Department for
Digital, Culture,
Media & Sport

5G Infotainment Services for Transport Environments - UK/South Korea 5G Funding Competition

Summary

The aim of this competition is to develop **new** and **novel** applications and services that can be ready for 5G, in collaboration with South Korean partners.

The successful UK applicant will be required to test solutions in a real-life environment (rather than a lab environment). The test environment will be provided by South Korean partners and the technical architecture provided is a hybrid 4G/5G network, but any solution should be designed for a 5G future.

The funded project will test the live deployment of Infotainment mobile services. The testbed offered is a subway environment, initially across the Seoul subway system, but potentially extendable to other forms of transport, and travelling at greater speeds.

The UK and Korean Governments are offering £1.2 million grant funding each (total grant funding of £2.4 million) to support organisations in their respective countries to participate in the collaboration.

One or more organisations (as a consortium, with one lead partner) from the UK will be awarded the £1.2 million DCMS capital grant funding to deliver the Project finishing no later than 31st March 2021.

Background

The aims of the 5G Testbed & Trials Programme include fostering the development of the UK's 5G ecosystem to ensure that the UK is well placed to maximise the efficiency and productivity benefits of 5G by creating opportunities for UK businesses, including SMEs, to develop new 5G applications and services that they can market at home and overseas.

South Korea is widely viewed as one of the leading 5G countries and there is much that we could learn from one another.

This 5G collaboration with South Korea will be part of the UK 5G Testbeds and Trials Programme and should help to deliver against the Programme aims as follows:

- Trade: Helping, through new industry partnerships between UK and Korean institutions, to further trade opportunities for UK companies in Korea. This includes digital services enabled by 5G;
- Cross-fertilisation of expertise: Allowing UK Industry and academia and Government to benefit from greater access to Korea technology, hardware, software and Intellectual property, including transition strategies from 4G to 5G;

- Lowering Costs: Lowering shared costs of 5G R&D in the UK by providing access to Korean funds and resources, sharing experiences of Korean and UK testbeds and trials; and
- UK as a 5G Leader: Helping to promote the UK as a world leader in 5G by highlighting our learning and successes and partnering with other world-leading 5G countries.

Funding type:
Grant

Project size:
Your project's total eligible costs (for the UK partner) must be a minimum of £1 million and you can request up to £1.2 million grant.

Eligibility

Your project:
Projects must start by 1st August 2019 and end by 31st March 2021.

Applications must be from a consortium. Applications from a single party will be rejected. Applications must be submitted by the lead applicant. Projects must involve at least one micro, small or medium-sized enterprise (SME).

Lead applicant:
To lead a project, you must:
- be a UK based business, of any size and;
- carry out some of your project work in the UK and;
- intend to exploit the results in or from the UK
- be willing to sign-up to the 5G Programme Participation Agreement

Collaborators:
To collaborate on a project, you must:
- be a UK based business, academic organisation, charity, public sector organisation, third-sector organisation or Research and Technology Organisation and;
- carry out some of your project work in the UK and;
- intend to exploit the results from or in the UK
- be willing to sign-up to the 5G Programme Participation Agreement

Partners with no funding:
Projects can include partners that do not receive any funding (for example, non-UK businesses). Their costs will count towards the total project costs, but they do not count as collaborators.

Multiple applications:
Any one business can lead on one application and collaborate in a further 2 applications. If a business is not leading an application, it can be a collaborator in up to 2 applications.

An academic institution or Research Technology Organisation cannot lead on an application but can be a collaborator in up to 2 applications.

State aid:
Any UK business claiming funding must be eligible to receive state aid at the time we confirm you will be awarded funding and thereafter follow eligibility requirements. If you are unsure, please take

legal advice. For further information see the [general guidance](#). We expect this project to be funded under GBER Article 25.

Funding:
DCMS has allocated up to £1.2 million to fund a single innovation project in this competition. Please read the funding rules guidance for more information on the different categories of funding and the rules around our [state aid framework](#) This guidance contains general information relating to this competition and the processes UK5G will use to deliver it. Please note that the grant funding rates for businesses are different from those in the general guidance and are set out below.

For experimental development involving collaboration[1], the maximum grant allowed towards your eligible project costs under state aid rules if you are an organisation receiving direct grant funding from DCMS is:

- up to 60% if you are a small business
- up to 50% if you are a medium-sized business
- up to 40% if you are a large business

Find out if your business fits the [EU definition of an SME](#).

To discover what cost are eligible please see the standard definition of eligible costs. An overview document is included in **supporting documents**.

Any Research Technology Organisation (section 2.1) in your consortium can share up to 30% of the total eligible project costs. If your consortium contains more than one research organisation, this maximum will be shared between them.

This competition provides state aid funding under the [General Block Exemption Regulation](#) (GBER). It is your responsibility to make sure that your organisation is eligible to receive state aid.

5GTT Programme Participant Agreement:
The funded project will be expected to sign-up to the 5G Testbeds & Trials Programme Participant Agreement, provided for sight in **supporting documents**. This outlines how members of the UK 5G ecosystem should collaborate, share knowledge and join-up through the five 5G Programme Participation Principles.[2]

Scope

DCMS, in conjunction with the Korean *Electronics and Telecommunications Research Institute* (ETRI), has set out the following principles for the 5G collaboration project.

Any 5G collaboration project with South Korea **must**:

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[1] Collaborations between businesses and research organisations where the research organisation bears at least 10% of the costs and have the right to publish their own research, or business to business collaborations which involve more than one member state of the EU/EEA or involve at least one SME, provided that no one business partner carries more than 70% of the project costs.
[2] The 5G Programme Participation Principles are: Knowledge and outcomes are measured and shared; Collaboration takes place between projects and across the 5G ecosystem; Interoperability; Secure by design; Promoting the 5G Programme and the UK as a world leader.

- Align with the agreed scope of "**5G Infotainment Services for Transport Environments**"
- Allow demonstration on existing (testbed) networks across hybrid 4G/5G networks, either in the UK or South Korea, but must, by the end of the project, be ready for 5G deployment.
- Involve UK industry, which must include a minimum of one business or industry participant: a micro, small or medium-sized enterprise or a larger organisation.
- Be able to set-up and deliver within the set funding amount and timescale (£1.2 million from the UK, commencing by 1st August 2019 and end by 31st March 2021).
- Expect to commercialise within 2-3 years from 31st March 2021, the completion date of the project.
- Access identified South Korean strengths in 5G through the collaboration and show how such strengths might be developed for similar services back in the UK.
- Demonstrate how your consortium will manage an effective working relationship with South Korean partners, setting out appropriate project controls to manage an international collaborative project.
- Build on UK strengths in vertical industries enabled by 5G, creating opportunities for UK businesses globally.
- Build on existing activity taking place in the UK and in Korea, avoiding as far as possible duplicating existing trials taking place in the UK (without a clear benefit and rationale in doing so).
- Support the potential for extension of the applications developed and trialled into other transport environments, for example, high-speed rail or highways, which would be highly desirable.

Testbed Environment:
Projects will be trialled in Seoul Metro, an underground subway, involving trains equipped with ultra-fast connectivity. The expected bandwidth available within the test carriage environment will be approximately 1.5Gbps.

Challenges:
The Project **must** utilise **infotainment services**, including possible AR/VR content or broadcasting solutions.

Cellular technologies currently provide some degree of service to underground trains and the Korean platform will provide high bandwidth capability.

Some aspects of the test environment are likely to be <u>user-experience challenge</u>s:
- Maintaining the provision of a high quality of service while travelling across multiple stations and subway platforms, as well as above and below ground.
- Providing safety and security for passengers in transit across a very busy environment
- Developing services which may provide successful social and/or immersive experiences in busy and confined public spaces
- The provision of highly dynamic services in limited and/or contested environments.
- The provision of services which successfully match commuter timescales

However, some aspects of 5G in the context of test environment will create <u>technical challenges</u>:

- The smaller cells at higher frequencies, plus the speed of transit may result in more frequent handovers. The need for lower latency for some services may be harder to achieve in such an environment where connectivity is rapidly changing.

- MIMO antennas may have difficulties in confined spaces. Tracking fast-moving devices and specialised solutions such as mmWave backhaul may be needed in some cases such as underground environments. In the short-to-medium term, the non-standalone solution initially being deployed may result in difficulties because of the need for separate 4G control channels and 5G data channels, both of which are rapidly changing.
- Consumer devices (especially for AR/VR) may need to run "smart" applications or there may need to be special media server/cache systems developed specifically for the local transport environment to compensate for the variable quality of connectivity. This may include "intelligent downloading" or edge computing.

Applications must demonstrate how they address **at least one** of the above user-experience challenges and at least one of the technical challenges.

This call is particularly interested in how proposed projects will maintain a high quality of experience for users, potentially where several different applications may be competing for bandwidth *and* where network infrastructure-to-train connectivity may be limited.

The diagram below is an illustrative diagram highlighting what the South Korean partners will be expected to contribute to the project and what will be expected from UK project team. It is provided to highlight the potential range of technical and service capabilities required from the winning project and indicative only. (Please note: potential overlaps and not all elements within the illustration will be required for all projects).

UK-Korea project Vehicle Infotainment Architecture

SF 2019.02.06

Aims and Benefits:
The potential benefits to the UK from the 5G collaboration Project will be dependent upon the proposals submitted as part of this open competition. However, they could include the following:

- Developing better solutions for connectivity including advanced backhaul which might benefit businesses already working in this space.
- Improving apps so that they function better in moving environments, giving app developers important insight and the ability to deliver higher quality services.
- Enabling better algorithms for cellular networks, such as better MEC systems, which may benefit UK companies with strengths in this area and also UK operators who might deploy such solutions.
- Leveraging the UK's globally recognised strengths in the creative industries and content provision, including the large number of UK companies operating in this space.
- Providing access for UK participants to relevant Korean hardware and testbeds.
- Offering up expertise in leading-edge consumer audience/consumer experience and/or nascent immersive approaches in transport environments (as initially demonstrated at the Winter Olympics in Korea, in 2018).

It is envisaged that the Project will help to contribute to the 5G Testbed & Trials Programme and its vision to:

- Foster - the development of the UK's 5G ecosystem
- Build - the business case for 5G by stimulating new use cases and create the conditions needed to deploy 5G efficiently
- Lead - the way in 5G R&D to drive UK 5G leadership

Projects will be expected to monitor the benefits arising from their projects in order to share lessons learned and contribute to the overall 5G Programme Evaluation. Projects will report quarterly to DCMS on any lessons arising and their progress to achieving expected benefits, such as on Technology Readiness Level increases, investment in 5G areas in each consortium partner and a range of other information to be agreed with projects once selected. An example list of monitoring indicators and information that will be needed is provided for sight in **supporting documents**. In addition, project partners will be expected to participate in occasional Programme activities, e.g. surveys and interviews of grant recipients, which will be conducted by DCMS or a third party acting on its behalf to assess the outcomes of the 5GTT Programme and its constituent projects. Evaluation activities are expected to be undertaken both during and after the lifetime of the project.

Out of scope:
DCMS will not fund projects that cover:

- Proposals that do not credibly plan to commercialise within 2-3 years from the end of the project.
- Proposals for projects that work on simulated, rather than existing or newly-created networks (lab-based environments). Projects must be on real world testbeds.
- Proposals that do not explain how your UK consortium will engage with South Korea partners
- Proposals that unduly overlap with existing 5G projects, such as the DCMS Testbeds & Trials programme.

Dates

25th April 2019	Competition opens
7th May 2019	Competition briefing event
1st June 2019	Competition closes
1st July 2019	Grant awarded by DCMS
1st August 2019	Project begins by this date

How to apply

Before you start:
As the lead applicant you will be responsible for:
- collecting the information for your application
- representing your organisation in leading the project if your application is successful

You will be able to invite:

- colleagues to make contributions
- other organisations to collaborate with you

What we will ask you:
The application is split into 4 sections:
1. Application details.
2. Application questions.
3. Financial information.
4. Grant agreement.

Proposals must be sent to: 5grapidtransport@uk5g.org by noon on 1ˢᵗ June 2019. Applications received after this time will not be eligible.

Documents to be submitted:
1. Project Application form (plus any allowed appendices)
2. Project finance form (one per project partner), signed.
3. Project participant form (one per project partner)
4. PDF copy of latest accounts

5G Programme Participation Agreement
By submitting an application, the lead applicant acknowledges that all partners will be signed up to the 5G Programme Participation Agreement, if the application is successful.

Section 1: Application Details

Explain your project. This section is not scored, but we will use it to decide whether the project fits with the scope of the competition. If it does not, it will be rejected.

Application information
The lead applicant must complete this section. Give your project's title, start date and duration.

Project summary
Describe your project briefly and be clear about what makes it innovative. We use this section to assign experts to assess your application. List any organisations you have named as collaborators. Your answer can be up to 400 words long.

Public description
Describe your project in detail, and in a way that you are happy to see published. Please do not include any commercially sensitive information. If DCMS awards your project funding, we will publish this description. This could happen before you start your project. Your answer can be up to 400 words long.

Scope
Describe how your project fits the scope of the competition. If your project is not in scope it will not be eligible for funding. Your answer can be up to 400 words long.

Section 2: Application questions

The assessors will score your answers to these questions. Each question will be given an unweighted score 0-10.

Applications which score over a quality threshold will be ranked in order of highest cumulative score (out of 100). The preferred proposal will be that which scores the highest cumulative score.

Your answer to each question can be up to 400 words long. Do not include any URLs in your answers unless we have explicitly requested a link to a video.

Question 1. Need or challenge
What is the business need, technological challenge or market opportunity behind your innovation?

Describe or explain:
- the main motivation for the project
- the business need, technological challenge or market opportunity
- the nearest current state-of-the-art, including those near market or in development, and its limitations
- any work you have already done to respond to this need, for example if the project is focused on developing an existing capability or building a new one
- the wider economic, social, environmental, cultural or political challenges which are influential in creating the opportunity, such as incoming regulations, using the Horizons tool if appropriate

Question 2. Approach and innovation
What approach will you take and where will the focus of the innovation be?

Describe or explain:
- how you will respond to the need, challenge or opportunity identified
- how you plan to address the technology challenges described in the Scope section of the competition brief.
- how you will improve on the nearest current state-of-the-art identified
- whether the innovation will focus on the application of existing technologies in new areas, the development of new technologies for existing areas or a totally disruptive approach
- the freedom you have to operate
- how this project fits with your current product, service lines or offerings
- the nature of the outputs you expect from the project and how these will help you to target the need, challenge or opportunity identified

You can submit one appendix to support this answer. It must be a PDF and can be up to 2 pages long and no larger than 10MB. The font must be a minimum of 10 point.

Question 3. Team and resources
Who is in the project team and what are their roles?

Describe or explain:
- the roles, skills and experience of all members of the project team that are relevant to the approach you will be taking (including any prior experience putting in place international commercial collaboration agreements)
- the resources, equipment and facilities needed for the project and how you will access them
- the details of any vital external parties, including sub-contractors, who you will need to work with to successfully carry out the project

- the current relationships between project partners and how these will change as a result of the project
- any gaps in the team you will need to fill

You can submit one appendix to support this answer. It must be a PDF and can be up to 4 pages long and no larger than 10MB. The font must be legible at 100% zoom.

Question 4. Market awareness
What does the market you are targeting look like?

Describe or explain:
- the markets (domestic, international or both) you will be targeting in the project and any other potential markets
- the size of the target markets for the project outcomes, backed up by references where available
- the structure and dynamics of the target markets, including customer segmentation, together with predicted growth rates within clear timeframes
- the target markets' main supply or value chains and business models, and any barriers to entry that exist
- the current UK position in targeting these markets
- the size and main features of any other markets not already listed

If your project is highly innovative, where the market may be unexplored, describe or explain:
- what the market's size might be
- how your project will try to explore the market's potential

Question 5. Outcomes and route to market
How are you going to grow your business and increase your productivity in the long term as a result of the project?

Describe or explain:
- your current position in the markets and supply or value chains outlined, and whether you will be extending or establishing your market position
- your target customers or end users, and the value to them, for example, why they would use or buy your product
- your route to market beyond deployment in South Korea
- how you are going to profit from the innovation, including increased revenues or cost reduction
- how the innovation will affect your productivity and growth, in both the short and the long term
- what new commercial services/products will you develop over the next 2-3 years from this competition
- how you will protect and exploit the outputs of the project, for example through know-how, patenting, designs or changes to your business model
- your strategy for targeting the other markets you have identified during or after the project

Question 6. Wider impacts
What impact might this project have outside the project team and how will you evidence this?

Describe, and where possible measure:

- the economic benefits from the project to external parties, including customers, others in the supply chain, broader industry and the UK economy, such as productivity increases and import substitution
- any expected impact on government priorities
- any expected export benefits
- any expected environmental impacts, either positive or negative
- any expected regional impacts of the project
- how this project might accelerate the UK take-up of 5G

Describe any expected social impacts, either positive or negative on, for example:
- quality of life
- social inclusion or exclusion
- jobs, such as safeguarding, creating, changing or displacing them
- education
- public empowerment
- health and safety
- regulations
- diversity

Question 7. Project management
How will you manage the project effectively?

Describe or explain:
- your approach towards engaging with South Korean project partners
- your project plan in enough detail to identify any links or dependencies between work packages or milestones
- the main work packages of the project, indicating the lead partner assigned to each and the total cost of each one
- your approach to project management, identifying any major tools and mechanisms you will use to get a successful and innovative project outcome
- the management reporting lines

You can submit a project plan or Gantt chart as an appendix to support this answer. It must be a PDF and can be up to 2 pages long and no larger than 10MB. The font must be legible at 100% zoom.

Question 8. Risks
What are the main risks for this project?

Describe or explain:
- the main risks and uncertainties of the project, including the technical, commercial, managerial and environmental risks, providing a risk register if appropriate
- how you will mitigate these risks
- any project inputs that are critical to completion, such as resources, expertise, data sets
- any output likely to be subject to regulatory requirements, certification, ethical issues and so on, and how will you manage this?

You can submit a risk register as an appendix to support this answer. It must be a PDF and can be up to 2 pages long and no larger than 10MB. The font must be legible at 100% zoom.

Question 9. Added value
What impact would an injection of public funding have on the businesses involved?

Describe or explain:
- if this project could go ahead in any form without public funding and if so, the difference the public funding would make, such as faster to market, more partners and reduced risk
- the likely impact of the project on the businesses of the partners involved
- why you are not able to wholly fund the project from your own resources or other forms of private-sector funding, and what would happen if the application is unsuccessful
- how this project would change the nature of R&D activity the partners would undertake, and the related spend

Question 10. Costs and value for money
How much will the project cost and how does it represent value for money for the team and the taxpayer?

Describe or explain:
- the total project cost and the grant you are requesting in terms of the project goals
- how the partners will finance their contributions to the project
- how this project represents value for money for you and the taxpayer
- how it compares to what you would spend your money on otherwise
- the balance of costs and grant across the project partners
- any sub-contractor costs and why they are critical to the project

Section 3: Financial information

The proposal must include financial information, completed in the financial template provided. This file must be included with the other application documentation requested.

Each organisation in your project must complete their own project costs, organisational details and funding details.

Section 4: Grant Agreement

The successful lead applicant will be expected to enter into a grant agreement with DCMS to facilitate the provision of grant funding. We have shared a draft grant agreement to allow you to familiarise yourself with its terms. Please confirm your acknowledgement of the draft grant agreement.

The agreement has been shared in draft form and may be subject to amendment by DCMS. However, DCMS does not anticipate deviating from the core terms of the draft agreement. If necessary, your application should highlight any major issues raised by the draft grant agreement, which could affect your ability to comply with its terms.

Supporting documents - see competition page

Technical FAQ Document - 5G Infotainment Services for Transport Environments

5G Infotainment Services for Transport Environments - Finance Submission

Eligible expenditure - DCMS

5G Programme Project Participation Agreement (Execution Version April 2019)

Potential Monitoring Indicators - 5G Infotainment Services for Transport Environments

DCMS - UK-Korea Collaboration - Draft Grant Agreement

Supporting information

Details of the 5G Testbeds and Trials Programme:
https://www.gov.uk/government/collections/5g-testbeds-and-trials-programme

Extra help
If you want help to find a project collaborator, contact the Knowledge Transfer Network.
If you need more information, email us at korea@uk5g.org.