Li-Fi

Future Mobile Applications by Light

Professor Harald Haas
http://www.eng.ed.ac.uk/drupal/hxh

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Li-Fi in the Press…

- Li-Fi: TED Online video watched more than 1.4 million times
- TIME Magazine listed among “50 best inventions in 2011”
- Shortlisted for World Technology Award, New York, 2011
- Spin-off company, pureLiFi Ltd
... radio spectrum shortage

Global Mobile Data Traffic

How Efficiently We Use RF Spectrum

Spectral Efficiency Gains are Slowing

Source: Cisco VNI Mobile, 2012

Source: Qualcomm
A Real Wireless report recently hit the national headlines in the UK predicting that the UK’s mobile and Wi-Fi networks will be unable to cope with demand for data by 2020.

The report is now available to download from our website.
The electromagnetic spectrum

Frequency / Hz

0 3×10^{10} 3×10^{11} 4×10^{14} 7.9×10^{14} 3×10^{16} 3×10^{19}

HF VHF UHF SHF EHF THz IR Visible Ultraviolet X-rays Gamma Rays

× ~10,000
'Li-fi' via LED light bulb data speed breakthrough

By Matthew Wall
Technology reporter, BBC News

UK researchers say they have achieved data transmission speeds of 10Gbit/s via "li-fi" - wireless internet connectivity using light.

The researchers used a micro-LED light bulb to transmit 3.5Gbit/s via each of the three primary colours - red, green, blue - that make up white light.

This means over 10Gbit/s is possible.

Li-fi is an emerging technology that could see specialised LED lights bulbs providing low-cost wireless internet connectivity almost everywhere.

High speed
State-of-the-Art: Wi-Fi
State-of-the-Art: Wi-Fi

Wi-Fi Routers
Optical Attocell Network

- Existing infrastructure
- Energy efficiency

x 1000
Security
Dense environments
Cellular communications
EMI sensitive environments
Augmented reality
Advertising
Underwater communication
Intelligent transportation systems
Smart homes
Indoor navigation
... Li-Fi Outlook

- Emerging technology
- Potential to create new industry:
  - “Future cellular communications”
  - “Smart homes”,
  - “Smart cities”,
  - “Smart environments”,
  - “Internet-of-Things”. 