The business case for 800GE routing in the age of sustainability

A study by Nokia Bell Labs consultancy

Executive summary

The worldwide growth in web traffic is relentless, with the amount of data sent over the internet increasing by an average of 30% each year.

All that traffic adds up to skyrocketing energy consumption and carbon emissions from IP networks under tremendous pressure to add more network links. Because most routers max out at 400 Gigabit Ethernet (GE) speeds, however, their network footprints quickly become swollen as additional interface ports and line cards consume more rack space and energy.

A more sustainable way to grow: 800GE routing

That's set to change with the introduction of 800GE routing, which allows network operators to build faster and more scalable networks without increasing their network footprint. 800GE routing uses faster and more efficient silicon and optics so networks can move more traffic for less energy per bit without adding more interfaces.

800GE routing achieves such speed and efficiency by leveraging next-generation, higher-density 7 nm routing silicon such as Nokia's FP5 network processor. FP5 supports the 112Gb/s SerDes electrical signaling interfaces required by 800G QSFP-DD pluggable transceivers, allowing the integration of packet processing, traffic management, high-bandwidth memories, and switch fabric interfaces in a single system on a chip (SoC).

Routing silicon drives the capacity, density, and energy consumption of IP switching fabric, line cards, and interface optics, making it a key contributor to several efficiency improvements:

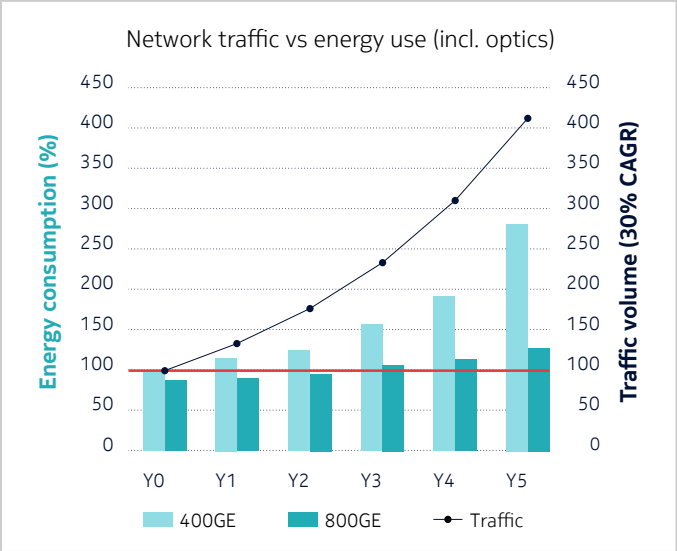
- Takes up 70% less space than the 16nm FP4 chipset
- Delivers almost 4x more line rate traffic capacity per line card
- Consumes 75% less energy per bit (excluding interface optics)

FP5 hardware also provides greater flexibility because it allows operators to initially deploy 100GE and 400GE optics and upgrade to 800GE later to efficiently accommodate future traffic growth.

400GE vs. 800GE: A detailed comparison

To illustrate these gains, Nokia Bell Labs Consulting conducted a detailed comparison of the scaling properties of 400GE and 800GE routing solutions over a five-year period, with an annual cumulative traffic growth of 30%. The study was based on a reference edge and core network encompassing low- and high-density access aggregation using Nokia service routing platforms.

Figure 1. Comparing energy effciency of 400GE and 800 GE routing



Key takeaways of the study included:

- Nokia 800GE routing solutions offer up to 4x more capacity than 400GE routers with the same resource footprint
- Upgrading existing 400GE routing platforms to 800GE routing platforms powered by FP5 silicon resulted in energy savings of up to 55% by the fifth year
- Using 800GE optics saves an average of 30% in energy consumed by router optics, and reduces managed link connections by up to 47% compared to 400GE optics

While the study didn't quantify the operational savings of operating a faster IP network with fewer link connections, these are likely proportional to the reduced number of managed objects. Using faster 800GE links also reduces packet latency and gives more headroom for traffic peaks and future growth.

Get the white paper to learn more about 800GE routing

Learn more about how the digital world can grow more sustainably in Nokia's latest white paper on the case for 800GE routing. The white paper provides more granular detail on the five-year study by Nokia Bell Labs Consulting, including a deep dive on the reference network's topology, platform choices, system configurations, and traffic growth assumptions.

For a copy of the white paper, please contact your Nokia sales representative.

About Nokia

At Nokia, we create technology that helps the world act together.

As a B2B technology innovation leader, we are pioneering networks that sense, think and act by leveraging our work across mobile, fixed and cloud networks. In addition, we create value with intellectual property and long-term research, led by the award-winning Nokia Bell Labs.

Service providers, enterprises and partners worldwide trust Nokia to deliver secure, reliable and sustainable networks today – and work with us to create the digital services and applications of the future.

Nokia OYJ
Karakaari 7
02610 Espoo
Finland
Tel. +358 (0) 10 44 88 000

Document code: (April) CID213266