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NIA Project Registration and PEA Document

Date of Submission

Jan 2025

Project Reference Number

NIA_UKPN0106

Project Registration

Project Title

CommsConnect

Project Reference Number

NIA_UKPN0106

Project Licensee(s)

UK Power Networks

Project Start

January 2025

Project Duration

1 year and 11 months

Nominated Project Contact(s)

Scott.Flynn@ukpowernetworks.co.uk

Project Budget

£626,972.00

Summary

CommsConnect aims to improve Distribution Network Operators' (DNOs') visibility of the resilience of public mobile networks to understand the interdependence between these two systems. The project consists of two technical methods of data gathering to better understand the resilience and power autonomy of public mobile networks:

1. A software upgrade to existing mobile routers to use idle time to monitor surrounding mobile network availability. Mobile routers deployed across DNO operating regions would create a wide-area sensor network to detect and report any mobile outages.

2. Direct engagement with mobile network operators to obtain the location of masts, and if possible the associated installed power autonomy available at each site.

Nominated Contact Email Address(es)

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Problem Being Solved

Problem

Traditionally, Distribution Network Operators (DNOs) have designed and provisioned their own independent communication networks or worked with telecommunications partners to ensure resilience for operational communications such as Supervisory Control and Data Acquisition (SCADA) which is used to monitor and control the network. However, deploying and maintaining these networks can represent a large expense. A more cost-effective communication method is simply to utilise existing public mobile infrastructure at certain sites. For instance, as a backup to the primary form of communication and as the primary method of communication at secondary sites.

There are two main challenges to this approach. Firstly, power autonomy. There is currently opacity in the operation and status of public mobile networks, and therefore DNOs have less information available to them to make informed decisions about its performance and suitability. This project aims to increase the visibility of power autonomy and redundancy within the public mobile infrastructure so to enable DNOs to make informed decisions about where they can deploy lower-cost public mobile communication.

Current Lack of data:

· DNOs have limited visibility over which mobile masts are providing connectivity to DNO assets.

· DNOs do not have visibility over how much power autonomy/resilience is available on particular key mobile network operator masts.

· Mobile network outages are not recorded and monitored by DNOs.

· The interdependence between mobile and electrical networks not well understood.

Secondly, infrastructural resilience of the public mobile network. As electrical networks become increasingly intelligent and reliant on communications connectivity, communication requirements increase the cost of maintaining the expanding network, which will either increase or limit the potential efficiency of the grid.

Currently, DNOs employ multiple methods of communication to deploy the optimal solution per site including ADSL, fibre, satellite, and public and private mobile. This project aims to develop and provide tools to automate and assist the selection and deployment process for which communications methods are most suitable on a site-by-site basis, taking into account their historic availability, resilience, and cost.

By providing lower-cost resilient communication to these sites, DNOs could significantly reduce operational cost and improve the cost-benefit case for providing communication networking to more substations.

Method(s)

The project consists of two technical methods of data-gathering to better understand the resilience and power autonomy of public mobile networks:

1. A software upgrade to existing mobile routers to use idle time to monitor surrounding mobile network availability. Mobile routers deployed across UK Power Networks' operating regions would create a wide-area sensor network to detect and report any mobile outages.
2. Direct engagement with mobile network operators to obtain the location of masts, and if possible, the associated installed power autonomy available at each site.

Method 1: Router software updates

Mobile routers currently connect Remote Terminal Units (RTUs) located in substations to the central SCADA control system. Depending on the site-specific requirements, these routers are either polled by UK Power Networks' Advanced Distribution Management Software (ADMS) continuously or periodically to check connectivity. Routers at sites which are polled periodically, e.g., secondary sites which are polled once every eight hours, remain idle the majority of the time, unless called upon by UK Power Networks' Advanced Distribution Management Software, or if they require a message to be passed to UK Power Networks' Advanced Distribution Management Software. As a result, it is possible to extend their functionality and use this idle time to monitor the surrounding mobile masts once their primary function of receiving and sending SCADA communications via UK Power Networks' ADMS is not impacted.

Conducting real-time mobile network monitoring would allow DNOs to better understand the available resilience and redundance within different parts of the public mobile communication network. Currently, public mobile coverage in urban areas is likely to be overlapping and redundant, whereas in rural areas coverage in rural areas more likely to suffer from single points of failure. The

software update thus acts as a remedy to detect uneven public mobile network coverage. The proposal suggests to implement this solution in two phases:

Phase 1

To gather initial data, a suitable number of prototype sensor devices will be deployed across the UK Power Networks area to monitor the status of the surrounding mobile network.

This data will be used to model predicted data consumption and data storage requirement. These prototypes will then be further employed to construct a detailed technical specification, including details on any implementation challenges that had been experienced in earlier course of deployment, such that equipment manufacturers can develop according firmware updates to include new scanning and reporting functionalities into existing mobile routers, thus avoiding the need for network-wide router replacement. A scoping phase for the specification will be concluded with a design freeze for new mobile routers; with the approval of a detailed technical specification used to inform future tenders of mobile routers. Simultaneously, a proof-of-concept centralised server will be developed to receive the data from the sensor devices. This data will then be analysed and presented to users.

Phase 2

In the second phase of this project, the equipment manufacturers will implement the developed technical specification on existing mobile routers and validate that existing firmware mechanism allows for remote firmware update. This process will be carried out with the close supervision of UK Power Networks subject-matter experts and follow the below process:

· Initially, software will be deployed to non-operational routers with close monitoring of their performance over a period of time. A variety of device hardware and firmware versions will then be tested to ensure compatibility. Should any issues arise, they will be flagged with the equipment manufacturers for resolution.

· The software will then be rolled out over the air to a small number of deployed routers in the field, all of which will be closely monitored. Should any issues arise, the devices will be rolled back to their previous software versions remotely. An allowance for site visits in the event that any issues cannot be addressed remotely has been factored into under the project budget.

· Once a satisfactory level of testing has been performed, a staggered and controlled rollout to a greater number of devices will commence. All data gathered will be sent back to a central server, where it will be stored for further analysis and reporting.

Method 2: Data sharing agreements with Mobile Network Operators (MNOs)

The project will engage MNOs to establish information about their communication network, such as the physical location of their mobile masts and the installed resilience/ power autonomy. This data will then be used to align particular mobile masts to electrical substations and knowledge of specific Meter Point Administration Numbers (MPANs) of the mobile masts to determine their LV feeding arrangement. This would enable a coordinated approach between DNOs and MNOs to quickly detect where faults lie in i.e., electrical or mobile network outages, and dispatch the relevant restoration team to address the situation. This would reduce site visits for DNOs if the fault is identified as a MNO communication fault; and vice versa for MNOs, thus avoiding unnecessary internal issue troubleshooting if incidents occur. Particularly, these benefits are expected to multiply within a storm situation such that limited restoration resources can be most efficiently allocated.

During the second phase, the intention of the project is to establish a data-sharing agreement with the MNOs, and integrate shared information such as power autonomy, physical mast location, and MPAN with the centralised monitoring system.

Summary of project changes:

November 2025: Additional complexity has been introduced through the design of a centralised data gathering server, built with high availability and resilience in mind. This infrastructure could become business-critical, supporting network operations once the solution is fully deployed to Business As Usual (BAU).

To prepare for this, the overall project cost has been increased from £512,000 to £626,972. The project duration has increased from 14 months to 23 months. This increase in costs and time is associated with enhancements in the hosting of the software solution, the integration into existing workflows, and extended trial of the solution to maximise benefits when transitioned into BAU.

Scope

The development of this project will be broken down into two phases. The first phase will focus on proving the concept of the solution to deliver the intended service. Once the first phase is successful, the second phase will investigate the full integration of the solution and a streamlined operational process. Based on that, the project plan is as follows:

Phase 1:

- Data-gathering and manufacturer specification development.
- Creation and deployment of data-gathering devices to gather early results.
- Creation of a centralised web storage system for automated data collection.
- Engagement with MNOs to outline a data-sharing agreement.
- Development of a shared firmware specification with existing device manufacturers.

Phase 2: Solution testing, rollout, and implementation to BAU

- Demonstration that the developed firmware can be provided through the existing firmware update mechanism.
- Integration of a centralised storage system with long term UK Power Networks data repository.
- Deployment of the developed firmware to a select number of deployed devices for trial.

Phase 2: Conclusion

- Publication of a project closedown report on ENA Smarter Networks Portal.
- Commence transition to BAU.

Objective(s)

- The project aims to engage directly with MNOs to share knowledge about both DNO and MNO operational networks, including power autonomy available at each site and operational issues that may cause service interruption.
- The project aims to develop and test a software upgrade to extend the existing functionality of substation routers.
- The project aims to develop a technical specification for software upgrades.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

This solution will be solely accessible to UK Power Networks staff and, as a result, will not have an effect on vulnerable consumers. All customers, including those in vulnerable circumstances, will benefit from the enhanced resilience of the electricity network enabled by this project.

Success Criteria

- Creation and deployment of a suitable number of prototype sensor devices to gather data in a network trail.

· Engagement with mobile network operators.

· Creation of a functional specification.

· Deployment of created firmware to a small number of deployed devices.

Project Partners and External Funding

Actual Project Partners

· Cherry & White: An existing hardware supplier for UK Power Networks. It will be assisting in the provision of new software for the project. The software update will need to be single sourced from Multitech and Avara.

· Multitech and Avara: Two main hardware suppliers that UK Power Networks employs for their mobile routers through their contract with Cherry & White. They are employed to ensure applicability to all existing devices and optimal usability. Both manufactures will be UK Power Networks project partners on firmware updates for existing mobile routers.

· Neutral Networks: A technical/ expert advisor on the design and architecture of the cellular monitoring system. Their services will be single sourced as the project requires subject matter expertise in both the telecommunications and electricity sectors. Specifically, being able to model the resilience, availability, and priority of utility use cases on public mobile networks. Existing suppliers do not have the required network modelling equipment in order to simulate the various technical and environmental considerations of a wide-area mobile network with multiple network users.

Potential for New Learning

The project will deliver key learnings in light of this innovative solution and how it will impact network operators – not just in the DNO sector, but also potentially in the Gas Distribution Network (GDN) and Transmission Operator (TO) space. As a result, the project will engage with a wider audience of potential project partners and standardise requirements across DNOs and MNOs to maximize the potential benefits in Phase 2.

Expected key project learnings:

1. The interdependence between electrical and public mobile networks will be better understood. This allows for a more joined-up approach to whole systems resilience and outage response.

2. The potential relationship between areas of poor public mobile network coverage and reliability and their associated impact on the running of the DNO activities.

Scale of Project

The first phase of the project aims to trial the proposed technology within the UK Power Networks area. The trials will be held within a controlled environment.

The second phase of the project will focus on the integration of the solution within the existing BAU workflows. We will be working with suppliers to identify the scale of the required integration and the benefits that will result from it. The scale of the investment is based on initial engagements with suppliers and stakeholders.

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

The project will be trialled within the UK Power Networks area. Exact locations are to be determined as part of the project.

Revenue Allowed for the RIIO Settlement

No funding was provided within the current RIIO settlement that will become surplus to requirements as a result of this project.

Indicative Total NIA Project Expenditure

We estimate the project expenditure to be £626,972, of which £564,274 (90%) will be recovered from NIA as Total NIA Expenditure.

Project Eligibility Assessment Part 1

There are slightly differing requirements for RIIO-1 and RIIO-2 NIA projects. This is noted in each case, with the requirement numbers listed for both where they differ (shown as RIIO-2 / RIIO-1).

Requirement 1

Facilitate the energy system transition and/or benefit consumers in vulnerable situations (Please complete sections 3.1.1 and 3.1.2 for RIIO-2 projects only)

Please answer **at least one** of the following:

How the Project has the potential to facilitate the energy system transition:

This project takes a whole systems approach to improving the reliability of communications with our assets and associated power supply restoration methods for our customers. This will improve the service we offer to customers and reduce the occurrence and duration of interruptions. Mobile network availability data gathered through this system not only benefits UK Power Networks' operations but also could be of benefit to external organisations. This could include emergency services such as Police, Fire, and Ambulance to know where mobile connectivity outages have occurred and where there may be individuals at risk. This information could additionally be reported to mobile network operators to add them restore connectivity as quickly as possible for members of the public.

As part of UK Power Networks' whole systems strategy, we will seek out whole systems solutions to deliver overall benefits to society and accelerate the net zero transition, as well as to meet our core objectives of delivering low cost and secure supply to our customers. Closer collaboration and coordination with public mobile network operators can also deliver operational resilience.

How the Project has potential to benefit consumer in vulnerable situations:

This solution will be solely accessible to UK Power Networks staff and as a result will not have a direct effect on vulnerable consumers. However, all customers, including those in vulnerable circumstances, will benefit from enhanced resilience of the electricity network as enabled by this project.

Requirement 2 / 2b

Has the potential to deliver net benefits to consumers

Project must have the potential to deliver a Solution that delivers a net benefit to consumers of the Gas Transporter and/or Electricity Transmission or Electricity Distribution licensee, as the context requires. This could include delivering a Solution at a lower cost than the most efficient Method currently in use on the GB Gas Transportation System, the Gas Transporter's and/or Electricity Transmission or Electricity Distribution licensee's network, or wider benefits, such as social or environmental.

Please provide an estimate of the saving if the Problem is solved (RIIO-1 projects only)

Not applicable for RIIO-ED2 projects.

Please provide a calculation of the expected benefits the Solution

By having a greater understanding of the reliability and coverage of public mobile networks across our operating areas, UK Power Networks will be better able to prioritise the deployment of appropriate levels of resilient communications methods to our operational sites. This greater knowledge will lead to improved network performance once actioned upon.

The cost benefit assessment for this project focuses primarily on the improved availability of data on the historic health and status of the public mobile networks which are used for UK Power Networks' SCADA comms. Data was collected on customer interruptions with reported issues relating to communications.

An assumption that 30% of these incidents could have been avoided by having prior knowledge of poor public network coverage was

taken. This assumption was made based on the use of the solution having been able to identify where installation of resilient communications options should have been prioritised such as satellite-based communications methods i.e., Broadband Global Area Network (BGAN) and Very Small Aperture Terminal (VSAT), or resilient 4G.

The total benefit of this project is estimated based on the following points which are expected to occur on a per annum basis:

- Reduction in customer CIs/ CMLs,
- Labour saving from automatic scanning for router connectivity, and
- Support for IT Operations discussions on mobile network performance with mobile network operators resulting in a labour saving.

Based on the above assumptions, the project is estimated to reduce operational costs up to the end of ED3 by £1.6m if deployed into BAU operations in November 2026, with the anticipated annual cost of using the proposed solution is £0.021m which will lead to an overall cost of £0.147m over a 7-year period. Therefore, the overall anticipated annual benefit from this project following a BAU transition is forecasted to be £1.453m.

Please provide an estimate of how replicable the Method is across GB

Once successful, the solution has the potential to be rolled out to all network operators across GB.

Please provide an outline of the costs of rolling out the Method across GB.

The roll out costs will be comprised of:

- Server development and deployment costs,
- Server maintenance costs,
- IT Support costs,
- Costs associated with integrating the solution into BAU processes, and,
- Mobile router software update costs/ added costs in next mobile router tender due to the inclusion of specification.

Requirement 3 / 1

Involve Research, Development or Demonstration

A RIIO-1 NIA Project must have the potential to have a Direct Impact on a Network Licensee's network or the operations of the System Operator and involve the Research, Development, or Demonstration of at least one of the following (please tick which applies):

☑ A specific piece of new (i.e. unproven in GB, or where a method has been trialled outside GB the Network Licensee must justify repeating it as part of a project) equipment (including control and communications system software).

☑ A specific novel arrangement or application of existing licensee equipment (including control and/or communications systems and/or software)

☐ A specific novel operational practice directly related to the operation of the Network Licensees system

☐ A specific novel commercial arrangement

RIIO-2 Projects

☐ A specific piece of new equipment (including monitoring, control and communications systems and software)

☑ A specific piece of new technology (including analysis and modelling systems or software), in relation to which the Method is unproven

☑ A new methodology (including the identification of specific new procedures or techniques used to identify, select, process, and analyse information)

☐ A specific novel arrangement or application of existing gas transportation, electricity transmission or electricity distribution

equipment, technology or methodology

☑ A specific novel operational practice directly related to the operation of the GB Gas Transportation System, electricity transmission or electricity distribution

☐ A specific novel commercial arrangement

Specific Requirements 4 / 2a

Please explain how the learning that will be generated could be used by the relevant Network Licensees

The project will deliver key learnings in light of this innovative solution and how it will impact network beyond the DNO sector, potentially venturing into GDN and TO space. As a result, the project will engage with a wider audience of potential project partners and establish overlapping requirements or benefits to expand the potential benefits in Phase 2.

Particularly, the completion of the project is expected to lend valuable insights into:

1. The interdependence between electrical and public mobile networks will be better understood. This allows for a more joined up approach to whole systems resilience and outage response from both parties.

2. The potential relationship between areas of poor public mobile network coverage and reliability and their associated impact on the running of the DNO activities.

3. The potential replication of data-gathering through existing assets acting as mobile network sensing devices by other networks, and likely application beyond the existing scope.

Or, please describe what specific challenge identified in the Network Licensee's innovation strategy that is being addressed by the project (RIIO-1 only)

Not applicable.

Is the default IPR position being applied?

☑ Yes

Project Eligibility Assessment Part 2

Not lead to unnecessary duplication

A Project must not lead to unnecessary duplication of any other Project, including but not limited to IFI, LCNF, NIA, NIC or SIF projects already registered, being carried out or completed.

Please demonstrate below that no unnecessary duplication will occur as a result of the Project.

Not applicable.

If applicable, justify why you are undertaking a Project similar to those being carried out by any other Network Licensees.

Not applicable.

Additional Governance And Document Upload

Please identify why the project is innovative and has not been tried before

This project is innovative for two main reasons.

Firstly, the utilisation of existing technology and new thinking to gain monitoring insights into networks which does not require all-out hardware replacement. This is why it had not been a project devised in the previous price control. However, the innovation lies in (1)

using mobile scanning technology that has been commercially available within GB, and (2) reusing existing hardware without affecting the normal operation of the equipment. As such, the completion of the project will significantly reduce the cost and complexity of deployment.

Secondly, the scale and efficiency in which the project will systematically address the lack of automatic and at-scale data-sharing integration between a GB DNO and MNO to share data between their respective networks to improve service quality and efficiency. Aside from an ongoing trial of data-sharing between NGED and an MNO circa 15 key locations, there had not been such an effort of similar vein nor scale. This project is thus innovative and exciting in devising a solution that will represent an advancement on similar data-sharing works, especially as the project aims to utilise the smart meter network and MNOs' specific MPAN knowledge to help streamline and improve efficient utilisation of limited restoration resources by pooling together and monitoring for more information.

Relevant Foreground IPR

The data created, outputs, and deliverables produced as part of the project will conform to the default treatment of IPR. The supplier background IPR will be essential to use some of the foreground IPR.

Data Access Details

To view the full Innovation Data-Sharing Policy, please visit UK Power Networks' website here:

https://d1oyzg0jo3ox9g.cloudfront.net/app/uploads/2025/10/UKPN-InnovationDataSharingPolicy-Nov25-v1.pdf

UK Power Networks recognises that Innovation projects may produce network and consumption data, and that this data may be useful to others. This data may be shared with interested parties, whenever it is practicable and legal to do so, and it is in the interest of GB electricity customers. In accordance with the Innovation Data-Sharing Policy, UK Power Networks aim to make available all non-personal, non-confidential/ non-sensitive data on request, so that interested parties can benefit from this data.

Please identify why the Network Licensees will not fund the project as apart of it's business and usual activities

The project aims to trial a new and innovative technology which, to our knowledge, was never implemented in the industry. As such, it is deemed high-risk for the business to trial such a solution without any prior validation. Innovation can help fast forwarding this technology which will facilitate the business-as-usual transition once the project succeeds in delivering its objectives.

Please identify why the project can only be undertaken with the support of the NIA, including reference to the specific risks(e.g. commercial, technical, operational or regulatory) associated with the project

The NIA funding will enable UK Power Networks to undertake a project which has significant technical and operational risks associated with it. Furthermore, this is a whole system planning project which will deliver benefits to DNOs, MNOs, and likely beyond, including TOs, and GDNs. As such, stimulus funding is necessary to facilitate the cost of greater whole system collaboration.

This project has been approved by a senior member of staff

☑ Yes