

Tackling the Hot Topic of Global Energy Consumption for Mobile Networks

NEWS RELEASE BY ERICSSON

Northampton, MA | January 20, 2022 09:30 AM Eastern Standard Time



Global energy consumption for mobile networks is a hot topic. Carbon footprint and costs generated by energy use is one of our industry's greatest challenges. As long as the energy mix utilized by the networks is not carbon neutral and comes in part from fossil fuel, mobile network operations will contribute towards the emission of greenhouse gases into the atmosphere. This means that reduced energy consumption through smarter use of mobile networks can have a decreasing effect on greenhouse gas emissions.

If energy consumption continues to increase, then most likely so will energy prices. Either way, there will be higher costs for network operations and the combination will raise total cost of ownership. Addressing energy consumption will take the combined effort of the telecommunications industry. It needs to be considered from every angle, leaving no stone unturned.

An inconvenient truth: for RAN

The first step to solving a problem is accepting that there is one. Which is why our Network Analytics function supports observability of energy consumption across the generations. The main villain of this story is site consumption. Radio access network (RAN) sites account for roughly 85 percent of network consumption with data centers making up the remaining 15. This could increase in the case of cloud RAN.

Ericsson's forthcoming Intelligent Automation Platform will support rApps such as the future Energy Saving Manager. The Energy Saving Manager can take centralized decisions regarding what energy saving features to activate and by what configuration.

Part of the Ericsson philosophy for intelligent RAN automation is to choose centralized versus decentralized control by each specific use case for maximum impact. For improved energy efficiency, centralized control allows holistic decision-making based on analysis of data from multiple sites. This analysis can then be used to create the best local setup to maximize KPIs and performance while reducing energy consumption overall.

Taking things one step further, improved data collection and analysis enables service providers to make active decisions on prioritization. This includes considering if (and how much) negative KPI impact can be allowed to further improve energy savings. This may differ depending on where in the network that energy savings and KPI targets can be achieved and adjusted.

Think globally, act locally: on the node

Saving energy on node level requires the energy-metering feature to support the energy analytics function. MIMO sleep is an efficient feature to maintain user experience while minimizing waste when lower capacity is sufficient. The problem was that it used to require manual configuration which is both time consuming and less efficient. To address the issue, we launched AI-powered MIMO sleep, which automates parameter setting to reduce manual work and improve feature performance (both for KPIs and energy savings) at the node. For more information check out the results from the **PoC**.

Capabilities like AI-powered MIMO sleep mode allows us to make the best of the current paradigm of resource use. The next leap in node energy savings will come from a paradigm shift. Today, resources are by definition 'always on' and powered off or put in low power mode when the traffic situation permits. In the future, we envision a move to an 'always available' paradigm in which resources are dormant until needed. With intelligent predictions they can be activated when they are needed. Using AI-based capabilities, we can perform accurate traffic predictions to further savings while allowing users the same great performance.

The day after tomorrow: an outlook

Looking ahead, we see that Reinforcement Learning (RL) approaches will further improve energy savings and network performance. RL is particularly useful in the type of dynamic, complex, and high-demand environments that constitute mobile networks.

There are multiple ways that RL can be applied to networks in general and energy saving specifically. One example is the two successful trials Ericsson concluded applying reinforcement learning to remote electrical tilt of antennas (RET). At a glance it doesn't seem that complicated but every time you tilt an antenna it changes the shape of the cell the antenna is in. This in turn affects the user experience of those served by that cell and the cells around it, further tilting of surrounding antennas has a cascading effect in the network. This makes it all the more impressive that in a single live network, when optimizing for reduced ERP, Ericsson and the partnering service provider caused a 20 percent decrease in DL transmission power without affecting performance.

RL also presents more opportunities of large-scale and complex orchestration. For example, energy savings could be integrated into traffic control and used to route traffic to the most energy efficient resources in the network. This would allow deep sleep of other resources while the traffic control scheme is active.

If we take a step back and look at the network and its entire lifecycle it is easy to see that we should not only optimize for today and what is already deployed but also take serious account of what should be deployed in the future. Considering what to deploy and where is especially important now that much of the world is in the middle of the 5G rollout.

It is quite simple: smarter, more accurate deployment reduces required hardware and the environmental footprint of the network. The cognitive software suite has multiple features that supports in this. Including capacity planning for traffic forecasting, site selection to determine the best place for deployment, and RF design to optimize the models used for network design. The total impact is an optimized network layout that reduces pressure on both wallet and environment.

Earth hour, every hour

At Ericsson, we know that business can only thrive in a sustainable environment. But, of course, unlike Earth hour, mobile networks cannot be allowed to power off so we must all make sure that we optimize every hour. We take this challenge seriously and provide solutions across mobile networks and their lifecycles. We believe that this benefits us now and future generations.

Reach out if you want to know more about how we can help you reduce your mobile network's carbon footprint and become more energy efficient!

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