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Green digitalisation

System

Connectivity demands, energy-efficiency targets

Skills/access to talent; standardisation system issues; public support

External partners (e.g., 25GS-PON Multisource Agreement)

Enabler of follow-on innovation

On-going worldwide

Challenges need to be addressed

The need for speed

In the digital world, speed is key

Connectivity underpins 21st century industry. It makes it easier for energy grids to include more renewables. It allows factories to increase productivity and virtually eliminate waste. It ensures logistics hubs can send the right things to the right people without delay. And it allows globally distributed workforces to collaborate as smoothly as they would if they were sitting next to each other.

But it's all predicated on speed.

If connections are slow, all those benefits are lost. Cloud-based services, file transfers and even basic communication will all struggle.

With that in mind, it's essential that communities and businesses have access to reliable and fast connectivity – both mobile (for example through 5G) and fixed (through physical cables).

Optical fibre is part of the answer. 25 Gigabit-per-second speed passive optical network (25GPON) is the fastest commercially available fibre access technology, based on Nokia's "Quillion" chipset and developed largely within the EU. 25GPON not only provides higher density and throughput – it also offers power savings of more than 50%, compared to the previous generation of fibre solutions.

As always, better performance unlocks new use cases. 25GPON provides the technical foundation for immersive metaverses, smart city applications and Virtual Reality home entertainment devices.

Factors for success

The successful development of 25GPON began with a clear commitment to R&D. Nokia's leadership is anchored in a well-defined portfolio strategy with a clear vision forward, a stated interest in pioneering a more sustainable future, and significant investment into new technologies. All these were essential.

Software and cross-domain expertise were also critical in driving the 25GPON innovation process. This expertise reflects the multi-party and software-defined reality of next generation networks. It also allowed our engineers to ensure 25GPON being an integral part of software-defined access network evolution and novel use cases.

Collaboration was another enabler of success. This was not only true for the pre-competitive research often supported by EU public funding (such as within the scope of H2020 and Celtic/Eureka) but for all stages up to and including deployment.

Finally, innovation is not insulated from the need to display return-on-investment and sustainable operational excellence. 25GPON has proven to be a powerful solution for a variety of telecoms challenges. As a result, Nokia's research division, Nokia Bell Labs, has already begun exploratory work on 100GPON. Commercialisation stimulates innovation.

Where Europe has to think and invest more strategically

The 25GPON development experience offers a number of lessons learned.

First, the two important building blocks of the 25GPON solution are leading edge chipset technology and System-on-Chip solutions. In order for Europe to secure technology leadership, we need more people with high-level skills in chip design and hardware/software co-design, as well as associated intellectual property expertise. Today those skills are scarce in Europe – if we want to grow (even maintain) our capacities we urgently need to grow chip design talent.

Second, the 25GPON solution faced standardisation-related challenges. Issues of complexity and geo-political bias in international standardisation processes need to be addressed to ensure innovations are not delayed in reaching the market. That said, standardisation should remain private sector-led and Europe needs to further increase the attractiveness of European standardisation.

Third, both coherent political goals and public support for R&D in relevant areas are necessary to maintain and grow a strong European R&D capability. We should continuously assess which relevant technology areas require support and how Europe is progressing in comparison with other regions. Given the society-wide uses and implications of connectivity, we should also consider the role of the public sector, including government agencies, in the innovation ecosystem: where might they add value as early adopters of future PON technologies?

Fourth, the EU Taxonomy provides a classification system for environmentally sustainable economic activities and is designed to channel public financial support and private investment accordingly. At present the taxonomy's approach is too narrow. Advanced telecom connectivity such as fibre and 5G networks should be included in the EU Taxonomy framework as soon as possible. This should be obvious: connectivity possesses a unique ability to support net zero emission targets across almost all sectors of the economy, including in energy intensive industries important for Europe such as chemicals, steel and cement.