

PRESS RELEASE

Bell Labs and Technische Universität Dresden sign agreement to collaborate on advancing the development of 5G networks

Collaboration to focus on development and testing of technologies to maximize efficiencies of 5G networks in meeting ever-growing connectivity demands of people and things

Paris, France, June 15, 2015 - Bell Labs, the industrial research arm of Alcatel-Lucent (Euronext Paris and NYSE: ALU), has become a research partner of the Technische Universität Dresden's [5G Lab](#) Germany.

Under the research collaboration agreement, the two organizations will develop and test technologies that will help to define the capability of 5G mobile networks in meeting the massive connectivity demands of the future, with the high-performance required by end-users.

Opened in September 2014, the 5G Lab Germany brings together 20 professors from the Technische Universität Dresden, one of the leading universities in Europe, with more than 500 scientists. The 5G Lab Germany is a recognized technology consortium and industry leader in the collaborative effort required to develop and deliver 5G networks. It comprises four separate tracks which allow members to focus on areas of interest, while providing a holistic view of [5G networks](#). As a new member of the 5G Lab Germany, Alcatel-Lucent will initially focus its research efforts on the Wireless & Networks track of the program.

The Alcatel-Lucent collaboration with 5G Lab Germany will initially focus on:

- **Use of multiple device-to-radio connections to enhance reliability for mission-critical communications**

Studies will investigate how network capacity and reliability could be enhanced by connecting a device like a smartphone to multiple radios simultaneously. It will focus on how multiple 5G radio links or a combination of [5G and 4G LTE](#) radio links could enhance reliability for mission-critical communications, where disruption to the network will cause a failure in operations, such as for transportation workers and emergency first responders.

- **Definition of a 5G air interface**

The organizations will jointly analyze new air interface - or radio frequency link - proposals for 5G concept/prototype networks and will be proposing them in the upcoming 5G standardization process. The newly-developed Bell Labs Universal Filtered-Orthogonal Frequency-Division Multiplexing (UF-OFDM) waveform for 5G networks is a leading contender for standardization and will enable enhanced performance and new services, while dramatically increasing the number of users (both human and machine) as well as reduce the complexity of 5G networks.

Key Facts:

- Alcatel-Lucent’s Bell Labs and TU Dresden, via its 5G Lab Germany, are collaborating to develop key technologies that will define the future of 5G networks.
- Of the four research tracks at the 5G Lab Germany – Wireless and Networks, Tactile Internet Applications, Silicon Systems and Mobile Edge Cloud - Alcatel-Lucent will initially focus effort on the Wireless & Networks track.
- Alcatel-Lucent’s research cooperation will focus in two areas: Definition of a new air interface, and the use of multiple device-to-radio connections.
- As a research partner, Bell Labs will fund the joint research and will then incorporate findings into its ongoing Network 2020 development work.

Quotes:

Prof. Gerhard Fettweis, Vodafone Chair for Mobile Communications Systems at TU Dresden, running the university’s 5G Lab Germany, said: “With Alcatel Lucent’s system insights and know-how we can address the most relevant challenges in designing and operating highly reliable and resilient mobile networks. We investigate a theoretical framework that allows us to analyze waveforms, find performance bounds and find low-complexity designs for implementation. The second project targets on new access technologies as an enhancement of the dual-connectivity transmission approach and joint coordination among multiple radio access technologies to meet various service requirements.”

Tod Sizer, head of wireless research in Bell Labs, added: “Bell Labs is an industry leader in wireless innovation and research, and is working closely with customers, key government funded projects in Europe and with leading universities like TU Dresden to collectively define what 5G should and will be. Our history with TU Dresden goes even beyond the very early definition of 5G and now we are innovating together to enable low latency applications, higher capacity solutions, as well as support for both Massive MIMO and Massive numbers of connected machine devices.”

Background

Alcatel-Lucent demonstrated its research on UF-OFDM at Mobile World Congress 2014 and 2015 and at the NGMN 2015 conference. The digital multi-carrier modulation method used in today’s 4G LTE networks – OFDM – was optimized for smartphone traffic only. As the Internet of Things and machine-to-machine communications brings a more diverse range of traffic, a new digital radio waveform is required that is more resilient to these types of connections, to maintain network performance and service quality in a 5G network. UF-OFDM is optimized for a combination of smartphone and the large volume of sensor-type traffic that will occur in 5G networks.

Under its Network 2020 vision, Bell Labs is committed to working with other industry-leaders to develop technologies that will define the future of 5G communications. The company has signed collaboration agreements with companies such as NTT Docomo, KT, Freescale, and more.

Links

- White paper - [5G is coming – Are you prepared?](#)
- [Alcatel-Lucent and Korea’s KT sign collaboration agreement to deliver 5G mobile networks of the future](#)
- [5G can deliver a ‘truly networked’ society with Europe in the driving seat](#)
- [Alcatel-Lucent introduces LTE radio access network portfolio to transition operators smoothly to next-generation technologies](#)

About TU Dresden

Founded in 1828, Technische Universität Dresden (TUD) is a full-scale university with 14 faculties, covering a wide range of fields in science and engineering, humanities, social sciences and medicine. TUD has about 36,000 students and 4,400 permanent employees with 419 professors among them. TUD prides itself for its international flavour and has partnerships with more than 70 universities worldwide. Since 2012 TUD is one of eleven German universities that were identified as an "excellence university" by the Federal Government. TUD's emphasis on applications in both teaching and research has been honoured by leading industrial companies with currently fourteen endowed chairs.

www.tu-dresden.de

About 5G Lab Germany

Within the 5G Lab Germany, 20 professors from TU Dresden collaborate in an interdisciplinary team with more than 500 scientists to advance research on the key technologies for the 5th generation of mobile communications (5G) and its applications. A key feature of 5G will be a short latency that will enable Tactile Internet applications, e.g. automated driving, robotic-aided tele-surgery, as well as new learning and trainings methods with special tactile-to-visual feedback. To achieve this goal, the researchers in the 5G Lab Germany are addressing the whole value chain: from the semiconductor chips across wireless data transmission, networking and mobile edge clouds to Tactile Internet applications.

www.5glab.de

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ABOUT ALCATEL-LUCENT (EURONEXT PARIS AND NYSE: ALU)

Alcatel-Lucent is the leading IP networking, ultra-broadband access and cloud technology specialist. We are dedicated to making global communications more innovative, sustainable and accessible for people, businesses and governments worldwide. Our mission is to invent and deliver trusted networks to help our customers unleash their value. Every success has its network.

For more information, visit Alcatel-Lucent on: <http://www.alcatel-lucent.com>, read the latest posts on the Alcatel-Lucent blog <http://www.alcatel-lucent.com/blog> and follow the Company on Twitter: http://twitter.com/Alcatel_Lucent.

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