For the sake of Fire and Ice

By Zhao Yuan

Iceland's eco concerns

Of the world's over 190 countries, Iceland not only boasts a unique and ultra-diverse natural landscape, but it is also the world's fourth most productive nation per capita. Situated to the north-west of the United Kingdom, this beautiful land of fire and ice resides on a plateau of mountains, glaciers, and sand fields. Iceland is enriched by its hot springs, geysers, active volcanoes, ice caps, snowfields, tundra, and waterfalls. Iceland's income, social cohesion, and literacy reflect extremely high living standards. Unsurprisingly, its environmental record is exemplary, and Reykjavík, the most northerly national capital in the world, is remarkably smoke-free.

Nevertheless, Iceland's inherent natural advantages belie a future that is not necessarily optimistic. A recent report released by the Icelandic Ministry for the Environment reveals that global warming is melting Iceland's glaciers faster than ever before; it is estimated that they will have vanished completely by the next century. Vatnajökull, which is located in the southeast, is Europe's largest glacier. It covers 8,000 square kilometers and boasts a maximum thickness of 900 meters. However, this vast mass of ice is receding at 1 meter per year, and this rate is accelerating.

Global warming is therefore a key Icelandic concern. While the nation's BTSs operate 24/7 to facilitate modern communication needs, the mobile field is facing increasing pressure to conserve energy and look towards to sustainable development. As such, Iceland's leading mobile operator, Vodafone Iceland, made the commitment to upgrade its GSM network to a green mobile network, which helps to harmonize the natural and technological worlds.

Pioneer in fulfilling eco-commitments

Vodafone Iceland sprang from three local telecom companies and began to take shape in 2005. Iceland has a population of around 305,000, and Vodafone Iceland dominates the nation's mobile

market with a total subscriber base of roughly 120,000. However, despite its success, the company found itself in an unsustainable position prior to network overhaul: its 1997 network was aging rapidly, performance was outpaced by user demands, the complex network structure inhibited maintenance, and OPEX was elevated by high labor costs and inefficient energy consumption. Coupled with global warming, Vodafone Iceland had to make a decisive commitment to realizing an energy-efficient, sustainable network.

In May 2007, it selected Huawei to upgrade and optimize its network. In a scheme that required meticulous planning and design, Huawei's future-oriented, energy-efficient solution involved replacing the legacy network BTSs with its green BTSs.

Huawei green BTS utilizes the most advanced broadband power amplification (PA) technology and PA chips to achieve energy and emission reduction. The peaks and lulls in mobile traffic are accommodated by PA chips, which reduce static power consumption by over 60% during idle times. The new generation PA technology achieves a PA efficiency exceeding 45%. This not only beats the typical 40% common PA technology in Iceland's S4/4/4 sites, but the new PA technology also greatly reduces heat generation. Moreover, the direct ventilation and natural cooling mechanisms realize an eco-friendly heat dissipation system that is far superior to traditional air conditioners and heat-exchange cooling systems.

The power consumption of the green BTS is around 950W, which is 40% less than the standard 1600W. Thus, each BTS saves at least 5700kWh electricity annually. For Vodafone Iceland's 500 outdoor BTSs, 900,000 liters of diesel fuel are saved each year. Not only is the OPEX is dramatically reduced, but also the environment benefits from energy savings and emission reductions.

In addition, the Huawei green BTS is of high-density, which allows a single module to support four to six carriers. The new BTS is smaller and lighter than the legacy BTS, which reduces requirements on auxiliary equipment, but delivers the same capacity. Huawei successfully reused Vodafone Iceland's sites, which protected the latter's previous investment and shortened the cycle from network planning to commercial deployment to six weeks. Dramatic savings were also made in terms of both labor and material costs.

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According to ABI Research, network optimization is the key to realizing optimum energy utilization, under which meaningful advances in energy conservation and emission reductions can be made.

Considering Iceland's special geographical features, Huawei proposed solutions for realizing offshore communications and expanding offshore coverage to up to 120km. Through the dual timeslot cell expansion solution and by combining the power boost technology (PBT), transmit diversity, and the 4-way receiver, the system enhances both downlink gains and receive sensitivity, thus maintaining the uplink/downlink balance. Huawei engineers selected high altitude locations for antenna installation to widen offshore coverage and to reduce relative site numbers by 30%.

Given its long coastline and relatively cold temperatures, Iceland is subject to salty sea winds that can easily shorten a BTS's service life through erosion. Thus, network BTSs are required to be water, salt, and mildew resistant. Huawei green BTS operates normally between -40°C to 50°C, and is fully adaptable to Iceland's unique natural environment.

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With the implementation of the Huawei green BTS and its eco-commitment, Vodafone Iceland can genuinely be considered a pioneer in environmental protection. Inspired by its example, it is likely that other operators will follow suit. If Iceland's glaciers are to carve the eternal existence their majesty warrants, the efforts of all are necessary.

Vodafone's green dream

Besides optimizing its networks through green base stations, Vodafone Iceland is striving to share the network with other operators to further reduce the number of BTSs in Iceland. At the end of 2007, the Huawei-constructed 3G network was put into operation and it is shared by Vodafone Iceland and Nova. This enables that the number of BTSs is 30% less in Iceland, while both Vodafone Iceland and Nova benefit from reduced TCO.

The whole Vodafone Group has adopted environmental protection as a core responsibility. In its *Social Responsibility Report*, the corporation makes a detailed commitment to environmental protection. It has pledged that its CO_2 emissions will be cut by 40% and 50% respectively by 2011 and 2020. In fact, by optimizing and updating network equipment over the past few years, Vodafone has already cut its mobile network emissions by 12%. Vodafone will continue to adopt high-density BTSs and advanced technologies to update its networks and share resources with other operators. On the road to green communications, Vodafone has never stopped moving forward.

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