Whitepaper

Driving down Operator OPEX - the crucial contribution of ultra-high efficiency RF Power Amplifiers

Issue 1.1

Nujira Limited,
Building 1010,
Cambourne Business Park,
Cambourne,
Cambridge,
United Kingdom
CB23 6DP
Telephone: +44 1223 597900
Fax: +44 1223 597972
E-mail: info@nujira.com

© Nujira Ltd. 2007

Introduction

Operators are continuing to increase the number of 3G base stations around the world to improve both coverage and capacity. This, coupled to recent rises in the price of energy, is increasing the cost of running operators' networks, and driving up OPEX. Operators are very sensitive to OPEX increases since they have a direct impact on their profitability.

Energy usage and environmental impact are now increasingly important parts of the Operator agenda

Operators are now examining their energy usage very closely, not just because of the impact on the bottom line, but also to address legitimate environmental concerns about energy usage.

Many operators such as Vodafone are now taking this matter seriously and setting themselves hard targets for energy savings going forward. For example, Vodafone has announced that it will target a 33% improvement in energy efficiency of new network equipment by March 2008 (compared to the 2006 baseline), and other Operators are also keen to address environmental issues as part of their Corporate Social Responsibility initiatives.

Operators are actively looking at ways of reducing energy usage…

Radio networks normally account for around 80% of the total electricity used by an operator, and so the power consumption of each cell site is coming under intense scrutiny. Many operators have plans to remove air conditioning from cell-sites, or are installing more intelligent controls to minimise the power used for cooling. In addition, operators are looking at turning off selected base stations overnight (this needs to be done carefully to avoid coverage and capacity issues), and reducing the amount of equipment on 'hot standby'.

…. but 3G Base Station power consumption remains a real issue

Current 3G base stations are very power-inefficient due to the (necessary) use of linear RF power amplifiers (PAs) - the PA dominates the power consumption of the base station, accounting for approximately half of the total power used, and generating large amounts of heat.

Early base stations were particularly power-hungry, and although later designs are better there is still considerable room for improvement.

© Nujira Ltd. 2007

On average, we estimate that each fully-loaded 3G cell site using 'traditional' PA technology may require some 3.0 kW of power. For a typical European operator with a network of 20,000 base stations, the total energy consumption is approximately 56 MW (equivalent to a large wind farm) resulting in annual electricity costs of $60M, and annual CO_2 emissions of 220,000 tonnes a year.

The new generation of Node Bs now starting to be deployed have the potential to approximately halve the figures quoted above, but the overall power consumption of 3G radio networks, and their carbon footprint, will remain unacceptably high, and bolder solutions are required.

The solution - ultra high efficiency PAs

A timely solution to the power consumption problem is now becoming available - Nujira's HAT Modulator technology. This can make a significant contribution to the power efficiency of the PA, improving this from the 15% of 'traditional' PAs to 45% and more, together with significant knock-on effects on the overall design of the base station, in many cases allowing cooling fans and air-conditioning systems to be dispensed with, with a consequent improvement in operational and maintenance costs, and equipment reliability.

Nujira's technology can reduce network energy consumption by 50% compared with the technology in use today. Again, for a typical European operator with a network of 20,000 base stations, adopting Nujira's technology could save:

- ***28 MW power consumption***
- ***$ 30M annual electricity costs***
- ***110,000 tonnes annual CO2 emissions***

Figure 1 shows the potential savings in OPEX costs that are possible using the Nujira technology, scaled by network size and electricity costs, compared with currently-deployed technology - with the savings become ever more significant as the cost of energy rises:

© Nujira Ltd. 2007

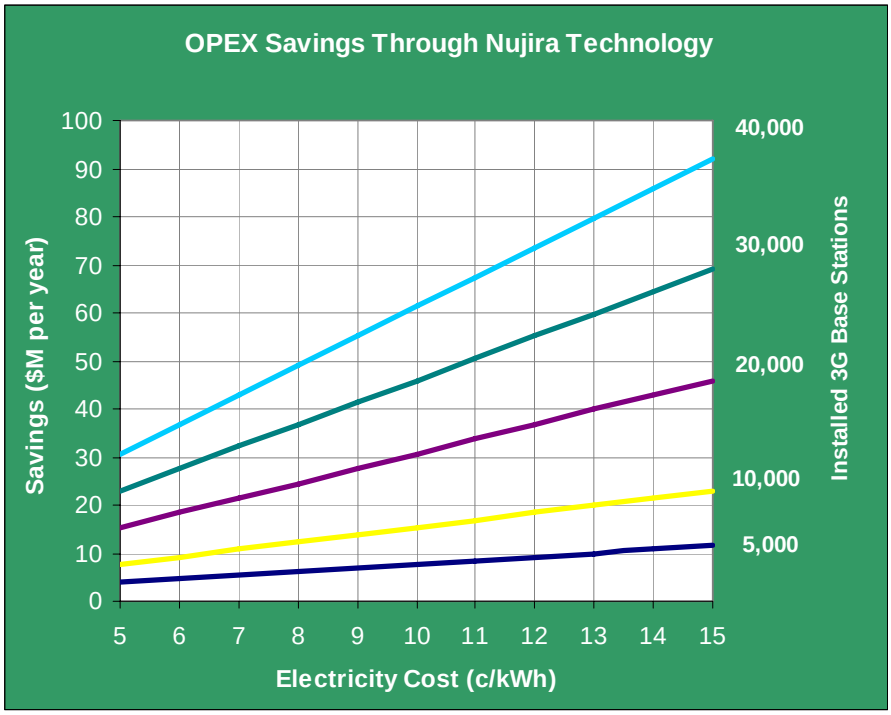

Figure 1: OPEX savings through use of Nujira Technology

In Summary

As the 3G networks continue to grow to support customer demand for high-speed, 'always-on' connectivity, so does the energy used to run the networks. Operators are very keen to reduce OPEX costs and reduce their environmental impact, for good business reasons.

It's important that every opportunity is taken to adopt new technologies which offer the possibility of reducing energy usage, and Nujira, with it's HAT technology, expects to play a large part in helping to solve the problem.

For more information, please visit nujira.com.

© Nujira Ltd. 2007