HiPer-RAN - Highly Intelligent, Highly Performing RAN.
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HiPer-RAN - Highly Intelligent, Highly Performing RAN

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Lead editor	Marcin Filo (UniS)
Authors	Hossain Afroog, (AWTG), Jue Cao (AWTG), Burcu Sahin (Juniper Networks), Mohit Sethi (Keysight), Andrew Back (Lime Microsystems), Chris Alais (UniS), Hamed Alimohammadi (UniS), Barshan Balakumar (UniS), Hanli Dong (UniS), Marcin Filo (UniS), Chuan Foh (UniS), George Katsaros (UniS), Konstantinos Nikitopoulos (UniS), Riccardo Pozza (UniS), Dave Wood (UniS), Rafik Zitouni (UniS), Varun Kumar (Viavi), Georgy Myagkov (Viavi), Sanaz Soltani (VMO2)
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Executive Summary

The HiPer-RAN project ("Highly Intelligent, Highly Performing RAN") set out to develop an open, flexible platform capable of hosting diverse software-based intelligence across the entire Radio Access Network (RAN) architecture, from higher-layer orchestration down to the physical layer. Adopting a holistic approach, the project addressed software automation, performance, and interoperability within a unified framework, aiming to deliver measurable benefits at a system level and support the long-term evolution of Open RAN deployments.

To achieve this, HiPer-RAN brought together a strong consortium of industrial, academic, and SME partners, combining deep research expertise with real-world product development. The project followed two complementary development paths: an experimental track for exploring high-risk, non-standard concepts, and a near-to-market track focused on innovations that could be rapidly deployed in real-world Open RAN networks.

These developments directly support the UK's ambitions for Open RAN leadership. HiPer-RAN contributed to all three core objectives of the UK ONE competition:

- Developing, demonstrating and testing approaches for optimising Open RAN network performance in High Demand Density environments,
- Developing open and interoperable software, including RIC technologies,
- Developing hardware solutions for open interface infrastructure to reduce/remove barriers to scaled market adoption.

These achievements culminated in the project receiving the "Incremental Innovation" Award from UK DISIT and UKTIN. This award recognizes projects that have delivered "significant advancements in network technologies through iterative, practical improvements".

This report outlines a final overview of the project's results, key achievements, and financial costs. It includes not only high-level technical achievements with supporting evidence, but also highlights the external impact promoted by the consortium, through contributions to technical specification bodies, academic publications, event participation, and award-winning demonstrations.

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Abbreviations

AI/ML	Artificial Intelligence / Machine Learning
API	Application Programming Interface
CEO	Chief Executive Officer
CSF	Cyber Security Framework
DSIT	Department for Science, Innovation and Technology
FY	Financial Yer
GFA	Grant Funding Agreement
HiPer-RAN	Highly Intelligent, Highly Performing RAN
KPI	Key Performance Indicator
KPM	Key Performance Measurement
MIMO	Multiple Input, Multiple Output
MNO	Mobile Network Operator
MU-MIMO	Multi-User Multiple Input, Multiple Output
NEAR-RT	Near-Real-Time
NON-RT	Non-Real-Time
NVD	National Vulnerability Database
O-DU	Open Distributed Unit
ONE	Open Networks Ecosystem
OPEX	Operational Expenditure
O-RAN	Open Radio Access Network
O-RU	Open Radio Unit
PHY	Physical Layer
PoC	Proof of Concept
PSB	Planar System Board
RAN	Radio Access Network
RF	Radio Frequency
RIC	RAN Intelligent Controller
RRM	Radio Resource Management
RSG	RAN Scenario Generator
SCTP	Stream Control Transmission Protocol
SDR	Software Defined Radio
SLA	Service Level Agreement
SMO	Service Management and Orcherstration
TLS	Transport Layer Security
UE	User Equipment

UKTIN	UK Telecoms Innovation Network
VPN	Virtual Private Network

1 Deployment Summary

The HiPer-RAN project adopted an industry-academic collaboration model, designed to accelerate innovation in Open RAN by bridging the gap between cutting-edge research and deployable technology. By uniting leading university research teams, network operators, SMEs, and global technology vendors, the project pushed practical, forward-looking innovation encouraging partners to experiment with advanced, non-standard approaches not yet mainstream in commercial deployments.

At the heart of HiPer-RAN's methodology was a holistic approach to RAN innovation, covering the full technology stack from the physical layer to orchestration and policy. Development efforts were structured along two complementary tracks:

- An experimental track focused on high-risk, forward-looking concepts including non-linear processing, novel security paradigms, and open hardware innovation;
- A near-to-market track aimed at validating practical, standards-aligned use cases that could be integrated into real-world Open RAN deployments in the short term.

This dual-track strategy enabled the consortium to contribute to both long-term R&D and near-term commercial readiness. Based on this framework, the project successfully integrated, deployed, and validated a wide range of technologies across multiple labs and partner platforms:

Flexible RRM + PHY Software Stack: The University of Surrey deployed a fully software-defined O-DU stack combining non-linear MIMO signal processing with programmable RRM. This was tested with live UE-to-Core paths under 7.2x split and handover conditions, demonstrating substantial gains in spectral efficiency, user connectivity, and energy-aware scheduling.

Cloud-Native RIC Deployments: Juniper's Near-RT and Non-RT RICs, built on microservices and orchestrated with Kubernetes, were integrated with Keysight's RICTester and Surrey's O-DU. This setup enabled demonstrations of RAN-slice SLA assurance, AI-assisted MU-MIMO scheduling, and carrier-level energy optimisation.

Experimental RIC + SMO Integration: AWTG deployed its Non-RT RIC and SMO behind secure firewalls, interconnected with Surrey's Experimental Near-RT RIC via VPN over the A1 interface. This end-to-end setup supported validation of policy exchange, xApp conflict resolution, and energy-saving actions such as RF switch-off and deep sleep modes.

Programmable O-RUs: Lime Microsystems' flexible radios were integrated with Surrey's O-DU, enabling the testing of energy-performance trade-offs and power-aware RRM logic. These were validated in both Surrey's and VIAVI's test environments.

Security and Resilience Testing: VIAVI's AI-RSG platform was used to emulate realistic threat scenarios such as KPI poisoning and signalling storms. The University of Surrey designed and validated novel xApps for detection and mitigation within the Near-RT RIC, showcasing real-time threat response capabilities.

Operator-Led Use Case Selection: In coordination with MNOs, including VMO2, four high-impact use cases were prioritised: Energy Efficiency, MIMO Optimisation, RAN-slice SLA Assurance, and Security. These were defined against KPIs, business models, and deployment requirements to ensure industry alignment.

Validation and Instrumentation: Keysight deployed a comprehensive suite of O-RAN validation tools at Surrey, including RICTest, RuSIM, DuSIM, CoreSim, and UE emulators. These enabled multi-node, full-stack validation under realistic traffic and control-plane loads.

The University of Surrey served as the central integration and validation hub, hosting full-stack 5G Open RAN scenarios that brought together all project components. This joint deployment underscored the value of modular, software-driven architectures in enabling programmable, energy-efficient, and secure Open RAN systems, laying the groundwork for future commercial adoption.

2 Results and Benefits Achieved

Key Results, Findings, and Impact

The HiPer-RAN project brought together leading academic, industrial, and vendor expertise to deliver concrete technical innovations with measurable impact. The project's impact is captured across three core areas of innovation.

1. **Extending the RIC for High Performance and Scalability**

   HiPer-RAN significantly advanced the architectural foundation of the RIC, enabling scalable and secure real-time intelligence while supporting emerging use cases [D35]. The project delivered flexible, high-performance RIC platforms and contributed to O-RAN standards (see Sec. 5). HiPer-RAN also introduced, for the first time, experimental conflict resolution mechanisms demonstrating the feasibility of deploying dynamic, large-scale intelligence in practical systems [D31, D35].

2. **Deploying Advanced Intelligence: xApps and rApps for Real-World Use Cases**

   Following coordination with MNO partners and industry leaders through dedicated engagement activities [D41], HiPer-RAN prioritised four high-impact xApp/rApp use cases selected for their potential to unlock tangible benefits for mobile network operators.

   Energy Efficiency: HiPer-RAN developed and validated a set of intelligent apps focusing on energy efficiency use-cases. These were tested under realistic conditions, demonstrating power savings of up to 38.44% [D36], confirming the feasibility of automated RIC-driven energy optimisation, with additional gains achieved through PHY advancements (see Section 2.3).

   MIMO Optimisation: HiPer-RAN introduced intelligent apps for rate adaptation and scheduling, providing practical insights into the challenges of applying AI-based intelligence to RRM tasks. These insights informed the development and validation of alternative approaches based on theoretical, human-designed intelligence, highlighting where conventional methods can remain more effective and offering critical guidance for future deployment strategies [D36, D40].

   Security: HiPer-RAN strengthened O-RAN security by emulating, for the first time, unique, realistic threat scenarios such as KPI poisoning and signalling storms. These test cases, enabled the validation of ML-based detection methods on real-world data, achieving over 85% accuracy within control loop timescales [D38]. Insights from these evaluations directly contributed to the enhancement of security toolchains (Viavi's AI RSG platform) used in operational environments.

   SLA Assurance: HiPer-RAN introduced a dynamic RAN Slice SLA Assurance framework that adjusts RAN resources in real-time to meet throughput-based SLA requirements. The framework effectively prevents SLA violations and ensures consistent service performance across slices [D18, D36].

3. **Developing Flexible, RIC-Aware RAN Components**

   HiPer-RAN developed and validated open, RIC-aware O-DU and O-RU stacks. It introduced a flexible O-DU with advanced non-linear MIMO processing and intelligent RRM, achieving up to 300% more connectivity, 200% higher spectral efficiency, and 50% fewer active antennas over live 5G paths [D37, D40]. HiPer-RAN also delivered the modular HiPer O-RU, based on commodity hardware and low-power SDRs, supporting up to 64T64R MIMO. With open interfaces, software-controlled power, and open-source access, it enables energy-efficient upgrades and seamless integration with RIC [D37].

Replicating Successes

The replication of success begins with close collaboration between academia, industry, and network operators to ensure that innovation addresses real-world challenges. A dual-track strategy, combining exploratory research with deployment-ready development, helps align long-term vision with near-term impact. Full-stack efforts, from the physical layer to RIC-level intelligence, should be validated under realistic conditions. This approach offers a practical framework for turning advanced RAN concepts into scalable, operational Open RAN deployments.

3 Security

The project developed a cybersecurity framework to enhance O-RAN resilience, integrating machine learning-based detection, real-world attack simulations, and testing.

Ambitions outlined in the security strategy

The project's security initiatives used innovative technologies and proactive measures to strengthen O-RAN resilience against evolving threats. By addressing vulnerabilities like KPI poisoning, signalling storms, and malicious node detection through xApp attestation, E2 message inspection, and anomaly monitoring, it filled critical security gaps. Testing in controlled environments validated the framework and uncovered lessons to guide future strategies. The focus on access control, threat detection, and recovery mechanisms ensured a well-rounded approach. These efforts lay the groundwork for secure O-RAN deployments, meeting the demands of the telecommunications industry.

Best practice

This project significantly advanced O-RAN security by testing, extending, and innovating beyond existing best practices. It addressed overlooked vulnerabilities, such as signalling storm attacks triggered by malicious O-RUs and O-DUs, filling critical gaps in O-RAN Alliance recommendations. Detection of KPM poisoning further strengthened trust in E2 node reports, improving RIC decision-making. The integration of Viavi's RSG tool introduced rigorous, real-world threat simulations, validating the CSF and uncovering actionable insights. Additionally, runtime xApp attestation enhanced code integrity verification. Foundational protocols like SCTP and TLS reinforced reliable communication and data security. Together, these contributions provided a robust framework that not only addressed challenges but also laid the groundwork for evolving O-RAN standards and practices.

Standards testing and results

The project made notable contributions to O-RAN standards by conducting extensive testing and validating new security approaches. The Signalling Storm Attack use case, extended from O-RAN Alliance Use Case 15, was tested to examine how malicious O-RUs trigger excessive handovers, revealing critical vulnerabilities and the need for new detection methods. These findings, presented at IEEE CSCN 2024, are shaping future security frameworks. The xApp Attestation procedure, validated through tests on Surrey's experimental RIC, introduced a hash-based validation method, demonstrating its effectiveness in protecting against unauthorized code modifications. Additionally, the project's testing underscored the need for a standardized API between Near-RT RIC and xApps, addressing security gaps and promoting consistency. Variability in Near-RT RIC implementations reinforced the necessity for industry-wide standardization to ensure scalable and secure O-RAN deployments.

Lessons learnt

The project revealed key lessons in security strategy for O-RAN deployments. Threats from UEs and E2 nodes were tested, leading to tailored detection mechanisms like anomaly detection for UEs and protocol validation for E2 nodes. Open RAN's decentralized architecture posed challenges, highlighting the need for scalable, secure mechanisms. Testing FlexRIC exposed limitations like ASN.1 encoding errors, underscoring the importance of vetting third-party tools. The shift to rApps raised security challenges at the SMO layer, tested via integration with the experimental RIC. ML model constraints in near-real-time control loops emphasized the need for lightweight, optimized models. Testing revealed security control variability across Near-RT RIC implementations, calling for industry-wide standardization. Recommendations include strengthening coordination for decentralized systems, addressing threats with tailored approaches, and establishing adaptable security frameworks for Non-Real-Time RIC. These insights lay the foundation for securing future O-RAN systems.

4 High Level Summary of Project Costs

The finances for HiPer-RAN have gone through three main iterations since the start of the project. The original profile of project costs is shown below; firstly, with costs split between category and their respective % to overall costs, and secondly, the forecast of spending per claim period:

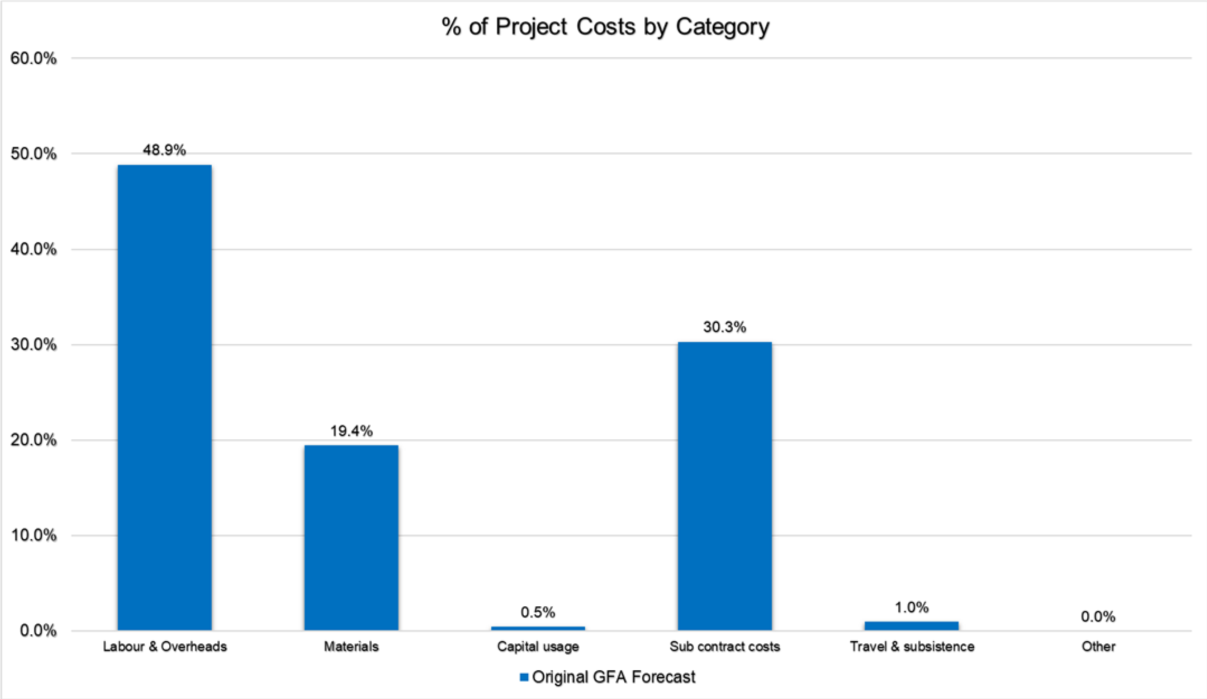

Figure 1 Percentage of Project Costs by Category in the Original GFA Forecast

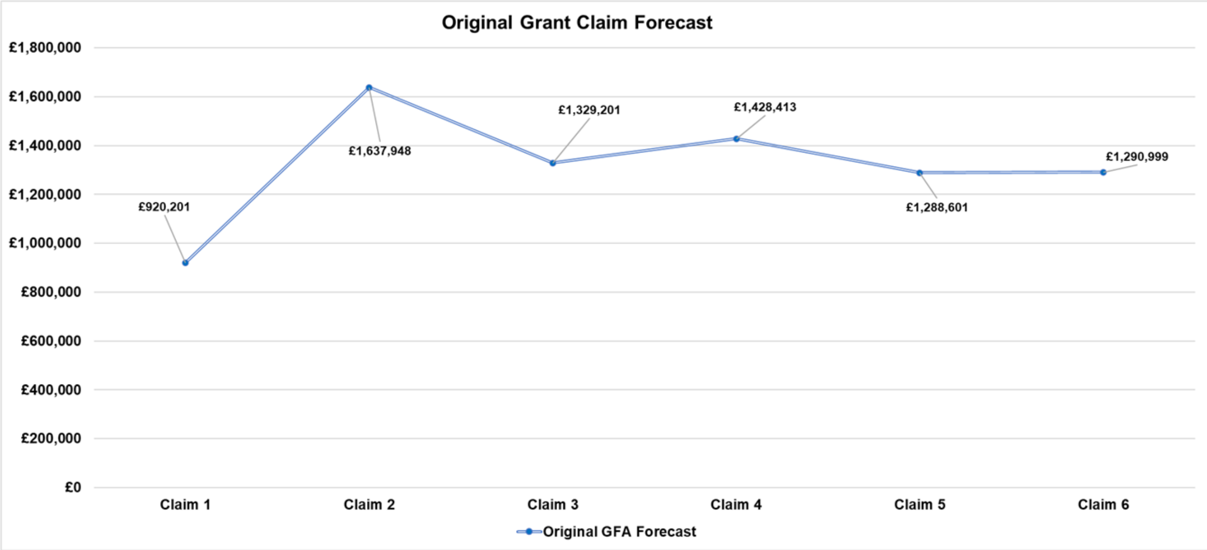

Figure 2 Original Grant Claim Forecast

The profile was built around amount of labour costs relative to active tasks (hence the low claim 1) and when large testbed equipment would be procured (hence the spike for claim 2). Spending got off slow start. This was a direct result to delays in signing the GFA and the partner collaboration agreement. Whilst partners had agreed to work at risk from the official start date of Oct 1st, 2023, spending for the first 3 months was none the less cautious.

The first significant change to project finances, was a request from a partner to move budget from labour to materials. This was to allow for the procurement of a Non-RT RIC as opposed to developing one in-house, which was the original plan. This would allow more time for experiments rather than time spent on development. This change in budget meant not all grant funding for FY23/24 was needed and regrettably became lost to the project.

The second significant change was a request from one partner to move budget from subcontracting to materials in order to improve the performance and functionality of their new generation integrated circuits used by the project. This was very much seen as a benefit to the project, as the chips would enhance experiments and require less input from overseas staff.

The third and final significant change were a request from a partner to request a further shift in budget from labour to materials. In this case it was to build a separate RAN/RIC testbed to enable additional validation and assessment of HiPer-RAN's "closer-to-the-market" solutions.

This is the final project spending compared to the original plan in the GFA:

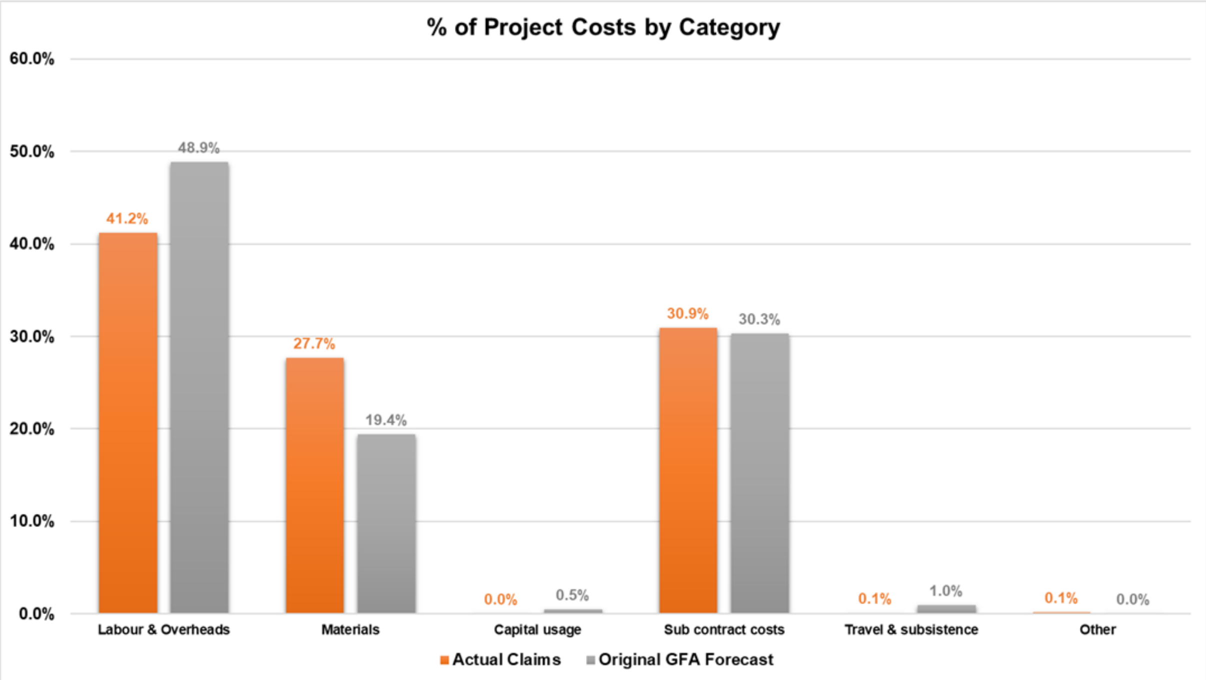

Figure 3 Percentage of Project Costs by Category

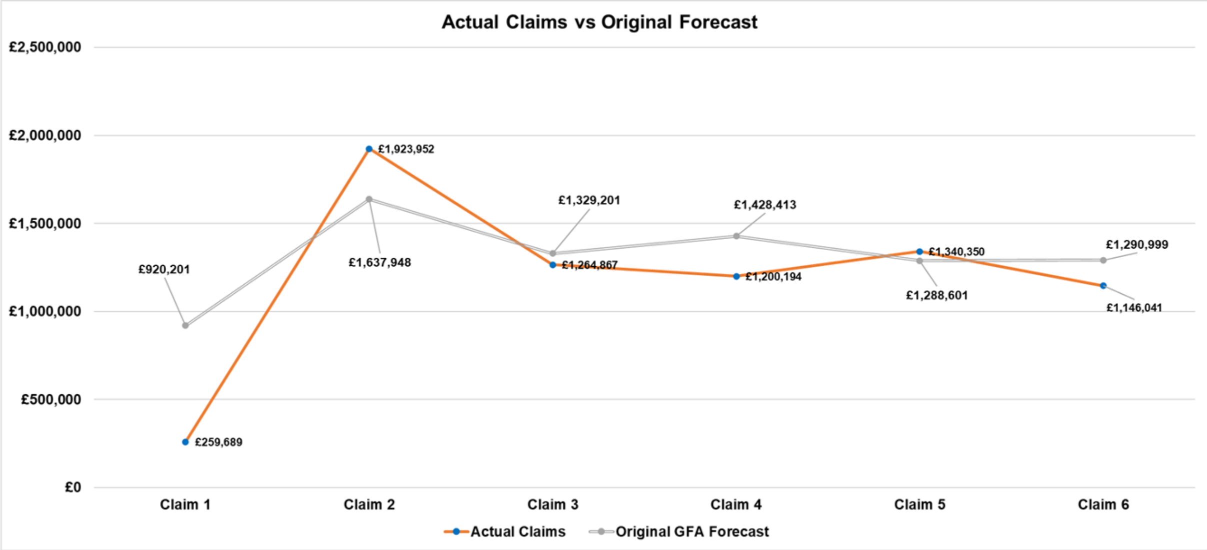

Figure 4 Actual Claims and Original Forecast

As the line graph shows, spending has deviated from the original plan. Claim 1 was significantly underspent due to delays in signing the GFA and collaboration agreement but subsequently caught up in claim 2, although there was a net underspend of grant funding for FY23/24 resulting in a 3% loss in total project funding. Spending for FY24/25 has remained relatively consistent, with significant budget retained for claim 6 to ensure all final deliverables and project closure are successfully achieved.

The following chart shows the distribution of project costs by work package demonstrating the how the bulk of investment was concentrated across technical work packages.

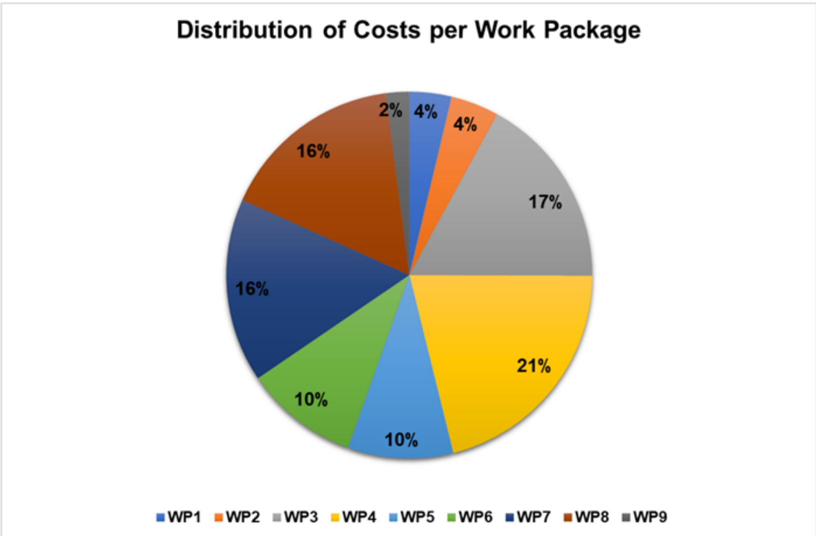

Figure 5 Distribution of Costs per Work Package

The corresponding work packages are:

1. Project management
2. Scenarios, use-cases, business models and KPI definition
3. High-Capacity, High-Performance RIC Framework
4. Intelligent xApps/rApps development for identified use cases

5. RIC-aware, Flexible O-DU and O-RU
6. Cyber security framework (RIC-CSF)
7. RIC framework integration and testing
8. System integration, optimisation, testing and trialling
9. Dissemination, standardisation and outcomes sustainability

5 Project Highlights

The **HiPer-RAN** received the **“Incremental Innovation” Future Networks Award**, presented by DSIT and UKTIN. This award recognizes projects that have delivered “significant advancements in network technologies through iterative, practical improvements”. The **HiPer-RAN project was selected by the O-RAN Alliance**, in collaboration with industrial partners, to present a live demonstration at **Mobile World Congress (MWC 2025)**, showcasing its real-world capabilities on the global stage. In addition, the University of Surrey received the **“Best Demo Award”** at the IEEE CAMAD for showcasing the advancements of HiPer-RAN in non-linear MIMO physical layer technologies within the Open RAN ecosystem. These events significantly raised the project’s profile and reinforced its international relevance in driving intelligent, interoperable, and energy-efficient RAN systems.

HiPer-RAN made **four contributions** to O-RAN standardization, with more planned for Q2–Q3 2025. Notably, Juniper Networks co-signed Change Requests with NEC and Cohere to introduce a Query Service in the E2SM-CCC specification, now part of version R004-v05, enabling advanced xApp-driven use cases like energy saving and SLA assurance.

Technically, HiPer-RAN achieved multiple industry firsts:

- A next-generation **O-DU** architecture with **non-linear signal processing**, enabling improved spectral efficiency (over 200%), reduced power consumption (50% less required base-station antennas), and stronger resilience in dense deployments (300% increase in the number of connected devices). This technology was recommended for spin-out by the **Innovate UK ICURe Explore Options Roundabout** programme, recognising its commercial potential and readiness for wider impact.
- A **scalable, interoperable RIC design** supporting advanced xApp/rApp orchestration, anomaly detection, and real-time response to compromised E2 nodes.
- Deployment of a **hybrid intrusion prevention system** that protects RIC operations from real-world threats such as KPI poisoning and signalling storms.
- Implementation of **advanced cross-layer intelligence** that improves **energy efficiency,** optimizes MIMO performance, improves load balancing and radio slicing in dynamic network conditions.
- An advanced conflict resolution approach allowing third-parties xApp plugs-in to be directly deployed on O-RANs while preserving their potentials.

In addition, through close collaboration and practical interactions during the project, participating companies were able to enhance their testing tools with pre-product capabilities (e.g., Viavi AI RSG Tool).
In hardware innovation, the **HiPer-RAN System Board**, developed by **Lime Microsystems**, supports **64T64R MIMO configurations** and integrates high-performance SDR with AI-ready processing. This provides a flexible and scalable testbed for power-performance optimization across multiple Open RAN scenarios. The entire hardware, the radio drivers and APIs are Open Sourced and available to other organisations to modify and adopt as needed.

The project also produced substantial academic and public engagement outputs:

- **3 journal papers and 11 conference papers** were published, covering core advances in RIC design, MIMO optimization, security frameworks, and real-world validation, with additional publications underway.
- **6 public demonstrations** showcased major components and use cases developed during HiPer-RAN, including security threat emulation, real-time MU-MIMO processing, and energy-saving RRM, culminating in a flagship demo at **MWC 2025**, endorsed by the **O-RAN Alliance**.
- **A project closure event** was held at the University of Surrey, featuring a series of live end-to-end demonstrations and technical talks. Attendees included researchers, engineers, government

representatives and technical leads from academic institutions, SMEs, and global technology companies.

6 Project Conclusions

The HiPer-RAN demonstrated that a consortium consisting of industrial entities paired with the academic contributions and the university leadership was able create a dynamic collaboration that can drive, “out-of-the-box” innovations with measurable impact. Through its dual-track methodology (balancing high-risk experimental innovation with near-to-market implementation) the project delivered measurable improvements across network performance, security, and energy efficiency.

A central conclusion of the project is that meaningful Open RAN innovation demands holistic, cross-layer examination. Rather than isolated software enhancements or hardware replacements, HiPer-RAN validated the benefits of end-to-end co-design, where orchestration frameworks, cross-layer intelligence, physical layer innovations, and security mechanisms work in concert. This approach not only accelerated technical validation but also revealed deeper systemic insights into bottlenecks, integration risks, and standardisation gaps.

HiPer-RAN’s outcomes reinforce the value of public funding in unlocking innovation with long-term industrial and societal benefit. From developing spin-out-ready non-linear technologies for improving MIMO systems, to driving contributions to O-RAN specifications, the project has catalysed progress far beyond the lifespan of the funding window. The use-case-driven methodology, grounded in direct engagement with mobile network operators, ensured that each technological advancement remained aligned with real-world operational needs.

HiPer-RAN successfully contributed to all three core objectives of the UK ONE competition and has laid a robust foundation for the continued evolution of intelligent, secure, and energy-efficient Open RAN systems. Its model of collaborative, university-led innovation, dual-path development, and results-driven validation provides a clear blueprint for future programmes seeking to translate advanced R&D into commercial and strategic impact.

Following the successful conclusion of the project, several key suggestions for policy, regulatory, and programme adjustments have emerged to sustain and accelerate momentum in Open RAN innovation

- **Continued support for cross-sector collaboration:** Policies should promote the collaboration of academic institutions, global technology vendors and MNOs to develop and trial high-risk ideas with industrial backing.
- **Encouraging Open RAN Interoperability:** Policies should support open interfaces and disaggregated architectures to accelerate integration of highly innovative solutions from specialized third parties, including smaller vendors into larger systems.
- **Energy-Efficiency Incentives:** Given the demonstrated energy savings, future funding should incentivize energy-efficient solutions that adopt holistic, cross-layer approaches to RAN design and operation
- **Stronger O-RAN Security Guidelines:** Mandatory security testing and certification frameworks should be adopted to enhance O-RAN security.
- **Funding for AI and ML in Telecom:** As AI-driven RAN management enhances network efficiency, targeted funding should support research into methods that reduce the amount of training data required for effective deployment in telecom environments.

7 Next Steps

Following the successful completion of the HiPer-RAN project, the consortium is poised to drive continued innovation and accelerate the commercial adoption of Open RAN technologies. The next phase will concentrate on maturing the developed solutions, pursuing further real-world trials and deployments, and fostering broader ecosystem growth both in the UK and internationally.

Commercialisation, Trials, and Platform Enhancement

Key partners, including AWTG and Juniper, will advance their RAN Intelligent Controller (RIC) platforms and associated r/xApps. Plans involve enhancing AI/ML capabilities, optimising for large-scale commercial deployments, and expanding API functionalities. These efforts will be validated through extensive real-world testing, building upon HiPer-RAN's foundational results. The partners will continue active contributions to O-RAN Alliance specifications, aiming to standardize innovative solutions and develop utility applications that strengthen their cloud-native RIC stacks and overall commercial offerings.

Lime Microsystems will evolve the HiPer-RAN System Board into a next-generation open hardware platform supporting software-based intelligence across RAN layers. Future plans include deeper legacy integration, supply chain diversification, and extensive lab/field trials. The goal is to replace earlier solutions e.g., Flex-5G, potentially with operators like Vodafone, which tested its predecessor, to establish HiPer-RAN as a more complete, scalable Open RAN platform.

Expanding Security, Intelligence, and Performance

Viavi intends to expand its AI-powered Radio Scenario Generator (AI RSG) testing framework. The roadmap includes support for advanced MU-MIMO beamforming, UE beam tracking, and full closed-loop integration with Near-RT and Non-RT RICs. This will be crucial for validating high-capacity, energy-efficient, and AI-augmented RAN systems, with a vision for deeper integration of application training and threat mitigation in live environments.

Research-Driven Evolution Towards Market Readiness

The University of Surrey will spearhead further research, translating its cutting-edge developments, such as the high-performance non-linear empowered O-DU and novel security solutions, into commercially viable applications. In particular, the university's **non-linear MIMO processing solution**, is now **actively progressing towards commercialisation**. Following a recommendation for spin-out by the **Innovate UK ICURe Explore Options Roundabout**, the team is engaging with stakeholders to explore market-fit opportunities and early deployments. In parallel, the university continues to evolve practical security solutions for Open RAN environments, targeting emerging O-RAN concepts such as dApps.

Exploring New Frontiers and Addressing Future Needs

VMO2 will investigate cross-sector applications of O-RAN architectures, exploring their value in industries like manufacturing, healthcare, and transportation to unlock new services and revenue streams. Concurrently, partners like Keysight have identified pertinent use cases, such as Uplink Interference Mitigation and RF Channel Reconfiguration, which were beyond HiPer-RAN's initial scope. Future collaborations will aim to integrate these into vendor testing and validation workflows.

Enablers for Sustained Progress

To realise these ambitions, the consortium will actively:

- Seek follow-on funding (e.g., DSIT, EPSRC) for continued development and field validation.
- Engage with mobile operators for Proofs of Concept (PoCs) and commercial pilots.
- Foster international collaboration to ensure global relevance and interoperability.
- Invest in workforce development through specialised training in O-RAN software and AI integration.
- Liaise with regulatory bodies to address potential adoption barriers.

8 Media Library

The HiPer-RAN project had its own webpage at [HiPer-RAN Website], with a description of the project's overview, objectives, team, and contacts. Beyond that, multiple publications in the partners' websites were made, highlighting technical achievements and participations in events, which will be shown in this media library.

Connected Britain 2024

During the Connected Britain 2024 event, on September 2024, in London, the HiPer-RAN project was showcased at the DSIT stand. This event offered a great opportunity for wider audience from the public and private sectors to learn about our project and understand its benefits. The University of Surrey developed leaflets, posters, slideshow, among other marketing materials.

Figure 6 Connected Britain 2024 in London

Figure 7 HiPer-RAN slides at DSIT booth in Connected Britain 2024

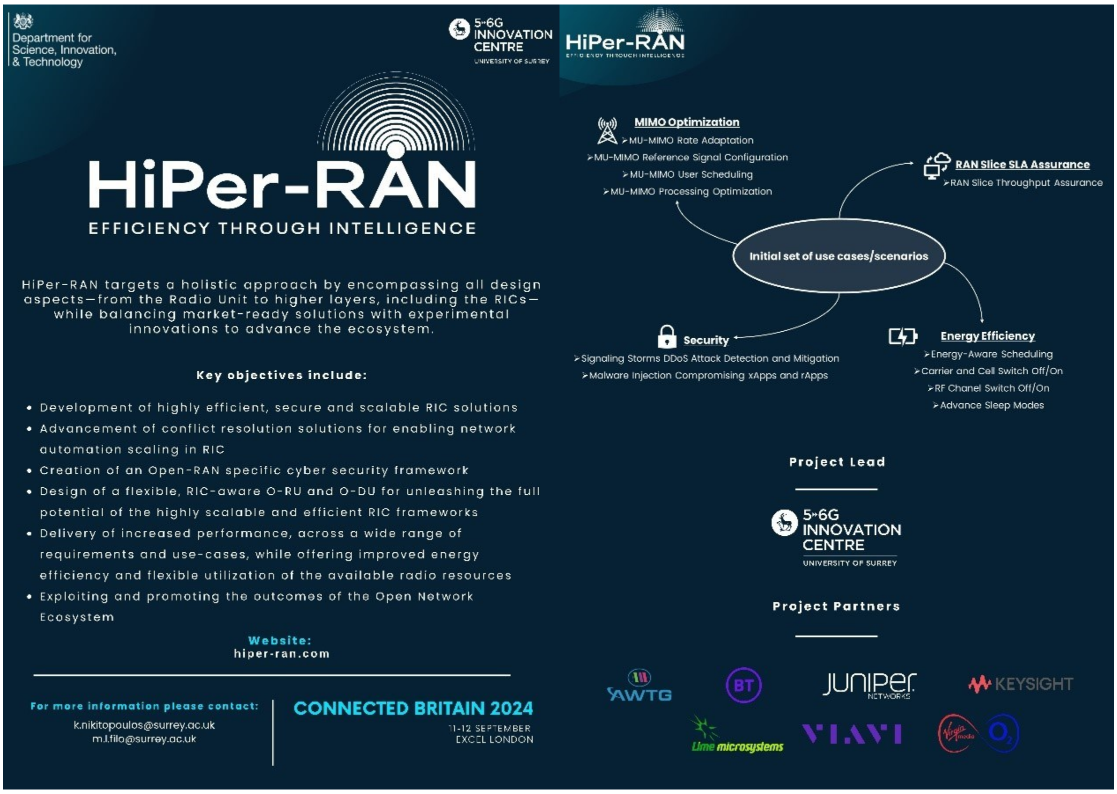

Figure 8 Front and back pages of the HiPer-RAN leaflet for Connected Britain 2024

VMO2 HiPer-RAN Workshop

On October 2024, partners and industry experts participated in the VMO2 HiPer-RAN workshop, with the goal of evaluating and prioritizing O-RAN uses cases that would drive real performance improvements and deliver the highest value to MNOs. The analysis was based on technical feasibility, business impact, and deployment readiness, and the selected use cases were implemented through the project. The evaluation consisted of a comprehensive requirement study, definition of key performance indicators (KPIs), and performed impact analysis for the high priority use cases, focusing on MNO perspectives that took place throughout the project. The process offered actionable insights, enabling informed decisions for efficient O-RAN deployment and long-term cost optimization for the industry.

Figure 9 VMO2 HiPer-RAN workshop, collaborating to evaluate and prioritize O-RAN Release 14 use cases

Figure 10 Industry experts at the VMO2 HiPer-RAN workshop actively discussing and prioritizing O-RAN use cases

IEEE CAMAD 2024

The University of Surrey received the "Best Demo Award" at the IEEE International Workshop on Computer Aided Modeling and Design of Communication Links and Networks (CAMAD), in October 2024. At this opportunity, we showcased the practical gains of non-linear signal processing applied in Open RAN networks, aligned with the MIMO optimisation use case of the HiPer-RAN project.

Figure 11 Project lead Prof. Konstantinos Nikitopoulos receiving the "Best Demo Award" in IEEE CAMAD 2024

Mobile World Congress (MWC) 2025

The HiPer-RAN participated in the Mobile World Congress 2025, one of the most prestigious events of telecom industry, in March 2025. Featuring alongside other innovative projects of the University of Surrey, the HiPer-RAN was able to engage with over 200 participants, underscoring the attention that the project received by academia and industry communities. The event significantly increased the project's visibility, allowing great opportunities for discussions, feedback, networking, enabling also the identification of future leads and collaboration opportunities. Additionally, several project partners also participated in the event, emphasizing collaboration and representation internationally. Finally, key members, including BT Group CEO Allison Kirkby and the UK Minister of State for Investment, Baroness Gustafsson, visited our stand and appreciated our project highlights.

Figure 12 HiPer-RAN stand at MWC 2025

Figure 13 HiPer-RAN stand at MWC 2025

Connected Reflections Live

The Connected Reflections Live event, hosted by DSIT and UKTIN, took place at The Minster Building on March 2025, celebrating groundbreaking innovations, ecosystems, and market-shaping insights from the Future Network Programmes. The HiPer-RAN project was showcased with a live demo and displaying materials, and it was joined by Lime Microsystems demonstrating their hardware innovations. As a high point, the HiPer-RAN received the "Incremental Innovation" Future Networks Award, a recognition for projects delivering significant advancements in network technologies through iterative, practical improvements.

Figure 14 HiPer-RAN stand at Connected Reflections Live event

Figure 15 HiPer-RAN receiving 'Incremental Innovation' award at Connected Reflections Live event

Project Closure Workshop

As another key contribution towards the dissemination of the project, we organised a Project Closure Public Workshop at the 5G/6G Innovation Centre, University of Surrey. The event brought together all the partners involved, with their respective results and demos, as well as DSIT officials, telecom companies, and stakeholders. The event was also open to the public, published on Eventbrite, encouraging public attendance and was fully booked within just three days.

The event counted with multiple technical presentations and demos of the partners, which raised enriching discussions throughout the day. A compilation of multiple interviews with project's key figures was published in the video [Video].

Figure 16 Day agenda displayed across the venue

Figure 17 Welcome presentation by Prof. Konstantinos Nikitopoulos, 5G/6G Innovation Centre, University of Surrey

Figure 18 Presenters at the HiPer-RAN Closure Workshop

Figure 19 Networking session over lunch with interactive demo stations during HiPer-RAN Closure Workshop

Figure 20 Networking session over lunch with interactive demo stations during HiPer-RAN Closure Workshop

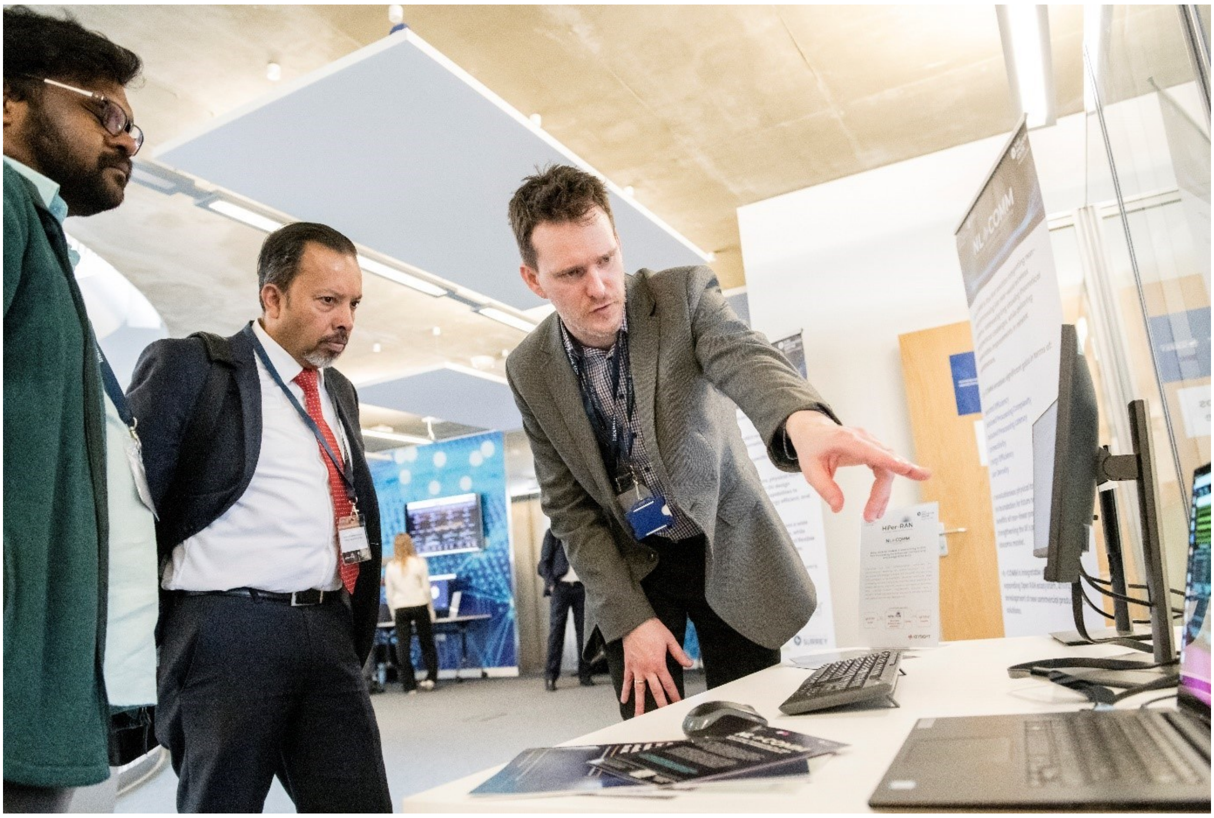

Figure 21 Networking session over lunch with interactive demo stations during HiPer-RAN Closure Workshop

<u>Partners websites</u>

Our partners have also used their websites to show the project's progress and outcomes.

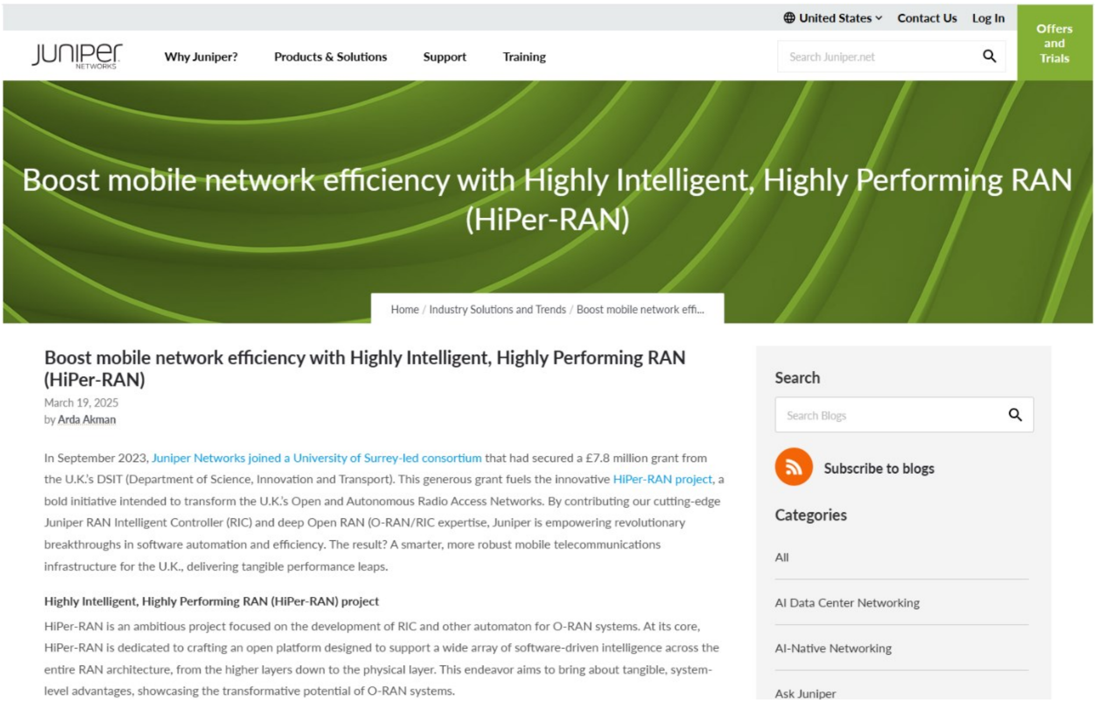

Figure 22 Snapshot from a blog post on Juniper's website

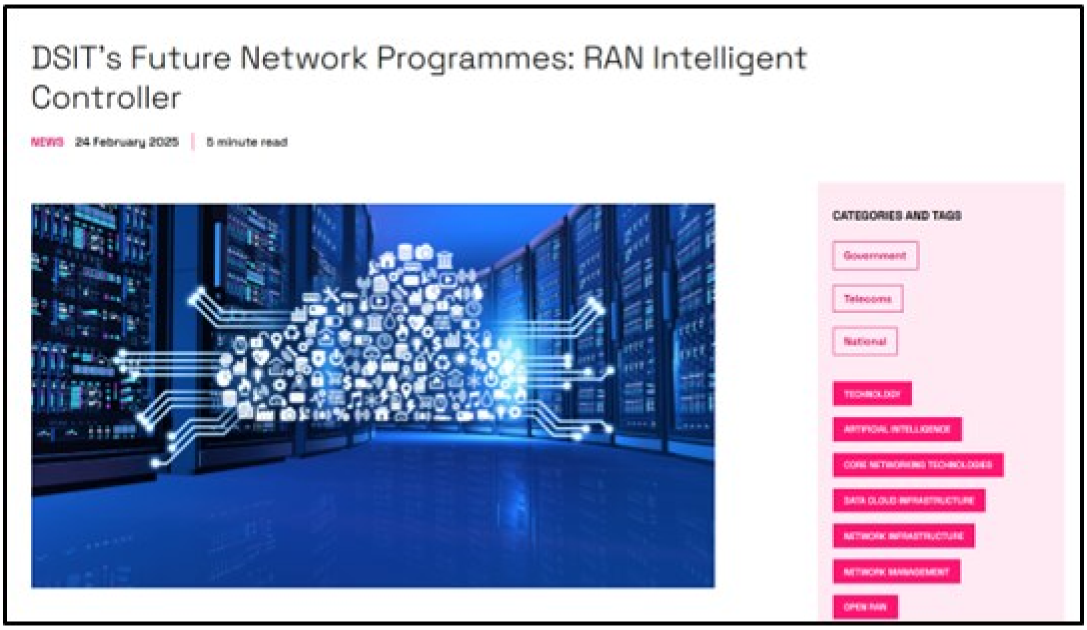

Figure 23 Snapshot of a blog post on UKTIN's website

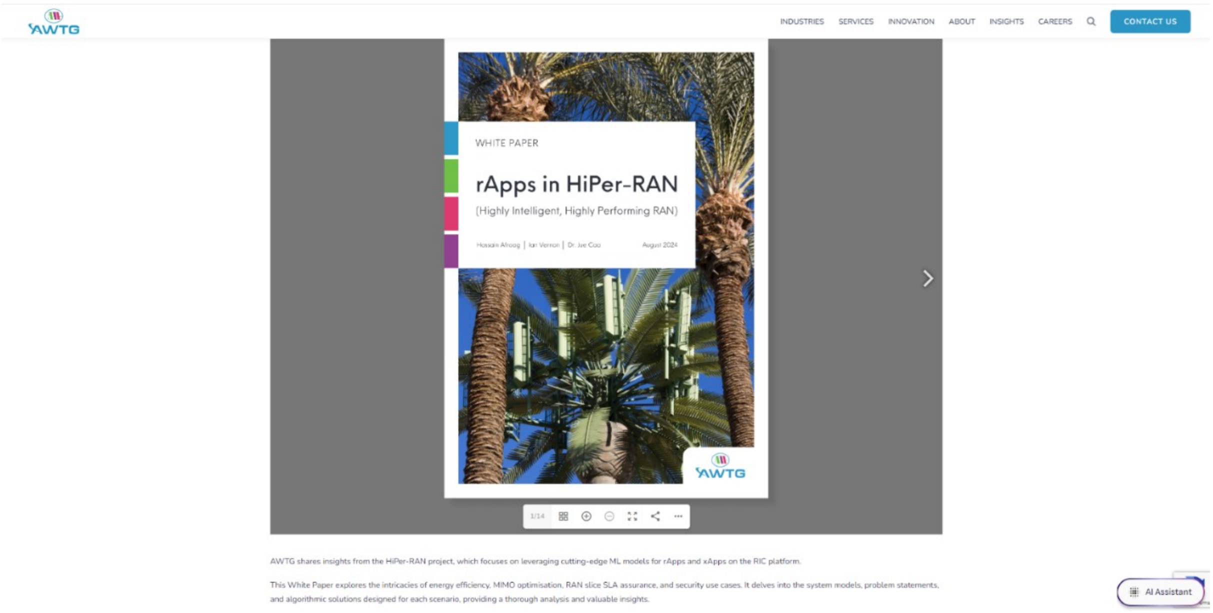

Figure 24 Snapshot of AWTG's website, promoting the white paper rApps in HiPer-RAN

References

[D35] HiPer-RAN Deliverable 35: Final report on the RIC framework integration

[D31] HiPer-RAN Deliverable 31: Final report on the integrated system lab testing

[D41] HiPer-RAN Deliverable 41: Six-month report on standardisation, dissemination, exploitation, and training actions

[D36] HiPer-RAN Deliverable 36: Report on the final design for intelligent xApps rApps solutions, including detailed description of refinements and reasoning behind them

[D40] HiPer-RAN Deliverable 40: Final report on trials and quantification of outcomes, focusing on the examination of trials experience and quantification of the outcomes based on clearly defined KPIs

[D38] HiPer-RAN Deliverable 38: Report on the integrated cyber security framework over RIC

[D18] HiPer-RAN Deliverable 18: Initial report on the integration of the developed RIC solutions

[D37] HiPer-RAN Deliverable 37: Final version of RIC-aware MAC, PHY and Radio Unit supporting (m)MIMO

[D23] HiPer-RAN Deliverable 23: Report on intelligent xApps.rApps solutions for the identified use cases

[HiPer-RAN website] HiPer-RAN website [Online] Available at: https://www.surrey.ac.uk/research-projects/hiper-ran

[Video] HiPer-RAN: Advancing UK mobile networks through smarter software automation [Online] https://www.youtube.com/watch?v=JzLCqITLaOI