

Title	<b>CORE Final Project Report</b>
Versions	<b>Ver 2.7</b>

**ONP Final Project Report:** This report is expected to be publishable externally and provided to DSIT in an accessible format. The details are outlined in point 98 of the “DSIT Guidance for Live Open Network Projects”. This template looks to outline the key sections we’d expect to see in projects final reports and provide prompts and guidance around the content for each section.

<b>NAME OF PROJECT</b>	
<b>List of partners</b>	<p><u>Project partners</u> Cambridgeshire County Council, AWTG, Benetel, Gooii, Ontix, University of Surrey and Wolfram.</p> <p><u>Other key stakeholders</u> Cambridge City Council University of Cambridge</p>
<b>Total funding amount</b>	£9,453,135/6,523,644 - Total/DSIT (original GFA), and now £9,257,705/6,405,086 - Total/DSIT (CFP v6.2)
<b>Locations</b>	Cambridge
<b>Executive Summary</b>	
<p>The Cambridgeshire OpenRAN Ecosystem (CORE) Project deployed and tested a high-performance <b>5G Standalone OpenRAN network optimised for High Demand Density (HDD) environments</b>. These are urban settings with large numbers of simultaneous users where traditional networks often underperform.</p> <p><b>Project aims:</b></p> <ol style="list-style-type: none"> <li>1. Develop a collaborative project partnership and governance framework to manage the design and delivery of 5G standalone networks using OpenRAN principles.</li> <li>2. Implement software-based automation (rApps/xApps) to reduce operational costs and improve performance</li> <li>3. Showcase demanding use cases including Augmented Reality immersive applications in real-time HDD scenarios.</li> <li>4. Test readiness for Neutral Host deployment in line with Joint Operator Technical Specifications (JOTS).</li> <li>5. Develop new features in the existing Benetel radio to enable MOCN and allow MNOs to share the network providing a Neutral Host environment.</li> </ol>	

Looking at HDD impact, the densities chosen met or exceeded UK benchmarks for HDD and provided an excellent real-world testbed for OpenRAN capability under stress.

To support these densities, Benetel's radio units were enhanced with Multi Operator Core Network (MOCN) functionality, enabling shared infrastructure and facilitating future commercial integration with Mobile Network Operators. The network is technically JOTS-ready, and plans are in place to connect with VMO2's Test Core to validate compliance with MNO certification for **Neutral Host Outdoor Deployment (NHOD)**.

The project demonstrates the value of software-defined networks in high-demand environments, combining 5G private networking capabilities with open, interoperable RAN infrastructure. For industry, this represents a reduced total cost of ownership, faster deployment, and **new commercial models for urban coverage**.

**Supporting documents** provide additional content, images and progress of work done and future ambitions in Appendix 1 & 2.

This public-private collaboration has delivered commercially valuable innovations in OpenRAN, automation, and neutral hosting, advancing UK leadership in 5G and supporting DSIT's goals for network diversification, innovation, and economic growth.

### ***Deployment Summary***

Deployment of the network was split across two primary environments: a live **city-centre** deployment in Cambridge and a **testing laboratory** hosted by AWTG in London. These deployments were designed to reflect real-world High Demand Density (HDD) environments, ensuring the network was tested in busy urban and indoor event spaces.

In Cambridge, the network was distributed across three main components: the outdoor network (Market Square and surrounding streets), indoor network (Cambridge Corn Exchange), and the data centre hosted at the University of Cambridge's Campus.

#### **Network infrastructure:**

- Dark fibre connections via Light Blue Fibre Ltd and Openreach ducts- linking lighting columns, Guildhall, and the Corn Exchange.
- 9x outdoor RAN sites (N77): 7x streetlighting-mounted Benetel RAN650 Split 7.2 ORAN small cells mounted on streetlights and 2x building-mounted Benetel RAN650 ORAN Radio Units
- 4x indoor RAN sites (N77 & N78): Benetel RAN550 Split 7.2 ORAN Radio Units in auditorium.

- The Benetel radio units were connected over fibre fronthaul to the AWTG CU / DU.
- Fibre fronthaul connecting radio units to AWTG's CU/DU at the University of Cambridge data centre.
- 10 Gbps internet backhaul, with a secondary rack at the Corn Exchange.
- 5G Standalone Core Network and SMO from AWTG (software) and Capgemini (core hardware).
- 1 RIS deployment to cover the stairwell area at the Corn Exchange

The **test lab** mirrored key components of the live network, enabling software integration, testing, and debugging in a controlled setting. A key feature of the deployment was **integration of intelligent software**, including the SMO platform and prototype rApps/xApps developed by Wolfram. These enabled real-time network optimisation and traffic control during HDD conditions.

The network was enhanced for Neutral Host use. Benetel radios were upgraded with Multi Operator Core Network (MOCN) capability, enabling shared infrastructure and aligning with Joint Operator Technical Specifications (JOTS). Plans are in place to validate the solution with **VMO2's Test Core**.

#### **Use cases deployed:**

- Augmented Reality (AR) experience celebrating 150 years of the Corn Exchange.
- Live gig streaming from the Corn Exchange to outdoor locations.
- Online gaming indoors and outdoors.
- Digital art exhibitions with real-time delivery.
- Reliable outdoor market trader connectivity and supporting point-of-sale devices.
- Gooii-developed AR apps for Meta Quest 3, streamed over 5G for immersive, real-time interaction.

These use-cases were designed to maximise the testing of HDD parameters including mobility, user numbers and data throughput.

#### **Product Development:**

- AWTG evolved its Service Correlation and Assurance Platform into a full SMO solution.
- Benetel – Software Feature enhancements to RAN650 and RAN550 5G ORAN based Split 7.2 Radio Units to develop towards being fully OpenRAN and Neutral Host compatible.
- Wolfram developed and tested rApps/xApps for real-time network optimisation.
- University of Surrey – RIS – Multibeam forming RIS operating from 3.5 to 3.8 GHz.
- Gooii created custom 5G-enabled AR applications for Meta Quest 3, tailored for stress-testing immersive use cases.
- Ontix - complete and custom-designed solution to streamline the small cell deployment process.

- Connecting Cambridgeshire – a public-led vehicle to enable OpenRAN collaborations to manage investment, design and delivery of 5G SA networks.

## Results and Benefits Achieved

The CORE project has delivered a comprehensive and impactful set of results that demonstrate the value of DSIT's investment, both in terms of national innovation and industry transformation. The project used a structured **Benefits Realisation Framework** to track outcomes and ensure lessons were captured and applied. A detailed breakdown is provided in the separate Benefits Realisation Report v39 where 24 out of 27 benefits were met.

The broader benefits of the project are:

1. **Supply Chain Growth:** The project expanded the UK mobile ecosystem by enabling more suppliers to develop commercially viable 5G solutions.
2. **New Product Development:** Key technologies such as rApps, xApps, the SMO, and RIS have all progressed in Technology Readiness Level (TRL)..
3. **Wider Collaboration:** The project fostered new partnerships, resulting in tailored features and greater alignment between software and hardware suppliers.
4. **Revenue Pathways:**
  - The network assets can generate sustainable commercial revenue.
  - The Neutral Host environment, enables MNOs to connect via MOCN. Work is underway to finalise an effective business model.
  - Local businesses and traders benefited from reliable 5G connectivity, supporting service delivery and customer transactions.
5. **Technology Advancement:** Integrated automation powered by artificial intelligence and machine learning has improved network performance in real time.
6. **Reduced power consumption:** Increasing the coverage and optimizing the channel for stable communication by using the RIS.
7. **Efficiency Gains:** Pioneering new approaches to deployment and integration, helped reduce costs and time to deploy, offering a replicable model for future rollouts.

**Key deliverables** include:

1. AWTG's commercial SMO platform and "Network in a Box" product.
2. Benetel's upgraded RUs with MOCN and identified MORAN capabilities for Neutral Host.
3. Enhanced DU platform from AWTG, increasing support from 3 to 4 RUs.
4. Wolfram's rApps/xApps, optimised using live network data.
5. Gooii's first ever low-latency live-streamed event to AR Headsets.

6. Connecting Cambridgeshire, Ontix and civil partners designing and deploying network infrastructure in faster than normal timelines.

Performance was tested under demanding AR use cases, proving stability, scalability, and quality of experience. Real-world deployment allowed the team to validate system resilience and application delivery at scale.

For businesses: significantly reduced time and risk in adopting OpenRAN technologies with an integrated, proven solution that supports revenue generation while lowering operational costs.

For DSIT and UK stakeholders: the project has helped diversify the telecoms supply chain and positioned the UK at the forefront of OpenRAN innovation.

The success of CORE can be replicated. This includes:

1. Applying the structured benefits realisation approach.
2. Repeating development methodology and AWTG's process for evolving SCAP into a full SMO.
3. Establishing live network environments early for testing and validation.

The CORE project has shown that public-private collaboration can accelerate innovation, produce market-ready products, and create a scalable, flexible platform that will support future economic growth and digital infrastructure ambitions in the UK.

The learnings from this project are transferable to emerging projects looking to develop new products in the mobile ecosystem.

## Security

### Security Strategy Ambitions in CORE HDD

CORE set out an ambitious security strategy designed to tackle the multifaceted challenges inherent in securing next-generation telecom infrastructures. The strategy focused on integrating security at every level - hardware, software, and physical infrastructure - across all partners involved, ensuring that the systems were resilient, robust, and able to respond dynamically to emerging threats.

Below are some of the security strategies with best practices that were implemented:

1. **Alignment with Industry Standards:** The security strategy adhered to leading global security frameworks such as **3GPP Security**, **ISO/IEC 27001**, and the **O-RAN Alliance-WG11** guidelines.
2. **Proactive Risk Management and Mitigation:** A core ambition of the security strategy was the proactive identification and mitigation of security risks. Extensive

risk assessments were carried out to identify potential vulnerabilities and threats, both at the **physical** and **software** levels. The project's ambitions extended to ensuring that **hardware vulnerabilities** and **software misconfigurations** were addressed before deployment, with partners like **Wolfram (rApp)** and **University of Cambridge** (server room, power, and physical security) implementing regular **security testing frameworks** and **vulnerability management programs**.

3. **Integration of Security Across All Layers:** The project adopted a comprehensive strategy to integrate security at all layers, ranging from hardware to software and physical infrastructure, ensuring robust protection across every aspect of the system. Each partner implemented specific security measures tailored to their area of responsibility, addressing unique risks and challenges.

### **Results/Achievements**

During project delivery, successes were achieved as security threats and risks were eliminated. Detailed threats and vulnerabilities scan results are presented in the final security report. Notable achievements of the security aspect of the project include:

1. **Successful Integration of Security Measures:** Integration of security measures across all layers of the network was achieved.
2. **Vulnerability Scanning and Risk Mitigation:** Proactive vulnerability scanning was conducted across the various sites involved in the project. Continuous monitoring and risk assessment procedures were implemented.
3. **Compliance with Global Security Standards:** The project successfully adhered to key security frameworks, ensuring compliance with international standards such as 3GPP Security, ISO/IEC 27001, and O-RAN Alliance-WG11.

### **Testing**

CORE incorporated world class standards for security testing. ISO/IEC 27001 is the international standard for information security management systems (ISMS), providing guidelines for managing and protecting sensitive data. The project incorporated ISO/IEC 27001 as a foundational security framework, adapting it to the unique requirements of telecom infrastructures.

### **Real-World Testing of Vulnerability Scanning and Risk Assessment Tools**

Regular scans of the network and physical environments across the AWTG and Cambridge sites were conducted, leveraging both automated and manual techniques.

### **Lessons learned:**

- **Proactive Vulnerability Management:** Rather than relying solely on periodic vulnerability assessments, we found that ongoing, real-time vulnerability scanning was crucial for identifying potential risks before they could be exploited. This included scanning network functions, interfaces, and components across the O-RAN ecosystem.

- **Need for New Security Models:** Unlike physical devices, virtualized components such as Virtual Network Functions (VNFs) and Cloud-native Network Functions (CNFs) operate in a more dynamic and decentralized manner, creating new attack surfaces.

## High level summary of project costs

### Grant Funding Agreement

The project ensured that it met the GFA requirements, subsidy control rules, DSIT Guidance for Live Open Network projects and best practice. The project carried out quarterly reviews of the cash flow profile and whenever a change control was agreed for grant funding changes.

### Grant Changes

There were three approved change requests across the project term affecting grant funding.

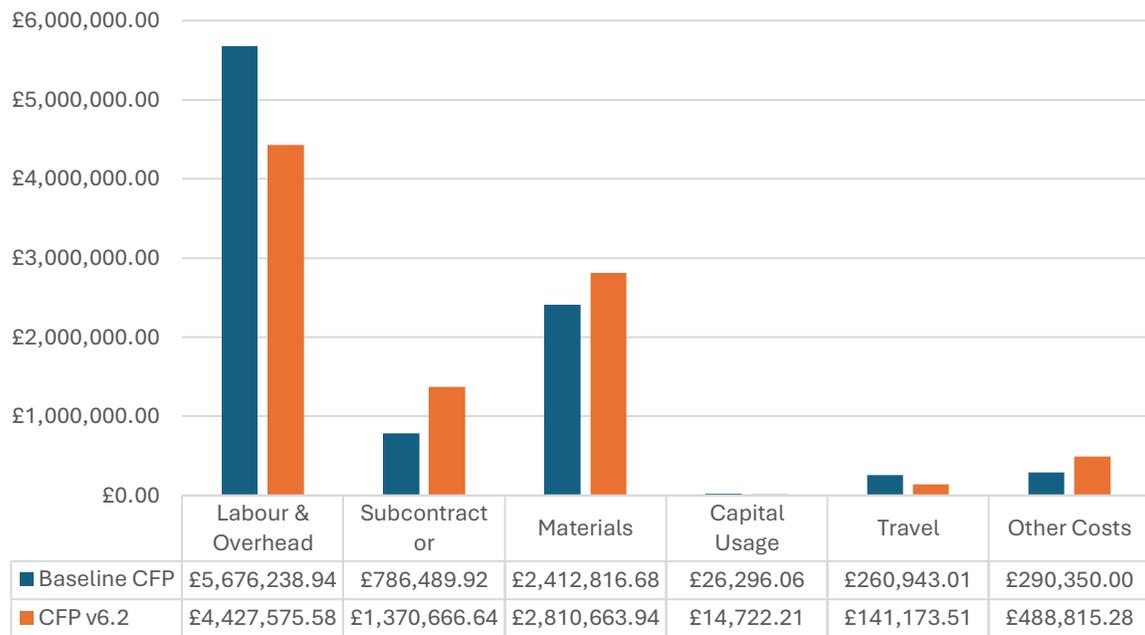
1. CR02 – move planned spend between financial years and move planned spend between categories.
2. CR03 – reallocation of funds between partners and spending categories. Request for additional funding for additional R&D.
3. CR04 – reallocation of funds between categories.

### Grant category spend (up to claim 5)

The categories are listed below with brief explanations on overall spend. Diagram below shows how the category profile changed from baseline to actuals. This is up to claim 5.

1. Labour & Overheads: Labour was reduced by just over £1m to add more to subcontractor. The main reason being that onboarding permanent staff proved difficult whereas using interim contractor support was easier.
2. Subcontractor: This increased by just under £600k to support the staff issues explained above.
3. Materials: This increased by just under £400k mainly for MNO testing.
4. Other costs including travel, capital usage and other costs: These had some minor increases.

### CORE Grant Category Change



#### Grant spend overview

Overall, Labour and Subcontractor costs accounted for approximately 63% of the project spend, recognising and reflecting the high level of specialist skills required to develop new products in a research and development environment and deploying a network in public spaces. It also recognises the highly technical and qualified workforce required to build and deliver a network – this is particularly true with subcontractors as it can be difficult to efficiently recruit and retain resource in-house particularly given the short-term nature of R&D projects.

Materials made up the second largest spend category reflecting the relatively high-level of costs associated with the licences, high quality components, suitable server access and backhaul connectivity required to deliver a reliable private 5G network.

The operational costs are difficult to break down due to the ongoing R&D on the network once deployed. Although it can be said with certainty that the annual operational costs are significantly higher than on a long-term deployment due to the inability to achieve economies of scale of a long-term contract.

#### Grant claims

The diagram below shows the grant profile actuals and original profile.

## CORE Grant Profile



## Project Highlights

CORE demonstrated standout achievements that reflect delivery excellence and strategic innovation. These highlights showcase how the project broke new ground in 5G OpenRAN deployment, collaboration, and commercial impact.

### HDD 5G OpenRAN Network Deployed

Successfully delivered and activated a network across outdoor and indoor environments in central Cambridge where no 5G standalone coverage previously existed, creating a vital opportunity for Neutral Host and local innovation.

### Realisation of Commercial-Grade Products

Several new products emerged and are contributing to revenue. Including AWTG's "Network in a Box", enhanced DU product, and Benetel's upgraded RUs supporting MOCN. These outputs are market-ready and form part of a growing OpenRAN product ecosystem.

### AR Use Case Showcase

A landmark demonstration featured Gooii-developed AR experiences over the 5G network. This included high-definition streamed content and interactive AR sessions tested under high user density, validating application performance and network resilience.

### **Supply Chain and Ecosystem**

Expanded UK OpenRAN supply chain through new collaborations across academia, SMEs, vendors, and local authorities. This ecosystem model lays the groundwork for future public-private deployments.

### **Neutral Host Readiness**

The network was technically prepared for JOTS-compliant Neutral Host deployment. MOCN functionality was enabled in RUs, and engagement with MNOs, particularly upcoming testing with VMO2's Test Core, demonstrates strong alignment with commercial operator needs.

### **Breakthrough in Automation and rApp Development**

Successful integration of a working rApp, developed by Wolfram with AWTG support. This rApp is capable of end-to-end flow, data collection, analysis, and configuration management actions. Many rApp suppliers have yet to demonstrate this full loop. While some manual processes remain, these are clearly identified and can be automated in future updates. This demonstrates real progress in OpenRAN automation and positions the UK as a leader in the field.

### **SMO as an Enabler of Intelligent Interoperability**

Evolution of AWTG's SCAP into a commercial SMO platform is a technical achievement. This enables interoperability and integration of the Non-RT RIC with CU/DU layers, providing the foundation for rApp connectivity. It's a key enabler of closed-loop automation and future intelligent network management with virtually unlimited potential.

### **Sustainable Platform for Innovation and Commercial Use**

The live network, validated software stack, and refined deployment processes are now reusable assets for trials, service development, and commercial expansion. This opens the door for local MVNOs, smart city applications, and innovative solutions highlighting the commercial potential of OpenRAN-powered, city-centre networks.

### **Local Government Capabilities.**

- New **working relationships** have been successfully leveraged to deploy a 5G standalone OpenRAN network with new features from new vendors.
- Completed several major **procurements**, using both open and framework routes, bound by public sector procurement rules for 5G networks and use cases.
- **Barrier Busting** engagement with approval bodies, both regulatory and private, to ensure that the necessary approvals were in place.
- **Finance Management** as lead partner, had to rely heavily on technical partners on costing various parts of the project.

## Events:

### September 2024

1. Cambridge Wireless Tech Week
2. Connected Britain

### February 2025

1. CORE HDD Project Showcase Days x 2

### March 2025

1. UKTIN Connected Reflections Live
2. Cambridge Wireless International Conference

## Project Conclusions

CORE has delivered a fully operational, commercially relevant 5G Standalone OpenRAN network and validated innovations in live, HDD environments. It shows the UK's ability to lead in the development of open, intelligent, and cost-efficient 5G infrastructure, supporting national goals around supply chain diversification, digital inclusion, and economic growth.

### Final Findings and Project Learnings

The project's core findings can be grouped into the following areas:

1. **Project Development and Governance:** CORE demonstrated how to structure and govern a multi-stakeholder OpenRAN deployment using a mix of public funding and industry delivery. Effective governance enabled rapid mobilisation, agile delivery, and risk sharing.
2. **Design and Cost Optimisation:** Lessons were learned on how to reduce design complexity and lower deployment costs through modularisation, software-driven architecture, and more efficient RU-to-DU configurations.
3. **Deployment Agility:** The live deployment provided valuable insights around accelerating site acquisition, installation, and operational readiness - even under constraints of city centre permitting and stakeholder negotiations.
4. **Licensing and Regulation:** Delays in Ofcom licence approvals impacted timelines. A simplified or fast-track process for R&D-focused mobile deployments would accelerate innovation.
5. **Network Readiness:** The deployed network proved ready for use cases like AR, Neutral Host testing, and AI-powered automation. Wolfram's working rApp demonstrated a full cycle of data collection, analysis, and network configuration.
6. **Security:** Security was embedded with strong risk management, interface controls, and data assurance - laying the groundwork for future scale.

## Policy and Programme Recommendations

- Enable short-term R&D extensions (e.g., 3–6 months) to allow further testing, data collection, and knowledge transfer post-deployment.
- Accelerate spectrum licensing for R&D by creating a dedicated streamlined process within Ofcom for innovation-driven projects.
- Continue investment in Neutral Host infrastructure, including incentives for MNO engagement in shared network environments.
- Support development of UK-based SMO and RIC platforms, which are foundational for automation and OpenRAN interoperability.
- Provide dedicated support for AI/ML model development, including structured programmes to gather and label network and user data prior to live deployment. These datasets are essential for training AI-driven models used by rApps and RIC systems to automate network optimisation.

### **Why the Project Was Worthwhile**

The project delivered clear outcomes: a live 5G SA network, market-ready products, new revenue models, and breakthrough automation capabilities. It enabled new players to enter the 5G ecosystem and develop new partnerships, advanced TRLs across the software and radio stack, and validated high-value use cases for city-centre deployment. Importantly, the project has created new commercial opportunities for Neutral Host, MVNO, and Fixed Wireless Access services in areas where MNOs currently don't provide 5G SA coverage.

### **Neutral Host Challenges and Ongoing Needs**

While technical JOTS readiness has been demonstrated, Neutral Host outdoor deployment still faces policy and commercial alignment barriers. Operator-led JOTS specifications are evolving, and MNO engagement remains essential to full commercial validation. These areas would benefit from ongoing support by DSIT.

In conclusion, CORE shows that with targeted investment and effective public-private collaboration, the UK can lead in developing scalable, secure, and intelligent OpenRAN infrastructure, and turn R&D into real-world economic value.

## **Next Steps**

### **New phase in mobile ecosystems**

The completion of the CORE project marks the beginning of a new phase - one focused on sustainability, commercialisation, and real-world application - whilst several important activities remain unfinished. These next steps are essential to unlocking the full value of the investment and ensuring that the UK continues to lead in telecom innovation.

The deployed network remains operational and the partners are now actively seeking alternative sources of funding and industry collaboration to progress the innovations already underway. The indoor network is ready to serve commercial use cases such as events, immersive experiences, and private venue connectivity. The outdoor network, presents an ideal platform for a Neutral Host solution, allowing MNOs and MVNOs to share infrastructure efficiently, especially in locations without 5G SA coverage.

Key work includes the final onboarding of MNOs and integration with their test core, which is vital for achieving JOTS-compliant Neutral Host status. Wolfram's breakthrough rApp, which has demonstrated the full cycle of data collection, analysis, and configuration, is currently semi-automated. Further refinement and AI model training are required, based on real-world network and user data that will allow the platform to function autonomously. The ability to automate is critical to reducing operational costs and enabling smarter, self-optimising networks.

The network needs to be further tested under a variety of HDD scenarios to validate its long-term performance and scalability. These tests will support new use cases such as fixed wireless access, smart city applications, and location-based digital services. Parallel to this, the partners are developing a business model to enable the ongoing use of the network at minimal cost to public stakeholders while unlocking new private sector revenue opportunities.

To realise these goals, modest support is needed. Targeted R&D funding could enable final testing, AI training, and JOTS certification. Collaboration with MNOs is essential to finalise technical validation and establish commercial pathways. Access to anonymised and labelled data will also be critical to advancing the intelligence layer of the network.

In short, the CORE network is a high-performance, city-centre platform that is already delivering value, but its full potential is just ahead. With the right support, it will become a foundation for commercial 5G services, smart city innovation, and a catalyst for UK leadership in digital connectivity and OpenRAN technology.

### **Connecting Cambridgeshire**

The council's **Digital Connectivity Programme** continues to explore strategic plans to bring advanced connectivity to local areas, and for Government's wider 5G targets. Some areas of further funding focus would be:

1. Network readiness for commercial pilots and use cases – providing a platform for emerging smart city applications, devices and stackable use cases to be tested as proof of concepts.
2. AI support - working with industry in developing and optimising xApps and rApps for telecom performance.
3. MNO engagement - support neutral host testing towards integrating the 5G OpenRAN network as a solution for MNOs.

4. Business plan development for the continued use of the network enabling the network to be retained at a neutral cost.

### *Media Library*

*This should include any links to project websites, social media handles, key documents etc.*

*It should also include any videos or photos from the project that would effectively showcase what it achieved.*

### **Project webpage**

The CORE HDD project webpage is on the Connecting Cambridgeshire website. This is the county council's digital connectivity programme. Going forward the programme will support the further expansion of 5G standalone networks across Cambridgeshire.

<https://www.connectingcambridgeshire.co.uk/mobile/5g/cambridgeshire-open-ran-ecosystem-core-project/>

### **CORE page on the UKTIN website**

- [Cambridgeshire OpenRAN Ecosystem \(CORE\)](#)

### **Project News**

- [Cambridgeshire set to benefit from over £9 million of investment to trial innovative 5G technologies](#) - Connecting Cambridgeshire
- [AWTG is proud to be part of UK's 5G OpenRAN project - CORE HDD](#) - AWTG
- [Gooii joins Cambridgeshire County Council to develop AR technology for UK's 5G OpenRAN project](#) - Gooii
- [Cambridge to trial 5G technology with Connecting Cambridgeshire's CORE project](#) - Connecting Cambridgeshire - Connecting Cambridgeshire
- [Innovative 5G OpenRAN technology previewed at Cambridge Tech Week's Innovation Alley by CORE project](#) - Connecting Cambridgeshire
- [CORE Project Connecting Cambridge](#) - Benetel
- [Calling all Cambridgeshire musicians! Be part of a groundbreaking 5G Augmented Reality performance at Cambridge Corn Exchange](#) - Connecting Cambridgeshire
- [Free tickets available for Cambridge's first live Augmented Reality events at the Corn Exchange](#) - Connecting Cambridgeshire
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- [In pictures: First 5G-powered augmented reality events come to Cambridge Corn Exchange](#) – Cambridge Independent
- [CORE's 5G network trial and Augmented Reality Experience showcases the future of live events](#) - Connecting Cambridgeshire

## **Social media**

### **Search on X and LinkedIn for the hashtag #COREHDD**

- [#COREHDD on X](#)
- [#COREHDD on LinkedIn](#)
- [Cambridge Corn Exchange](#) - Facebook

## **Project videos**

- Project video - <https://youtu.be/qblXZ3XAVuM?t=15>
- DSIT project video - <https://youtu.be/DAt2uBJ-hU>
- [CORE on ITV Anglia News](#) 24 February 2025

## **Project Case Studies**

- Gooii Documentary Video - <https://www.youtube.com/watch?v=ZXrvGJlpcJg>