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illuminating Sustainability: The Future of Optical Networks

Thursday, May 21st, 2026, 10:30-12:30

“Key directions for In-building Sustainable Optical Networks”

Dominique Chiaroni, *Optical Network Expert, Nokia Bell Labs, France*

The optical technology played a fundamental role in optical transmission systems and in the proposal of optical networks, for the core and for the access. The evolution of the market pushes industrials to identify new optical networks for verticals, defense and data centers. In this presentation we will describe the context and the sustainable approach we need to adopt for the design of future products. Then we will describe optical technologies that have a high potential to address the market segments listed. Finally, we will do a zoom on new optical technologies for in-buildings offering a photonic continuity up to the end-user, and offering a pragmatic design in line with the constraints of a sustainable approach. Some results will be shown and discussed. At the end of the presentation, a conclusion will be drawn and new challenges will be identified.



Dominique Chiaroni is graduated in Mechanics (IUT d'Aix-en-Provence), in Thermal Sciences & Physics (Bachelor and Master from the University of Corsica), and in Optics and Microwaves (Engineer degree obtained in 1990 from Telecom SudParis). He was engaged in 1990 by Alcatel CIT to work on optical switching technologies. Mainly focused on the study of innovative and eco-designed optical systems and networks, he is currently working in the Nokia Bell Labs Core Research team and involved in different projects dealing with Green Technologies since 2005 and more recently on the sustainable design of future optical solutions. He received several internal and external awards. Associate professor at Polytech and at the Institute Polytechnic of Paris, he is author and co-author of more than 200 publications and patents including numerous invited Papers, Tutorials, and contributions in Books.

“Toward sustainable data transmission: Environmental impact of a fixed telecommunication network in Sweden 2024”

Gudrun Gudmundsdottir, *PhD Researcher, Technical University of Denmark (DTU)*

High-speed connectivity has become a central part of human civilisation in many parts of the world. In 2025, it is estimated that 5.5 billion people are connected to the internet, meaning that 1/3 of the human population is yet unconnected and the individual usage is expanding year-over-year. Additionally, the services provided have been heralded as one part of the solution toward a more sustainable future, making the understanding of the environmental impact of the telecommunication services increasingly valuable. The study investigates the life cycle emissions from a fixed optical telecommunication network in Sweden using data obtained via a partnership with a network operator in Sweden and emission factors data derived from industry. The life cycle assessment covers five environmental impact categories among which resource usage is found to have the highest scores when compared to society's background loads. The network infrastructure cannot be considered environmentally sustainable in absolute terms due to three impact categories. Lastly, equations are presented for how network operators can allocate emissions to their services and customers.



Gudrun Gudmundsdottir is a PhD researcher at the Technical University of Denmark (DTU). Her research currently spans the environmental assessment of fixed and mobile telecommunication networks in Scandinavia with a focus on Absolute Environmental Sustainability. Before which she has created an autonomous carbon calculator for customer premise equipment and data centers focusing on sharing emissions with customers of telecom services. Her experience working in the ICT industry influences her view which is focused on scientifically valid and applicable solutions.

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