A new SPIDER for the web

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This new 'SPIDER chip' is much more efficient than the current technology powering the internet.

(PhysOrg.com) -- A revolutionary new chip that uses little energy and operates at ultrafast speeds for telecommunications and computing is set to replace the power-hungry, expensive and bulky equipment that currently resides at the core of the internet.

Developed by an international team led by University of Sydney physicist Associate Professor David Moss, the chip uses technology called Spectral Phase Interferometry for Direct Electric-Field Reconstruction, or SPIDER.

The internet uses high-speed signals that exploit the coherence of light to

transmit information. Until now it has only been possible to accurately measure the intensity and phase of optical pulses with bulky and expensive laboratory equipment.

"The ability to monitor and characterise these signals has, until now, been restricted to optical laboratories," explains Moss, a 2011 Eureka Prize finalist in the category Innovations in Computer Science.

"Using the SPIDER technology, applications such as telecommunications, high-precision broadband sensing and spectroscopy, metrology, molecular fingerprinting, optical clocks, and even attosecond physics, are all set for a major speed upgrade," he says.

In addition to using the SPIDER technology, the chip not only integrates with silicon computer chips, it is fabricated using the same methods as silicon chips, making it ideal for a wide range of applications.

Associate Professor Moss says the 'SPIDER chip' will give all parts of the internet, from long distance fibre-optic networks to silicon routing chips, the ability to measure state-of-the-art signals where the phase of light is used to encode information.

Professor David Moss is a senior researcher with the ARC Centre of Excellence CUDOS and the Institute of Photonics and Optical Science (IPOS) based within the School of Physics at the University of Sydney.

A paper, 'Sub-picosecond phase-sensitive optical pulse characterization on a chip', will be published in Nature Photonics in August 2011.

Provided by University of Sydney

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