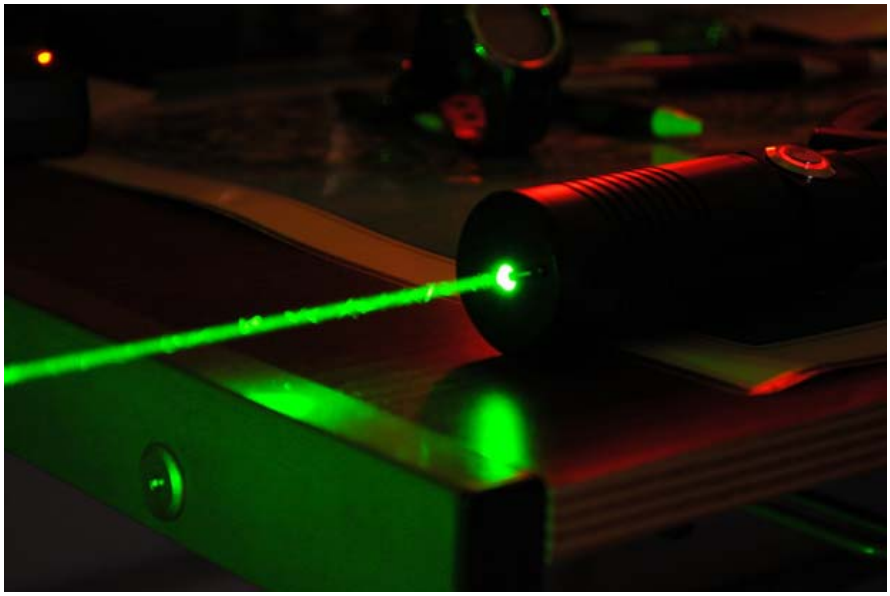
Physicists push 26 terabits per second down a laserbeam

By Mark Brown (/search/author/Mark+Brown) | 23 May 11 (Mon, 23 May 2011 13:00:48 +01:00)



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Physicists at the Karlsruhe Institute of Technology (http://www.kit.edu/english/) have clocked a new record for extreme download speeds, pushing (http://www.nature.com/nphoton/press_releases/nphoton0511.html) an incredible 26 terabits of data per second through a single laser beam.

26 terabits is roughly 3,300 gigabytes, which is the equivalent of about 132 Blu-Ray discs or 700 DVDs. The team beat out its own record, set when it achieved a download speed (http://www.wired.co.uk/news/archive/2011-05/18/jeremy-hunt-sewage-system) of 10 terabits per second in 2010.

Researchers have certainly gone faster before: Japanese physicists have whizzed 100 terabits per second down an optical fibre. But they used over 300 lasers, which would make infrastructure and power costs impossibly high if it were rolled out commercially.

Instead, KIT's Jürg Leuthold wants to achieve incredible speeds with just a single laser. To achieve this feat, Leuthold used the orthogonal frequency-division multiplexing (http://en.wikipedia.org/wiki/Orthogonal_frequency-division_multiplexing) principle (OFDM) to send, receive and process high-bit-rate data in a real-time manner.

Here's how it works (http://www.kit.edu/besuchen/pi_2011_6977.php), in the simplest explanation possible in 50 words.

On one end, a laser beam generates about 325 optical frequencies (as in subtly different colours of light), which are woven together into a single laser beam. On the other end, a receiver reverses the process and reads the different frequencies, and the times they arrive, to decode the data.

OFDM is used already in applications like European telephone lines, wireless

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LAN and digital radio (http://www.wired.co.uk/news/archive/2010-05/20/bbc-now-streaming-live-radio-to-phones). The team's new process extracts the data optically, rather than mathematically, to achieve such impressive speeds.

The technology could be used to help meet our ever-increasing demands for internet speeds and high-bandwidth communication, but also provide broadband in an environmentally friendly way, or for energy-poor environments. The technique doesn't rely on excess resources to power, since energy is only needed for the laser (http://www.wired.co.uk/news/archive/2011-04/11/navy-laser-sets-ship-on-fire) and a few decoding steps.

The full technique is described in the journal *Nature Photonics*.

Image Credit: flickr/High Power Green Laser, Dark Background (1) by FastLizard4 (http://www.flickr.com/photos/fastlizard4/5391914387/)

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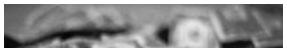

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