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Ericsson RAN Energy Cockpit rApp

Solution sheet

Available on Ericsson Intelligent Automation Platform

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Ericsson RAN Energy Cockpit rApp monitors the energy efficiency of both individual radio units and the entire network. By detecting the causes of energy inefficiencies, it enables faster resolutions.

At the forefront of sustainable design and optimization, Ericsson has developed Ericsson RAN Energy Cockpit rApp, which will create an operation centre for 4G and 5G networks. This will enable communications service providers to understand the amount and efficiency of energy being used in the network at any given moment.

In the current era of energy awareness, service providers cannot afford to waste even minimal quantities of energy. From both a sustainability and strategic perspective, it is vital to understand how much energy is being used and for what purposes.

Ericsson RAN Energy Cockpit rApp is an operations and management (O&M) tool capable of providing a detailed and scaled view on how energy is used in the network. This helps service providers to detect potential faults which can cause low efficiency in the overall network

energy consumption. This can be achieved by ranking every Radio Access Network (RAN) site within the network to inform operations staff of the energy efficiency status of the entire network via a web portal. This graphical user interface (GUI) has been developed following the industry standards.

Ericsson RAN Energy Cockpit rApp will help operational teams not only to detect inefficiencies, but also to isolate faults for root cause analysis and produce recommendations for resolutions, thanks to accurate insights which are available promptly and with minimal effort. This rApp can run in both open and closed loop. This is configurable according to the service provider's preference and their O&M team.

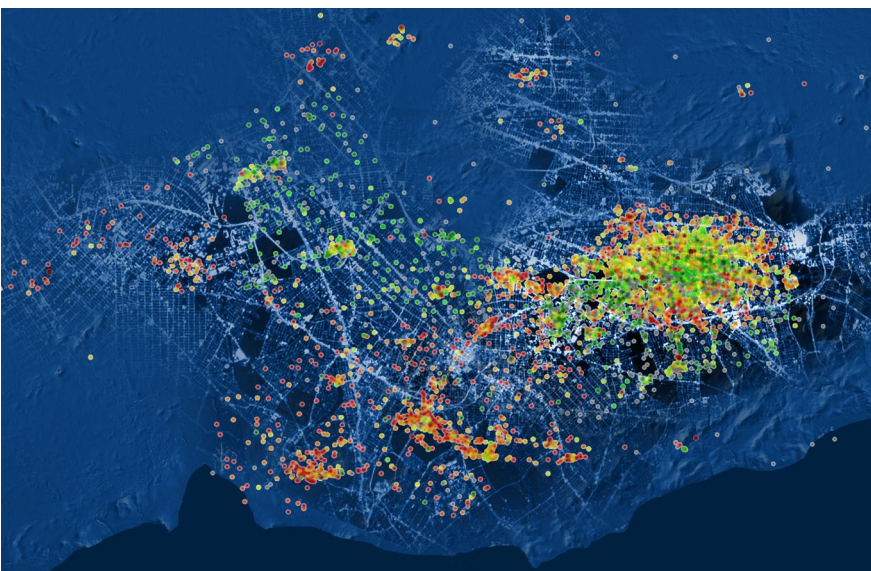
With this solution, Ericsson is supporting the O&M teams in coping with the increased complexity in radio networks, enabling a faster resolution using AI/ML technologies.

rApps benefit strongly from Ericsson Intelligent Automation Platform capabilities

Beyond adherence to R1 for inter-rApp communication and access to external interfaces, the platform facilitates all the tasks around design, development, testing and life cycle management for rApp developers. The most relevant capabilities in these regards are the following:

- **AI/ML APIs** for model training, execution and life cycle management
- **analytics data collection** capabilities for raw data in a file- or stream-based format, with fault and performance management (FM/PM) provided out of the box
- **analytics processing** capabilities to provide insights on network behavior and performance
- **data management and movement**
- **controller framework** uses the open standard R1 interface to abstract details of the underlying system, allowing developers to focus on the use case
- **inventory and topology** offers near real-time source of truth
- **policy design and execution** for policy handling using multiple engines
- **service orchestration** covers the TOSCA-based orchestration engine for declarative orchestration
- **workflow execution** realization for activities supports the design and creation of new use cases
- **design and onboarding environment**

Figure 1: Energy efficiency map



Our solution

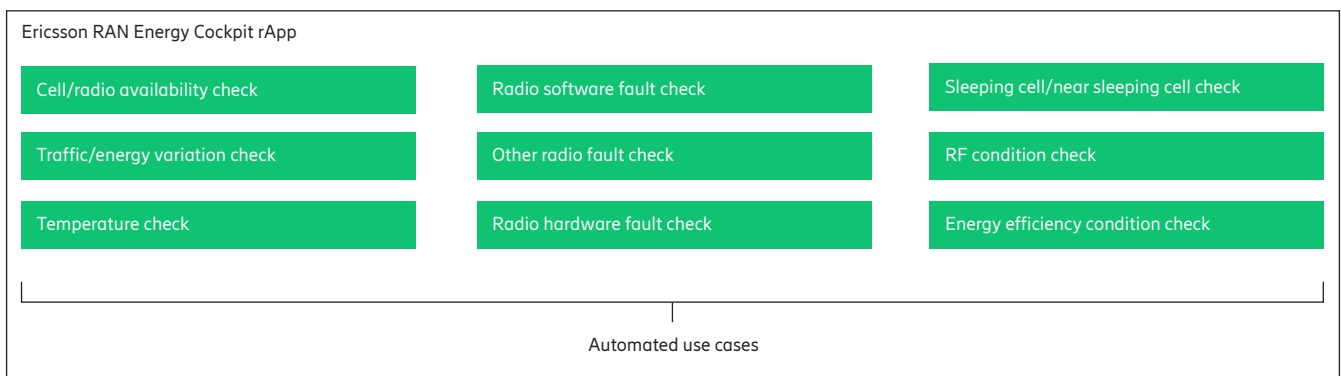
Ericsson RAN Energy Cockpit rApp monitors the energy performance of each radio unit and for the overall network. It improves energy efficiency of the radio network at scale by providing visualization and recommendations for the energy efficiency status and giving recommendations for fast resolution.

Ericsson RAN Energy Cockpit rApp process overview

rApps represents a new step in the network's architecture evolution. They are cloud-native application that can be onboarded and deployed in each customer's network, thanks to orchestration and automation layer evolution, the Service Management and Orchestration Platform (SMO). Ericsson Intelligent Automation Platform is Ericsson's approach to SMO. Following this evolution, Ericsson has developed a set of O&M rApps to satisfy 5G operational needs for service providers.

- 1 Visualize the overall network energy efficiency with site granularity** – not only is site energy consumption considered, but also traffic metrics (such as data volume and average users/cell). AI/ML techniques are applied and indicate an overall energy efficiency rank.
- 2 Understand the root cause of inefficiencies** – this is an automated process to identify and isolate the cause. The most common causes of energy inefficiencies are over dimensioning (in both low and high-traffic scenarios), configuration issues impacting performance and consumption, and hardware and software issues.
- 3 Provide recommendations for resolution** – once the cause has been identified, it is then shown in the web portal to alert the monitoring team, who will decide the next steps for the resolution such as implementing the recommendation or sending the actionable recommendation to the networks' operations team or opening a Trouble Ticket. For some scenarios, automatic resolution (closed loop) can be enabled such as parameter configuration.

Figure 2: Automated fault isolation for root cause analysis



The main characteristics of Ericsson RAN Energy Cockpit rApp

- **Data-driven algorithms.** Ericsson RAN Energy Cockpit rApp continuously gathers traffic data (throughput) and energy consumption data (watts per hour) from the network management layer to gain a clear view of the cost of data bandwidth as input for the algorithm.
- **Energy efficiency ranking estimation obtains the overall network efficiency measurement based on AI/ML techniques.** Based on the collected information, the rApp ranks each radio unit based on its energy efficiency. The ratio (data exchanged) / (energy unit) is used to create the overall RAN ranking – including the best and worst-performing nodes. AI/ML techniques are used for network clustering and modelling.
- **Fast processing engine due to powerful worker software.** The worker unit will process data and classify the processing output, providing the ranking results to the GUI.
- **Microservice implementation.** The granularity of the microservices will allow a better performance in terms of elaboration and faster output results.
- **Smart and flexible deployment.** Being an rApp, there is no need for a dedicated server – the rApp can be deployed on the cloud (private/public) and connected with the network management layer. The life cycle management can be AI-based automated in the Ericsson Intelligent Automation platform.
- **Automated root cause analysis process.** The rApp is synchronized to both performance management measurements and the alarm collection input. It has a dedicated section for alerts collection and presentation to help the operational team detect and isolate any faults causing inefficiencies. The evolution of this rApp will aim to achieve the highest possible level of autonomy in both root cause identification and resolution.
- **Flexible implementation adapted to a service provider's delivery model choice.** Ericsson RAN Energy Cockpit rApp has an off-the-shelf list of use cases for inefficiencies. For these use cases, closed loop actions can be triggered to fix the issue autonomously if desired.
- **Powerful GUI following the industry standards with Ericsson GUI presentation layer.** The output of all the executed processes is a web-based GUI where the users can see the map of network energy efficiency distribution. Color coding will indicate which are the individual node's energy efficiency performances.
- **Suited for both Ericsson 5G and 4G radio access networks.** The tool is designed for 5G and 4G radio access networks.

Key benefits

Ericsson RAN Energy Cockpit rApp provides the following benefits for service providers:

Improving energy efficiency of the radio network at scale

The solution provides visualization of the energy efficiency status and recommendations for fast resolutions.

Network performance can also be improved. For instance, one of the most common causes of energy inefficiencies is the incorrect configuration of functionalities, which can impact performance. Through faster issue detection and root cause analysis implementation, overall network performance will improve.

Flexibility with a shorter time to market

Every implementation will have its own thresholds with the service provider's input. The clustering process for the service provider's network is adapted to their specific needs. The AI-based algorithm can be customized according to the service provider's business priorities by using our services expertise for shorter time to market.

Simplified networks operations

A powerful GUI helps visualize the whole network to identify energy inefficiencies and the causes in an easy way. This tool can be adapted by each service provider's operations team in line with their resolution and automation processes.

Glossary

Non-RT RIC (non-real-time RAN Intelligent Controller): A logical function that enables non-real-time control and optimization of RAN elements and resources, AI/ML workflow including model training and updates, and policy-based guidance of applications/features in near-RT RIC.

R1: Interface comprised of a collection of services that facilitate the interactions between rApps and the non-RT RIC framework.

rApp: An application designed to run on the non-RT RIC. Such a modular application leverages the functionality exposed by the non-RT RIC to provide added value services relative to intelligent RAN optimization and operation. rApps communicate with the platform via the R1 interface.

About Ericsson

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