

Researchers achieve fastest real-world fiber speeds of 1.4Tb/s

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Alcatel-Lucent and BT have today announced trial speeds of up to 1.4Tb/s with a record spectral efficiency of 5.7 bits per second per Hertz (b/s/Hz) on an existing core fiber connection. This is believed to be the fastest speed ever achieved in commercial grade hardware in a real-world environment and is equivalent to transmitting 44 uncompressed HD films in a single second.

The field trial, conducted over an existing fiber link between the BT Tower in London and BT's Adastral Park research campus in Suffolk, used a new 'flexible grid' infrastructure (Flexgrid) to vary the gaps between [transmission channels](#), usually set at 50Gigahertz (GHz). By increasing the density of channels on the fiber, this approach achieved up to 42.5 percent greater data transmission efficiency compared to today's standard networks.

The trial demonstrated that use of the Flexgrid approach can increase BT's core network capacity using existing optical fibers, potentially reducing the expense of laying more fiber as bandwidth demands grow. This could allow BT to more easily scale its core network capacity to meet consumer and business demands for more bandwidth-hungry services such as streaming video, whilst more efficiently using its existing core fiber infrastructure.

The trial was conducted through the overlaying of an "Alien Super Channel" comprised of seven 200 Gigabits per second (Gb/s) channels bundled together to provide a combined capacity of 1.4Tb/s. By

reducing the spectral spacing between the channels from 50GHz to 35GHz using the 400Gb/s Photonic Services Engine (PSE) technology on the 1830 Photonic Service Switch (PSS), spectral efficiency is enhanced by almost 43%. The 1830 PSS can be used as an optical extension shelf of the 7750 Service Router (SR) and the 7950 Extensible Routing System (XRS). Flexgrid is the key to creating high-capacity, spectrally efficient super channels. The super channel is "alien" because it operates transparently on top of BT's existing optical network.

Key Facts:

- During October and November of 2013, BT and Alcatel-Lucent successfully demonstrated a number of world-leading high-speed alien wavelength technical achievements, including a record spectral efficiency of 5.7b/s/Hz which is equivalent to fitting a 1Tb super channel in less than 200GHz spectrum.
- The speeds were achieved on a 410km fiber link between BT's Adastral Park research campus in Ipswich and the BT Tower in London
- The trials were performed using production equipment that was software reconfigurable between 200Gb/s using 16 QAM modulation and 100Gb/s using QPSK modulation
- Alien Wavelengths allow telecom operators like BT to introduce new features and technology without the need to update the existing optical transport infrastructure
- Flexgrid maximizes the [spectral efficiency](#) of the installed fiber infrastructure, deferring the need to deploy costly new fiber infrastructure
- Trial and evaluation of the 1.4Tb/s alien super channel showed stable, error-free operation, when being transmitted with a mix of 40Gb/s and 100Gb/s native wavelengths. This was achieved for standard 50GHz sub-channel spacing and for flexgrid with sub-channel spacing down to 35GHz

- Working with BT to efficiently and cost effectively increase high-speed network capacity is aligned with The Shift Plan, the industrial strategy to reposition Alcatel-Lucent as a specialist vendor of IP Networking and Ultra-Broadband Access

Provided by Alcatel-Lucent

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