2operate

2solve ECO-RAN solution

Facing the power consumption challenge

Energy consumption has become a prime focus for corporate sustainability attention, and is a matter for increasing concern in telecom operations.
With the exponential increase in data traffic and the roll-out of more 4G and 5G frequency bands, power consumption in Radio Access Networks (RANs) requires rapid, effective action.

In 2019, 2operate headed up an R&D project – in collaboration with Aalborg University in Denmark and mobile network infrastructure owner TT-Network – to build and live-test energy optimisation technology in Radio Access Networks, and to address practical, sustainable transitions in mobile telecommunication operations.

CHALLENGES

- Turning off unused capacity during off-peak hours is one of the most effective ways to save energy in network operations.

- But how do you maintain reliable service coverage and high quality of service (QoS) in the network when you're turning off capacity and capabilities?

- Difficult to analyse historical traffic data to establish a baseline forecast to use in power-save planning.

2SOLVE ECO-RAN POWER-SAVING SOLUTION

- An intelligent power-save algorithm that predicts periods of low traffic and identifies unused 4G capacity that can be deactivated in order to reduce energy consumption.

- Algorithms that calculate the most energy-effective order for selecting carriers to go into power-saving mode, based on predictions about network field strengths and interference levels.

- Toolbox of 24-hour power consumption profiles, along with traffic and quality KPIs relevant for power-saving configurations.

MOBILE NETWORK OPERATOR BENEFITS

- An average of 20% of a network's 4G capacity can be switched into power-saving mode during off-peak hours.

- Average daily energy savings amount to 2.0 kWh per site.

- Expected annual savings amount to 75 € per site (based on current Danish electricity prices).

- Aggregated network quality KPIs show no service degradation or anomalies in network quality.

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Results from using the 2solve ECO-RAN solution

In order to monitor the potential energy savings TT-Network – an infrastructure company jointly owned by Telia and Telenor – trialled the 2solve ECO-RAN solution in a cluster of the network featuring 43 sites and 300 4G cells.

Mobile network capacity is normally planned and configured for maximum-load conditions, meaning that the network still consumes a significant amount of energy during off-peak hours. The network being studied already featured certain conventional power-saving mechanisms to automatically put unused 4G network capacity into power-save mode during off-peak hours.

However, 2operate wanted to extend these capabilities much further, moving well beyond existing energy-efficiency benchmarks and solutions, via an AI- and data-driven optimisation solution. Using insights from existing 4G network data, including customer-specific
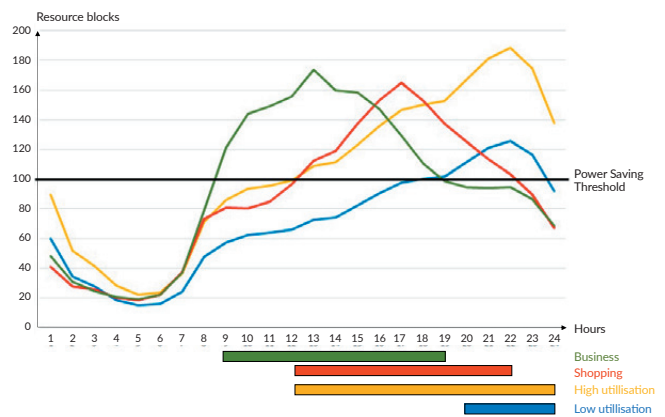
Power-saving schedules for selected traffic profiles.

KPIs, and combining these with business analytics, data mining and data visualisation, the ECO-RAN algorithms leverage business intelligence capabilities to provide performance benchmarks.

Aggregating network performance indicators and end-user Quality of Service values during the trial into advanced report matrixes revealed that the service quality requirements were still fulfilled throughout the trial.

Based on the 43 trialled sites, it was possible to turn off 20% of their 4G capacity (on average) using ECO-RAN power-saving algorithms.

This would normally reduce daily energy consumption by 85 kWh for the cluster as a whole, with a daily average of 2.0 kWh in power reductions per site.

Applying these values to the whole network of 4,300 sites and for a full year, the grand total for potential power savings is estimated to be 3,150.000 kWh/year. With a normal Danish electricity price of around 0.10 €/ kWh, the ECO-RAN power-saving solution would therefore result in a cost reduction of 315,000 €/year for the whole network, or 75 €/year for an individual site.

FACT BOX

Power saving per 4G cell in power-save mode	60W
Average number of cells in power-save mode within cluster	60 cells
Total power saving – 60 cells	3.6 kW
Scale to network size 4300 sites per year	3,150.000 kWh
Average cost per kWh	0.10 €
Annual saving per site	75 €
Annual saving for whole network	315,000 €

Savings when using 2solve ECO-RAN compared to no power saving mechanisms enabled in the mobile network.

> **Given that sustainability and energy efficiency are a priority for our shareholders – Telenor and Telia – we have been delighted to explore the opportunities involved in the 2solve ECO-RAN solution. We now have valuable insights about the energy-saving potential as well as the actions needed to optimise performance and make better, actionable decisions.**

HENRIK BROGAARD, CEO, TT-NETWORK

2operate develops and delivers breakthrough software solutions for mobile and service providers to use in operations-critical configuration, management and fault-findings setups. Our expertise is within the field of OSS incl. Performance Management, Fault Management, Site Configuration Management and Green Energy Solutions.

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