standard versions of these. Projects can address other innovative technologies for mobile access. They could also include elements of new radio access technologies and systems that will be important for 5G (such as massive MIMO, self-optimising networks, mm-waves).

Network architectures

- Network architectures could include network slicing, software defined networks, network function virtualisation and mobile edge computing.

Convergence

- This could include convergence between:
 - Mobile and fixed networks
 - Mobile and satellite networks
 - Mobile and broadcasting