

World record 10.4 Gigabit wireless transmission

June 21 2005

Researchers at the University of Essex are claiming a world record for the amount of computer data sent over a point-to-point wireless channel. The results achieved by the team from the Department of Electronic Systems Engineering are the equivalent of more than 162,000 phone calls or over 10,000 broadband internet connections being made simultaneously. Such large capacity could revolutionise wireless internet download times for many households and local businesses, small and large.

While the techniques used by the Essex group don't fit exactly to the MultiBand Alliance template in the IEEE (Institute of Electrical and Electronics Engineers) 802.15 ultra-wideband radio standardisation process, they are important because they show that 10 Gigabit radio is feasible. The successful experiment at Essex demonstrates that far greater capacity could be obtained from present generation wireless links given appropriate standardisation.

The Essex Department of Electronics Systems Engineering is one of the strongest in the country, and currently has a grade 5 rating for carrying out research of national and international excellence. In 2001, researchers in the department achieved a world record for the amount of computer data sent over a single multimode optical fibre, which won them a slot in the Guinness Book of Records.

The latest record-breaking results came at the end of a two-year project by MSc student Terry Quinlan, part of precursor work which will be

further enhanced by a recently-announced £1 million Higher Education Funding Council for England equipment award. Eventually, the mm-wave region could be used where even higher data rates may be possible.

Head of the Essex project, Professor Stuart Walker, said: 'This achievement represents the culmination of many months of painstaking work. Multigigabit transmission systems of any sort require really detailed design and wireless is no exception. The original aim was just to investigate the performance of cheap flat patch antennas. We were pleasantly surprised by the initial results and kept on improving the experimental set-up.

'This is a research-lab point-to-point experiment but there is world-wide commercial interest in getting multigigabit capacity from inexpensive wireless systems, either fixed or mobile.'

The Essex team succeeded in transmitting 10.4 Gigabits (that's 10.4 billion, or 104 followed by 8 zeroes) of data over a 60m line-of-sight span; this distance being typical of the urban distribution point to home environment in the UK. Greater distances should be possible and are the subject of further investigation.

The experiments were carried out using an array of three in-house designed patch antennas covering a band from just below 2 GHz up to just above 7 GHz. The 10.4 gigabit data rate was comprised of concurrent 1.2, 1.6 and 2.4 Gigabit channels combined with polarisation-based frequency reuse. A complete carrier and data synchronisation subsystem was also constructed so largely error-free performance could be demonstrated.

A paper on the basic subsystem design was presented at the IEE (Institution of Electrical Engineers) and IEEE-sponsored Antennas and Propagation Conference at Loughborough University in April 2005.

Source: University of Essex

Citation: World record 10.4 Gigabit wireless transmission (2005, June 21) retrieved 17 April 2024 from <https://phys.org/news/2005-06-world-gigabit-wireless-transmission.html>

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