Vodafone Group

## The Journey to Zero-Touch RAN Configuration

"RAN Configuration Management Automation is a critical topic for Mobile Network Operators in the modern telecommunications landscape. It addresses the challenges of network complexity, enhances operational efficiency, and delivers significant cost savings. For customers, this translates to better network performance, improved reliability, and faster access to new services. As the industry continues to evolve, the role of automation in RAN management will only become more pivotal and is at the heart of Vodafone."

Ingolf Seibert
Senior Manager Access Planning & Optimisation Tools within Network Strategy and Engineering at Vodafone

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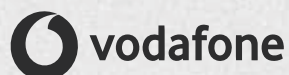
Streamlining RAN Configuration Through **Automation and Flexibility**

The growing complexity of modern telecommunications networks has made automating and simplifying Radio Access Network (RAN) configuration processes a key industry priority. Operators face increasing challenges in deploying and managing advanced technologies, driving demand for solutions that streamline tasks such as site commissioning, RAN sharing, vendor and platform transitions, and large-scale network upgrades.

The introduction of Open RAN, network virtualisation, and the use of new vendors and subcontractors adds further complexity, often requiring new skill sets. RAN configuration automation is not solely about reducing manual effort – it ensures accuracy, efficiency, and scalability in environments where small errors can cause major disruptions. By adopting advanced technologies, operators can **accelerate deployments, cut costs, and minimise mistakes**.

However, achieving effective automation also presents significant challenges, particularly in balancing process standardisation with the need for adaptability across diverse OSS and vendor environments. **Solutions must integrate smoothly with existing infrastructure**, maintaining consistency while supporting local customisation to address specific market and technology requirements. Furthermore, as multiple entities - including subcontractors - regularly update the network, robust auditing capabilities are essential to ensure configurations adhere to vendor, engineering, and operational standards. Aligning the network with inventory and planning system data is increasingly important to prevent misconfigurations, ensure data consistency, and support informed control and cost optimisation.

About **Vodafone Group**

Vodafone is a leading European and African telecoms company. The company serves over 340 million mobile and broadband customers, operating networks in 15 countries with investments in a further five and partners in over 40 more. Vodafone's undersea cables transport around sixth of the world's internet traffic, and it is developing a new direct-to-mobile satellite communications service to connect areas without coverage. Vodafone runs one of the world's largest IoT platforms, with over 215 million IoT connections, and provides financial services to around 88 million customers across seven African countries – managing more transactions than any other provider.

Challenges

Vodafone is committed to further simplifying and automating RAN configuration processes, with a particular focus on complex scenarios such as site commissioning, RAN sharing, platform or vendor transitions, and network upgrades. A key objective is to strike the right balance between standardising processes and maintaining the flexibility needed to support diverse markets, OSS environments, and multiple vendor ecosystems. Vodafone also seeks to ensure network configurations comply with vendor, engineering, and operational standards by validating them against planning and inventory systems.

In summary, Vodafone's goals were:

1. | **Improve RAN configuration efficiency** – from generating complex configuration scripts to deploying them on the network – while collecting feedback on results to support the transition towards zero-touch network operations;

2. | Ensure **adaptability** to new vendors and technologies, such as Open RAN and virtualisation;

3. | **Further automate operational processes**, reducing inefficiencies from administrative tasks while maintaining full traceability of activities performed;

4. | **Enable agility and flexibility** in the solution to support business evolution and align with operational requirements;

5. | **Detect network misconfigurations** and propose corrective updates;

6. | **Compare live network data with inventory** and planning systems to ensure alignment;

7. | **Leverage automation and a unified front-end architecture** to streamline operations and reduce the number of tools in use.
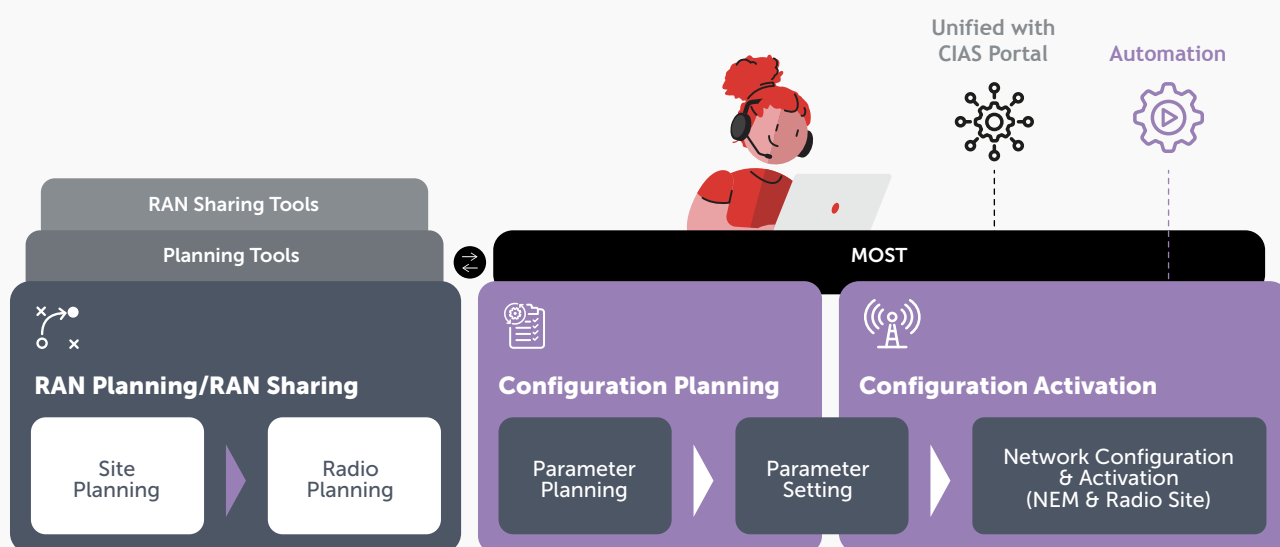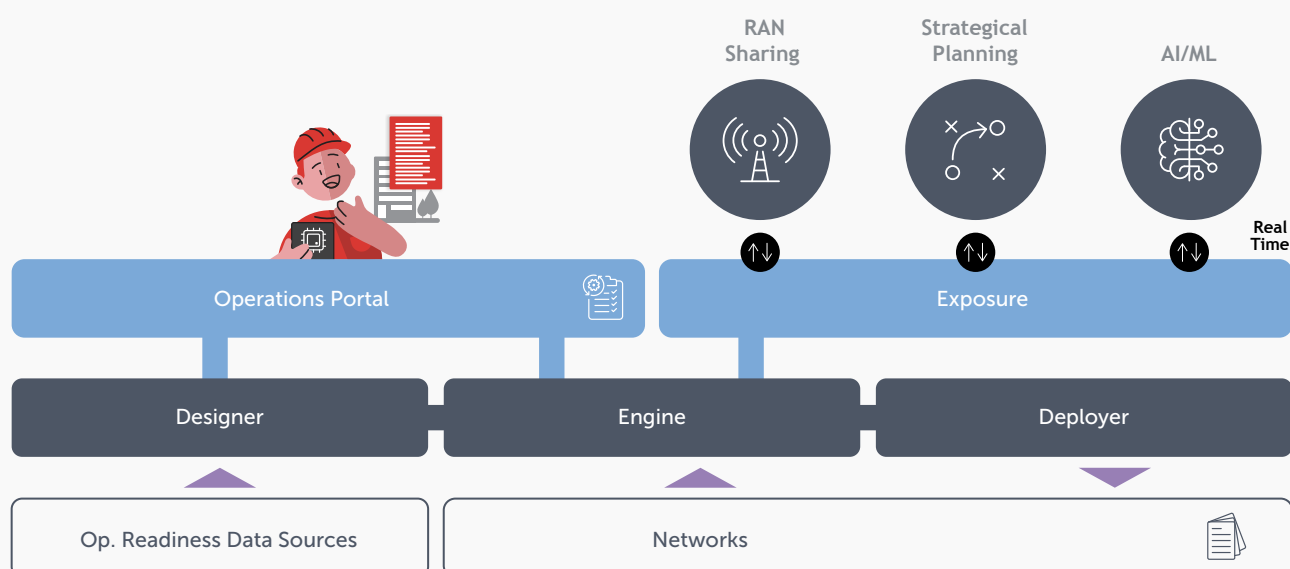
The Solution
A Multi-Opco Multi-Vendor Open Scripting Tool

Celfocus was selected as Vodafone's strategic partner to address key operational challenges through a tailored solution. The result was the development of **MOST (Multi-OpCo Scripting Tool)**, a robust tool that enables operations teams to efficiently execute business configuration scenarios. MOST guides engineers through the process of scenario selection and automatically generates, deploys, tests, and commits — or rolls back — network configurations in the live environment.

MOST transforms RAN configuration management by combining automation, standardisation, and adaptability across multiple markets, while accommodating country-specific engineering and operational requirements. Its open, vendor-agnostic architecture and real-time integration with the network make it a cornerstone for Vodafone's move towards zero-touch operations. The tool also enhances network reliability through advanced auditing, reporting, and configuration analysis, with the ability to identify and suggest corrections for misconfigurations.

Unified with CIAS Portal

Automation

MOST

RAN Sharing Tools

Planning Tools

RAN Planning/RAN Sharing

Site Planning

Radio Planning

Configuration Planning

Parameter Planning

Parameter Setting

Configuration Activation

Network Configuration & Activation (NEM & Radio Site)

Furthermore, MOST supports the introduction of new vendors and technologies, such as Open RAN, eliminating the need for localised tool acquisition or customisation across regions. Beyond its operational interface, MOST exposes configuration capabilities as-a-service, enabling integration with other domain solutions – such as Planning, Cognitive Automation, and Partner RAN Sharing platforms – with minimal manual intervention. This empowers engineers to maintain oversight and control while **enabling end-to-end automation, paving the way for truly autonomous network operations by design**.

The project is the result of a close collaboration between Vodafone and Celfocus, leveraging agile development methodologies to ensure the timely delivery, continuous evolution, and effective maintenance of the solution. The joint team comprises engineers, network operations specialists, and software developers from both organisations, working together to ensure that MOST addresses the specific requirements of Vodafone's various local markets. **The solution is currently in use for configuration activities in Portugal, Ireland, and Germany, and for network analysis in Romania and Czechia.**

Highlights

Design-Time
- Template-based scenarios for script generation
- Vendor- and technology-agnostic business rules

Run-Time
- Automated script generation
- Script execution and deployment monitoring
- Automated activation via element managers, including pre- and post-checks
- Ticketing tool integration
- Automated rollbacks according to defined business rules
- Graphical interface enabling users to view configuration outcomes
- Network analysis and reporting
- Network auditing
- Script download for subsequent modification or deployment

Benefits

The impact of MOST on Vodafone's operations is significant. The tool reduces network configuration time from hours to **under three minutes — a remarkable 40-fold improvement**. Furthermore, MOST has **decreased configuration errors**, substantially enhancing network reliability and service quality. By accelerating time-to-market for new services and technologies, MOST strengthens Vodafone's competitive position in the rapidly evolving telecommunications sector. Its scalable, cloud-native architecture ensures adaptability to future network demands, maximising return on investment over the long term.
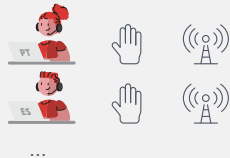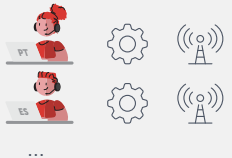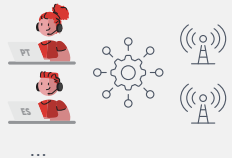
**With MOST, Vodafone can now:**
- Reduce the effort required to create and deploy configuration scenarios;
- Enforce additional business and validation rules to prevent potential network impacts during configuration;
- Minimise human error in repetitive script creation and editing by applying business rule validation;
- Incorporate live network data when configuring new network segments (e.g., neighbouring configurations);
- Validate network status post-configuration to avoid service disruptions;
- Enhance resilience to network software updates;
- Detect discrepancies among network, planning, and inventory systems.

In conclusion, MOST is a strategic asset that drives efficiency, standardisation, and innovation in RAN configuration management. Its seamless integration with various network management systems, process automation, and error reduction capabilities position it as a leading solution in the industry.

Direct feedback from the RAN engineering team is provided below:

	Manual		Macros		MOST	
Execution Length/Effort	Hours	🔴	<5 min	🟢	<3 min	🟢
Amount* of Business Rules considered	Low	🔴	Low	🔴	High	🟢
Amount* of Validation Rules	Low	🔴	Low	🔴	High	🟢
Prone to Human Logic Gaps/Errors	High	🔴	Medium	🟠	Low	🟢
Network Validations (Prior and After)	Low to None	🔴	Low to None	🔴	Medium	🟢
Impact from Network Software Upgrades	none	🟢	High	🔴	Low	🟢
Dependency on Key RAN Experts	none	🟢	High	🔴	Low	🟢
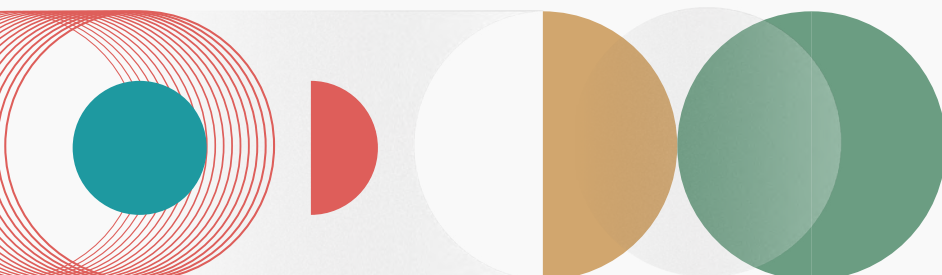
Next Steps

As a software-based solution, MOST is designed to evolve in line with Vodafone's business needs and the ongoing advances in technology and network development.
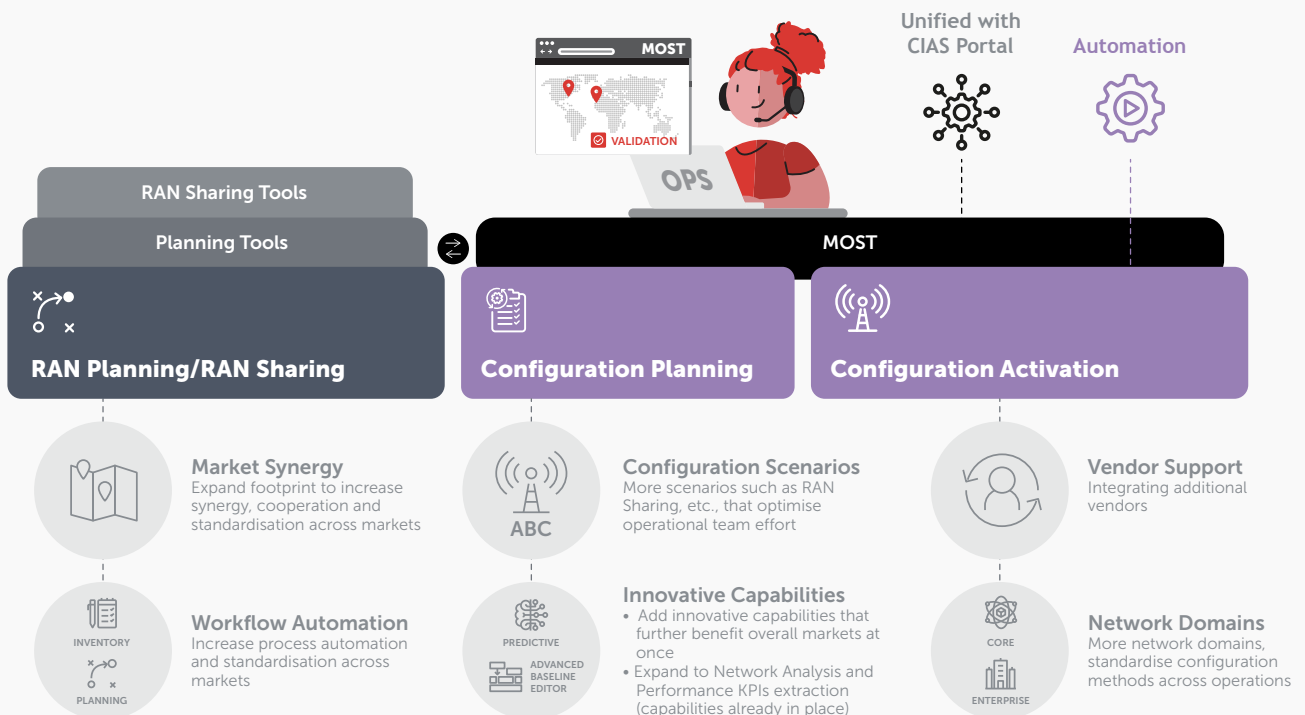
The fundamental areas of evolution being considered include:

- Expansion to additional Vodafone markets, promoting simplification and standardisation of operations while accommodating the unique requirements of each market;
- Onboarding and extending compatibility with more vendors and Open RAN;
- Enhancing workflow automation by integrating with existing process tools, ensuring both automation and compliance with established procedures;
- Leveraging AI and Machine Learning capabilities to enable proactive and predictive functionalities, such as preventing network congestion;
- Broadening application to other network domains, including Core, Transport (TX), Microwave and IP Networks.

Why Celfocus?

Vodafone Group chose a reliable partner with extensive expertise in integration, automation, scalable technologies, and, importantly, deep knowledge of RAN networks to ensure the success of the project.
Our proven experience in combining AI with network automation, operating within complex architectures, and delivering digitalisation initiatives positioned Celfocus as the ideal collaborator on Vodafone's journey towards autonomous networks.
Additionally, our proven agile delivery capabilities were essential to meet the evolving and dynamic demands of the business.

"Celfocus was selected by Vodafone OSS Engineering for the development of their RAN Configuration Management tool due to their proactive serving attitude, agile flexibility for development changes, scalable resource management, deep RAN expertise, and innovative solutions. Celfocus Zero Touch Activation solution MOST has enabled Vodafone to automate network configurations and service activations, reducing manual interventions and improving service delivery times."

Michel Baille - Senior Programme Manager Access Planning & Optimisation Tools within Network Strategy and Engineering at Vodafone

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