

Press Release – 26 October 2018

DKK 100 million for faster, greener Internet

Internet traffic has risen a thousand-fold since 2000 and currently accounts for around 10 per cent of the world's electricity consumption. This is a trend that is set to increase. There is therefore a great need for new infrastructure offering energy-efficient broadband solutions, and a new Grand Solutions project with funding from Innovation Fund Denmark now aims to consolidate Denmark's leading position in this field.

The Internet is like a network of bicycle paths, roads, and highways, within which data moves around independently. Given that the quantity of data increases by above 25 per cent per year, without the infrastructure being correspondingly expanded, it is not hard to imagine that congestion quickly occurs.

With the rise of the Internet of Things, Industry 4.0, and the rapidly growing number of online applications such as medical diagnostics, self-driving vehicles, and cloud services, Internet traffic—and hence the huge energy consumption required to drive it—will only continue upwards.

We have gone from simple communication that connected homes via landline phones, to powerful mobile devices that connect people on the move with voice and data, to now connecting *things* in an Internet of Things, where devices and machines communicate with each other. This component is growing by over 30 per cent annually, and more than 20 billion devices are expected to be connected in 2020. All this communication also takes place via the Internet.

This requires massive amounts of energy, and we will soon run out of space on the infrastructure and security is an increasingly important focus area. New technology is therefore essential.

A new three-year, DKK 100 million Grand Solutions project, which is receiving DKK 60 million from Innovation Fund Denmark, is bringing together DTU, Aarhus University, and twelve Danish companies. The project is called INCOM and aims to create new solutions for the next generation of communications infrastructure. The project also involves more than 15 associate partners, most of which come from the industry.

“Probably very few people realise that all the wireless connections we use so much today are only wireless for the first short segment. The traffic is then carried in optical cable connections across countries and oceans. This is where INCOM comes in, because the world has an urgent need to make these connections more powerful and greener,” says Professor Leif Katsuo Oxenløwe from DTU Fotonik, the man who conceived the new Innovation Fund Denmark project.

The hubs of the information age are data centres, connected by intercontinental optical cables that transmit information from machine to machine and person to person at high speed. In just 30 years, half of the world's population has been connected to the Internet.

However, this advance has not come without a huge energy bill. Global communications consume so much energy that they account for more than 2 per cent of all man-made CO₂ emissions, and data traffic is rising by more than 25 per cent annually. The key requirements for the new infrastructure are therefore to provide much greater capacity with significantly lower energy consumption. Greater reliability, minimal delays, and better security are also important.

INCOM will make it possible to reduce the number of light sources driving the Internet by refining a ‘frequency comb’, allowing a single laser to replace hundreds. This will lead to major power savings across

the entire network and in the data centres, while also allowing higher data speeds of more than 400 Gbit/s. INCOM is also working to integrate light circuits on a chip, significantly reducing the cost and power consumption, as this allows much of the signal processing which is currently done electronically to be done directly in the optical domain. The energy consumed to convert between light and electricity will be completely removed.

“Over the last few years we have established Aarhus University as a centre for photonic integration that connects Danish end users with European tech platforms. Together with our project partners, we will bring this technology closer to the market. The INCOM project will also investigate and implement simple new energy-efficient and scalable end-to-end security schemes across the IoT infrastructure,” says Associate Professor Martijn Heck from the Department of Engineering at Aarhus University.

The combined effect of stable Danish society and a strong infrastructure for telecommunications, data and green energy is attracting large data centres and an increasing number of high-capacity intercontinental submarine cables. To maintain a strong Danish position and grow in this very competitive market requires a major effort and some risk taking. This is especially true in industries that need to be able to take early innovative solutions from the universities and bring them to the market in the form of new products and services.

The need to build new infrastructure with energy-efficient broadband solutions offers great opportunities. Danish universities have extensive expertise in the right technical areas, and Danish companies are ready to take the new technologies and bring them to the world market. INCOM aims to make this possible and thereby create growth in the industry. Within five years after completing a successful INCOM project, each of the participating companies therefore expects to increase their annual revenue from a few to several hundred million Danish kroner, and to add around 100 jobs combined.

"New technology help us solve a lot of specific challenges and create a better society, but also requires large amounts of energy. This is an exciting project, as it is crucial that we make the digital infrastructure more energy efficient," says Danish Minister for Higher Education and Science, Tommy Ahlers.

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Project title: INCOM—Innovative Solutions for Next Generation Communications Infrastructure

Investment from Innovation Fund Denmark: DKK 60 million

Total project budget: DKK 100 million

Duration of the project: 3 years

Partners (alphabetically): Accelink Denmark, Bifrost Communication, Chocolate Cloud, Comcores, Danish Optical Fiber Innovation, Develco Products, DTU, Mellanox Technologies Denmark, Napatech, NKT Photonics, OFS Fitel Denmark, Telia Danmark, Zeuxion, Aarhus University.

Website: <http://www.incom.dtu.dk/>