CYIENT

#IntelligentNetworkModernisation

INTELLIGENT ENERGY SUSTAINABILITY OPTIMISER rApp

Solution Description

CYIENT Intelligent Energy Sustainability Optimiser (IESO)

The IESO rApp leverages Cyient's Energy Sustainability Class (ESC), a composite metric balancing Energy Efficiency (EE) and Spectral Efficiency (SE), to identify optimisation opportunities using AI/ML, enabling actions that reduce RAN energy consumption while preserving network performance.

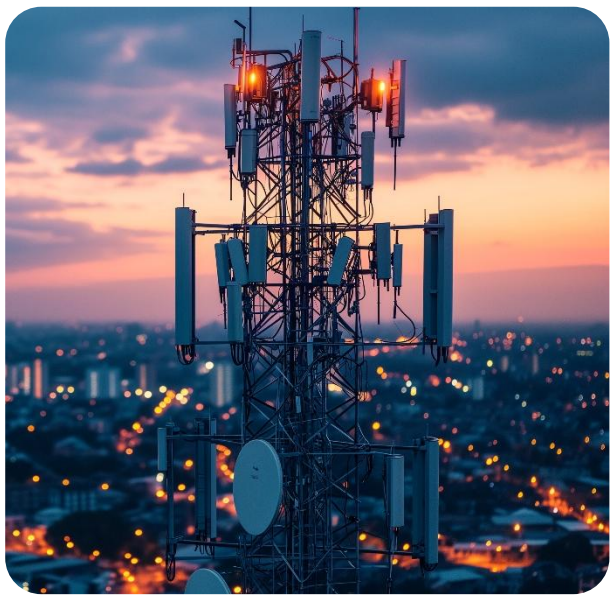
Mobile network optimisation has traditionally focused on improving spectral efficiency (SE) by maximising user throughput. However, rapid traffic growth and the expansion of radio access infrastructure, combined with rising energy prices, have significantly increased the importance of energy efficiency as a critical operational and sustainability concern.

Radio units account for roughly 40% of total network energy consumption, making the efficiency of RAN resources a key factor in reducing the overall energy footprint of mobile networks. However, optimisation actions that improve throughput or SE may also increase power usage and reduce Energy Efficiency (EE), highlighting the need to jointly optimise both SE and EE. To address this challenge, the Energy Sustainability Class (ESC) was introduced as a practical benchmark that jointly evaluates spectral efficiency and energy efficiency. By combining these two dimensions into a single classification framework, the ESC provides operators with an intuitive view of the sustainability performance of network sites and enables the continuous assessment of how efficiently network resources are being utilised from both a performance and energy perspective.

The IESO rApp continuously computes ESC and its indicators for each site, or group of sites, to monitor whether network elements operate within their expected efficiency region. When deviations from the optimal level are detected, the system triggers optimisation actions such as activating energy-saving features, temporarily switching off radio carriers during low-traffic periods, or switching off entire sites while neighboring cells compensate, if applicable, through antenna tilt adjustments, transmission power tuning, or traffic rebalancing. Through this continuous cycle, the IESO rApp converts ESC insights into explainable actions that improve network energy sustainability while preserving service performance.

The Ericsson Intelligent Automation Platform (EIAP) provides Service Management and Orchestration (SMO) for Open RAN and further enhances openness, network management, and automation by supporting multi-vendor and multi-technology RAN environments.

EIAP is supported by open interfaces and the industry's leading Software Development Kit (SDK) to enable an ecosystem of developers with all the capabilities needed to innovate, build, validate, share and operate.



CYIENT IESO rApp Solution Description

IESO integrates with the EIAP ecosystem through a network API that continuously ingests Performance Management (PM) and Energy Management (EM) indicators to compute the ESC, monitor its evolution, and detect deviations, triggering optimisation actions across the network and over time.

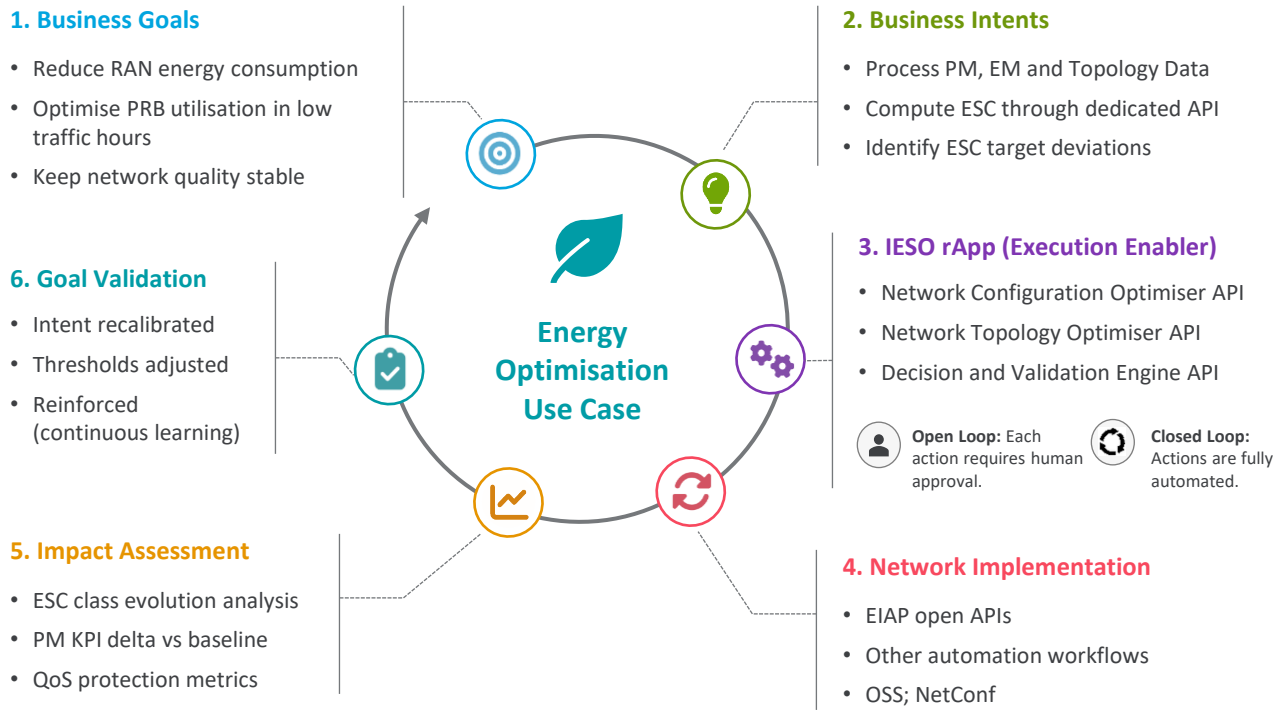
The IESO rApp leverages the dedicated ESC API to process in near real performance and energy measurements (PM/EM). The ESC classifies each site into one of four operating levels - A, B, C, or D -reflecting different sustainability levels, where Class A represents a balanced and sustainable operation and Class D indicates a non-sustainable condition with inefficient energy use. This continuous assessment allows the system to monitor network sustainability and identify sites operating outside their optimal efficiency region.

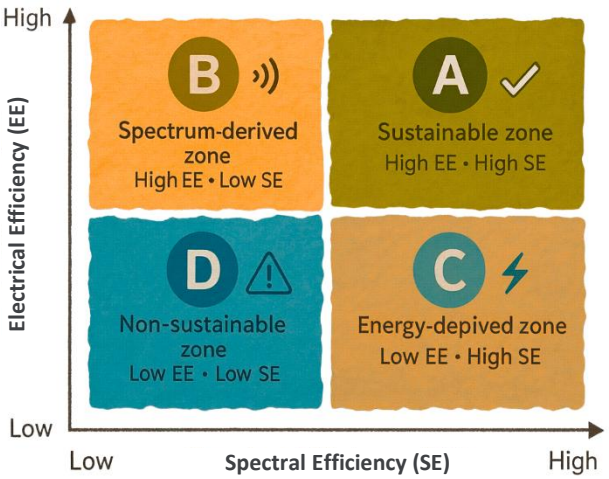
When such deviations occur, the rApp proposes or triggers optimisation actions aimed at restoring a balanced operating point between performance and energy consumption. Depending on the operator's configuration, the system can operate in open-loop mode, where recommendations are presented to the network operations team for approval, or in closed-loop mode, where predefined actions are automatically executed under controlled policies.

Typical optimisation actions include activating energy-saving features during low-traffic periods or selectively powering down entire sites in extreme low-load scenarios. Additionally, IESO combines network topology and configuration management (CM) information with Agentic AI algorithms to recommend complementary optimisation actions aimed at preserving service continuity.

Functional Workflow

The IESO workflow comprises a six-step automation framework which can operate in closed loop or open loop configurations, offering seamless integration with external service APIs:





Final Impact Report

The IESO rApp uses explainable AI algorithms to generate human-interpretable outcomes supported by causal analysis based on observational causal inference methodologies. These outcomes are provided as a recommendation set before the network implementation phase, enabling the customer to validate and understand the machine-generated outputs. If the user wishes to manually validate each action, the app can reintegrate this feedback when generating the network integration scripts. Finally, upon reaching stage six of the operational framework, a comprehensive report is produced showing the per cell/site impact of each implemented action and the overall effect in terms of energy consumption savings, including a monetary estimation based on industry references for price per kWh. The user may also choose to keep the cycle running continuously or execute it as a one-shot operation.

IESO rApp Characteristics

Vendor	Ericsson / NOKIA
RAN Technology	4G / 5G
RAN Infrastructure	Cloud RAN / O-RAN
Category	NW Optimisation

Key Features

- Continuous monitoring of network energy sustainability through ESC computation.
- Identification of sites or a cluster of sites operating in their optimal efficiency region.
- Automated or assisted optimisation through open-loop or closed-loop operation.
- Reduction of energy consumption while maintaining target QoS.

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