Open Networks Ecosystem Competition

ARIANE
Accelerating RAN Intelligence across Networks Ecosystems

October 2023 – March 2025

Department for Science, Innovation & Technology

ARIANE™

TELECOM INFRA PROJECT®

Acceleration RAN Intelligence across Networks Ecosystems

PROJECT SCOPE

1. Install & simulate a real-world Open RAN small cell deployment scenario in a controlled test environment
2. Arqit led security posturing assessment & report, with options to uplevel security hardening across interfaces and call flows
3. Develop, train and measure the before & after effects of xAPPs/rAPP application on RAN performance in simulated real-world traffic scenarios
4. Gather technical insights on the possible effects on RIC and Radio performance due to xAPPs/rAPPs conflicting & competing for RIC resources
5. Definition & feedback on common API requirements
6. Benchmark RIC platform performance using HCL built bouncer application based on messaging across interfaces (A1/E2/01)

PROJECT RESULTS

Unlocking the Future of Open RAN: The ARIANE Project

The ARIANE project, a collaboration between Accenture, Amdocs, Arqit, BT, HCLTech, NetReply, TIP and VIAVI Solutions, has revolutionised the Open RAN ecosystem with innovative solutions and comprehensive testing.

Set up as a "virtual RAN" environment, enabled by VIAVI, the project proved the benefits of three cutting edge rAPPs and xAPPs under simulated environments that represented real world RF propagation, mobility and traffic behaviours.

Accenture, in collaboration with VIAVI, VMware, and HCLTech, installed and integrated the necessary software, ensuring seamless remote connectivity for application vendors.

Pioneering O-RAN Use Cases

The ARIANE project focused on key O-RAN use cases, including QoS-Based Resource Optimization, Advanced Traffic Steering, Predictive Load Balancing and Energy Saving.

Amdocs Energy Savings Management used machine learning to identify optimal energy savings policies for 5G networks, achieving energy consumption reductions of 11-13%. Amdocs Energy Savings Management ran as a rApp within the Kubernetes cluster and used the O-RAN R1 interface to collect real-time traffic and utilization data from the NON-RT RIC platform. Its machine learning algorithms dynamically powered down cells to save energy without impacting QoS, surpassing static energy-saving measures.

HCLTech's Advanced Traffic Steering (ATS) xApp demonstrated significant improvements in load balancing and network performance. Its Benchmarking app, running as an xApp on both the OSC and VMware dRICs, met objectives such as testing E2 interoperability, determining capacity, measuring E2E latency, jitter, throughput, and resource utilization, and identifying bottlenecks. ATS results showed a reduction in overloaded cells and an increase in throughput, with a maximum gain of 11.95% for OSC RIC and 11.62% for VMware RIC.

NetReply developed three advanced applications: Energy Saving (ES) rApp, Traffic Steering (TS) xApp, and QoS-Based Resource Optimization (QoS-BRO) xApp where these applications worked in tandem to achieve network-wide optimisation. The ES rApp reduced energy consumption by 15-20%, the TS xApp improved load balancing, and the QoS-BRO xApp enhanced real-time resource allocation by dynamically optimizing PRB quotas, ensuring better QoS than fixed allocation strategies. NetReply has also developed a conflict avoidance mechanism where the applications exchange messages to prevent any conflicts between them, ensuring seamless coordination and optimal network performance.

Comprehensive Testing and Validation

VIAVI's AI RAN Scenario Generator (AI RSG) facilitated comprehensive testing and validation, ensuring interoperability within the Open RAN ecosystem. Accenture played a crucial role as the system integrator, coordinating the testing of six applications across three RICs, enhancing the maturity and interoperability of the ecosystem. The ARIANE team's System Integration approach and Test Strategy ensured thorough testing and accurate capture of results, enabling future projects to replicate the approach.

Security and Future Advancements

Security considerations were integral to the project, with Arqit leading efforts to enforce a secure-by-design methodology, ensuring high-grade encryption and ongoing authentication checks. The ARIANE security workstream aimed to enforce a heightened degree of security consideration throughout the project, exploring significant security vulnerabilities and promoting the use of higher-grade authentication and encryption to realise a quantum-safe deployment architecture. Security testing focused on Open RAN interfaces such as E2, O1 and R1.

API Portability and Conflict Management

The project also took on the effort to contrast API and SDK differences between the different RIC platforms with a view of accessing ease of apps development and portability of apps across different RIC platforms. With multiple applications running concurrently, the project also observed cases where conflicts between applications were handled at the application, RIC platform and RAN simulator levels.

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Impact and Future Directions

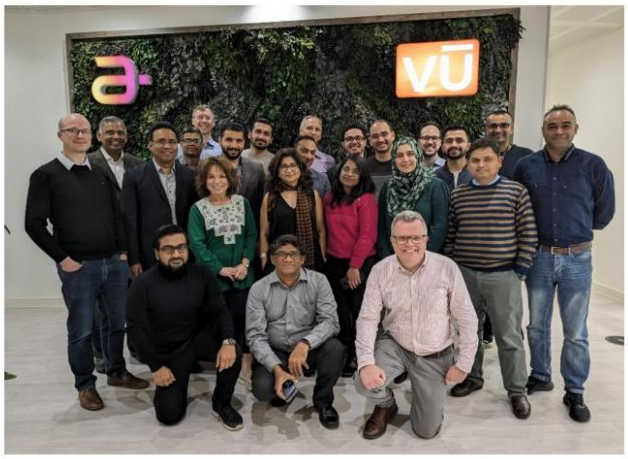
The ARIANE project demonstrated the potential for lower energy costs, improved network performance, and enhanced user satisfaction for telecom operators. The collaborative approach and successful implementation of Open RAN standards have paved the way for future advancements and industry-wide adoption. The project's findings and recommendations will serve as a valuable roadmap for standards organizations, industry stakeholders, regulators, and policymakers, driving the continued growth and development of innovative Open RAN solutions.

Broader Community Impact

TIP believes the project has significantly contributed to the Open RAN ecosystem by demonstrating real-world interoperability, addressing technical challenges, and providing a foundation for future advancements. TIP will (i) stimulate global telecom Operator action in Automation & AI of OpenRAN systems; (ii) activate a vibrant SMO/RIC/Apps developer ecosystem; (iii) expand upon ORAN ALLIANCE standards; (iv) and set forth a vibrant marketplace of TIP certified applications that can be commercially deployed in Operator networks. Furthermore, we are ready for ARIANE II – a focus on automated energy management rAPPs & security at SONIC Labs commercial OpenRAN over-the-air test environment.

The ARIANE Team

REPLY NET
ARQIT
vmware
HCLTech
VIAVI Solutions
accenture
TELECOM INFRA PROJECT
BT
amdocs



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