Researchers send data 4.5 million times faster than average broadband

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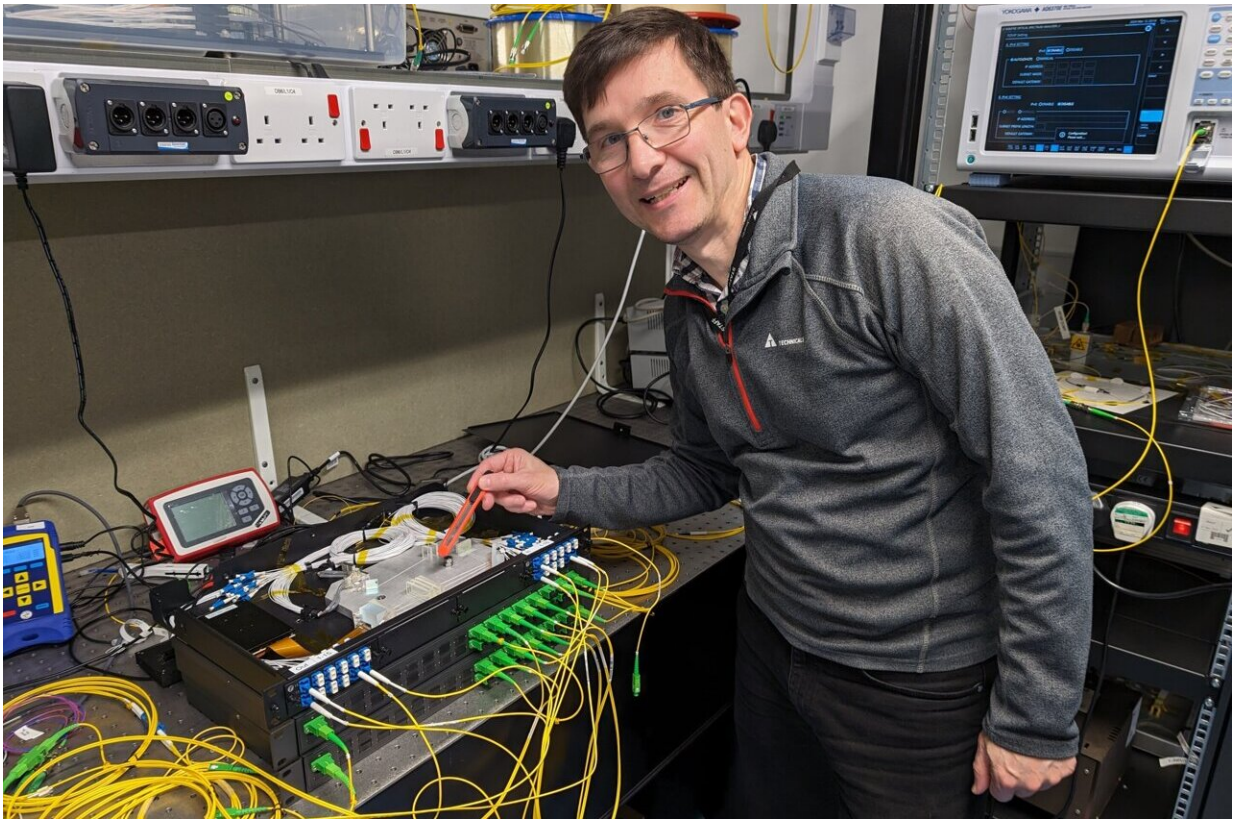

Dr. Ian Phillips with the wavelength management device. Credit: Dr. Ian Phillips

Aston University researchers have sent data at a speed that is 4.5 million times faster than the average home broadband. The rate is the fastest ever sent by opening up specific new wavelength bands that are not yet

used in fiber optic systems.

As part of an international collaboration, the academics transferred data at a rate of 301 terabits or 301,000,000 megabits per second, using a single, standard optical fiber.

That's compared to Ofcom's UK home broadband performance report published in September 2023, which stated that the average broadband speed is just 69.4 Mbit/s megabits per second.

Professor Wladek Forysiak from Aston Institute of Photonic Technologies and Dr. Ian Phillips were part of the team that successfully transmitted the data. They worked in collaboration with researchers from the National Institute of Information and Communications Technology (NICT) in Japan and Nokia Bell Labs in the U.S.

As the demand for more data increases, it is expected the newly developed technology will help keep up with future demand. The scientists used optical fibers, small tubular strands of glass that pass information using light. Regular copper cables can't carry data at such speeds.

The feat was achieved by opening up new wavelength bands that are not yet used in fiber optic systems. Different wavelength bands are equivalent to different colors of light being transmitted down the optical fiber.

They did this by developing new devices called optical amplifiers and optical gain equalizers to access them.

Dr. Phillips led the development of a management device, or optical processor, at Aston University. He said "Broadly speaking, data was sent via an optical fiber like a home or office internet connection."

"However, alongside the commercially available C and L-bands, we used two additional spectral bands called E-band and S-band. Such bands traditionally haven't been required because the C- and L-bands could deliver the required capacity to meet consumer needs."

"Over the last few years, Aston University has been developing optical amplifiers that operate in the E-band, which sits adjacent to the C-band in the electromagnetic spectrum but is about three times wider. Before the development of our device, no one had been able to emulate the E-band channels in a controlled way properly."

Professor Forysiak added, "By increasing transmission capacity in the backbone network, our experiment could lead to vastly improved connections for end users."

"This groundbreaking accomplishment highlights the crucial role of advancing optical fiber technology in revolutionizing communication networks for faster and more reliable data transmission."

"Growing system capacity by using more of the available spectrum—not just the conventional C-band but also other bands such as the L, S, and now E-bands can help to keep the cost of providing this bandwidth down."

"It is also a 'greener solution' than deploying more, newer fibers and cables since it makes greater use of the existing deployed fiber network, increasing its capacity to carry data and prolonging its useful life & commercial value."

The results of the experiment were published this month by the Institute of Engineering and Technology and were presented as a post-deadline paper at the European Conference on Optical Communication (ECOC) held in Glasgow, October 2023.

Provided by Aston University