



5G: from a millimetre-sized network to the first large transmission path

- **Size follows speed: Vodafone's 5G network delivers stable transmissions over 10 metres**

Düsseldorf/Hanover, 13 March 2016 – At last year's CeBIT Vodafone demonstrated the fastest 5G network in the world. Now, the development focus has shifted from high transmission speeds that are only stable over a distance of a few millimetres to sustaining these speeds over longer distances. That's a must if commercial 5G services are to be introduced in 2020. Vodafone, Ericsson and the Technical University of Dresden will be demonstrating progress in 5G to visitors at this year's CeBIT. Their research teams have managed to set up the very first 15 gigabit wireless network with stable transmissions across a distance of 10 metres. That's a hundred times the distance achieved with 5G just one year ago.

"A 5G network delivering gigabit speeds across a distance of millimetres is a big achievement for the lab teams. But it's also clear that if we want to bring 5G to market, we have to work out how to get it from the radio masts to people's smartphones and the billions of networked devices. That's what we're currently working on at the Vodafone Chair with the experts from Vodafone and Ericsson," said Professor Gerhard Fettweis from the Technical University of Dresden.

Vodafone Germany's CEO Hannes Ametsreiter adds: "In a partnership with the TU Dresden spanning more than 20 years we have been able to drive progress in a lot of mobile technologies that we use on a daily basis today. Not only is Professor Fettweis one of the world's leading researchers, he's also one of the world's leading 5G experts. With his help we can play an instrumental role in the development of the new wireless standard and the results show that, to a great extent, 5G is being conceived in Germany."

The Vodafone 5G network at CeBIT can deliver data rates of up to 15 gbps over a distance of 10 metres in a real environment. To do that, over 800 MHz of bandwidth in the 14501 - 15350 MHz frequency range is used. Autonomous driving is an example of how important these data rates will be in future because a self-driving car needs around 1 gigabyte per second. Vodafone's high-speed networks will be crucial to keeping up with the growing demand for fast data rates.

Ultra-low latency times of just a few milliseconds are another key factor that Vodafone and Ericsson are presenting in the 5G network today at CeBIT. The 5G partners are also presenting another innovation called beamforming. This technology automatically concentrates the signal emitted by the wireless antennas so that any nearby devices are continuously supplied with the maximum data rate.

5G Alliance: network operators, equipment suppliers and leading researchers drive development

Vodafone and Ericsson are collaborating with other partners in the development of the next generation network. In the recently formed 5G Alliance, the Vodafone Chair, the 5G Lab Germany and Ericsson are working together on

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the standardisation of 5G. The Dresden University-based researchers are now collaborating more closely with the Ericsson Eurolab and sharing their test systems and results.

M2M, big data and telemedicine soon to be everyday gigabit applications

On the way into 5G, further innovations that are due to be launched in the near future will lead to pioneering breakthroughs for economy and society. Networked machines, big data and cloud applications, telemedicine and virtual learning solutions are all based on the advanced development of the LTE network. The gigabit router that Vodafone and Ericsson are presenting at CeBIT can already achieve data rates of up to 100 mbps in uplink and 1 gbps in downlink – and it can be used by any number of terminals in a Wi-Fi environment. The gigabit router unites the power of Vodafone's ultra-modern cable network with bundled LTE frequencies. LTE-Advanced+ innovations such as the integration of an additional carrier in the 1.5 GHz spectrum or the aggregation of three frequency bands with up to 60 MHz, 4x4 MIMO multiple antenna systems and a new modulation scheme (256 QAM) all contribute to increasing transmission rates.

Next year there will be a dramatic increase in M2M. The latest Ericsson Mobility Report forecasts 28 billion connected devices by the year 2021. Autonomous driving, virtual learning, telemedicine and Industry 4.0 will become part of our everyday lives. This multitude of devices and applications poses different requirements on the networks that make M2M communication possible. Exceptional quality, maximum speeds and highest possible security are absolutely essential.

Vodafone will be exhibiting in Pavilion 32 at this year's CeBIT in Hanover from 14 to 18 March 2016. It is showcasing products for SMEs, large corporations and public-sector companies reflecting the motto: "Getting you ready for gigabit business". The portfolio extends from innovative network solutions to IoT and cloud applications and unified communications products.



Vodafone Germany

Vodafone Germany is a leading integrated telecommunications company in Germany with 45 million customers, € 11 billion in revenue and 14,000 employees. It is a one-stop provider of fixed network, mobile communications, internet and TV services - and the only company in the market with mobile communications, DSL and cable technology. The Düsseldorf-based company offers a comprehensive ICT portfolio for enterprise customers. Vodafone secures corporate networks and communications, networks machines and stores enterprise data in the German cloud. 90% of all DAX-listed companies and 15 of 16 federal states are already Vodafone customers.

Vodafone Germany is the largest operating company of the Vodafone Group, one of the world's largest telecommunications companies with its own cellular networks in 25 countries and partner networks in a further 57 nations. It also has fixed network infrastructures in 17 countries. Vodafone has around 461 million mobile service customers and 13 fixed network service customers around the world.

Visit the website at www.vodafone-deutschland.de for further information.

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