NEW LASER PROMISES TO MAKE INTERNET FASTER

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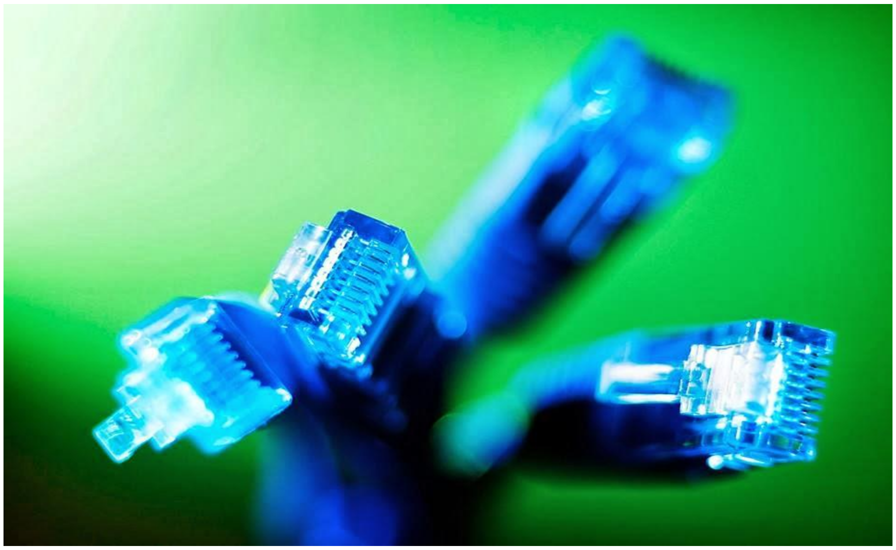
WASHINGTON: Scientists have developed a new laser that holds the potential to increase by orders of magnitude the rate of data transmission in the optical-fibre network - the backbone of the internet.

The laser is the result of a five-year effort by researchers at the California Institute of Technology (Caltech).

Light is capable of carrying vast amounts of information - approximately 10,000 times more bandwidth than microwaves, the earlier carrier of long-distance communications.

To utilize this potential, the laser light needs to be as spectrally pure - as close to a single frequency - as possible. The purer the tone, the more information it can carry, and researchers have been trying to develop a laser that comes as close as possible to emitting just one frequency.

Today's worldwide optical-fibre network is still powered by a laser known as the distributed-feedback semiconductor (S-DFB) laser, developed in mid-1970s, researchers said.



The S-DFB laser's unusual longevity in optical communications stemmed from its, at the time, unparallelled spectral purity - the degree to which the light emitted matched a single frequency.

The S-DFB laser managed to attain such purity by using a nanoscale corrugation within the laser's structure that acts like a filter.

Although the old S-DFB laser had a successful 40-year run in optical communications, the spectral purity, or coherence, of the laser no longer satisfies the ever-increasing demand for bandwidth, researchers said.

The old S-DFB laser consists of continuous crystalline layers of materials called III-V semiconductors - typically gallium arsenide and indium phosphide - that convert into light the applied electrical current flowing through the structure.

Since III-V semiconductors are also strong light absorbers - and this absorption leads to a degradation of spectral purity - the researchers sought a different solution for the new laser.

The high-coherence new laser still converts current to light using the III-V material, but in a fundamental departure from the S-DFB laser, it stores the light in a layer of silicon, which does not absorb light.

Spatial patterning of this silicon layer - a variant of the corrugated surface of the S-DFB laser - causes the silicon to act as a light concentrator, pulling the newly generated light away from the light-absorbing III-V material and into the near absorption-free silicon.

This newly achieved high spectral purity - a 20 times narrower range of frequencies than possible with the S-DFB laser - could be especially important for the future of fibre-optic communications, researchers said.

Source: http://todayscircuits.blogspot.com/2014/02/tc-news-new-laser-promises-to-make.html#.VUCEKSGqqko