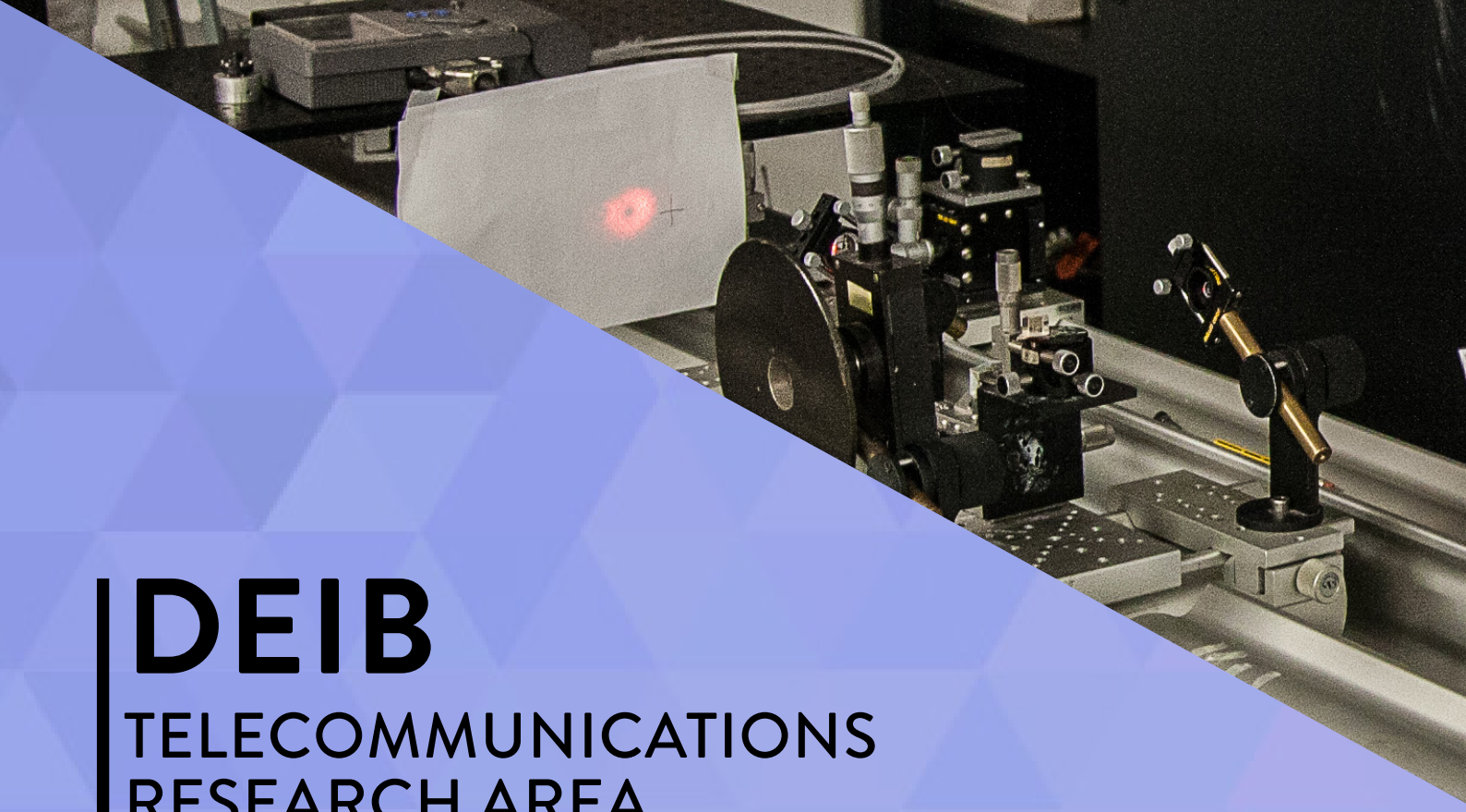

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TELECOMMUNICATIONS RESEARCH AREA

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Over the past 20 years (1995/2015) the Internet Protocol (IP) was established as universal network protocol, allowing the exchange of any kind of digital information at any distance. The "Internet addresses" increased from a few millions to a few billions with a growth rate that will take them to tens of billions by the end of this decade. IP was made possible by the tremendous developments in the telecommunications research. On one hand, wireless systems are pervading all aspects of human activity (with the use of smart-phones) and further terminals will expand with the development of new wireless technologies (5G) and the Internet of Things (IOT). At the same time the fibre optic network is expanding both as penetration (in metropolitan networks, in access and in the data-centres) as well as in capacity (thanks to the coherent detection and new coding systems). The digital signal processing (DSP) registers a wide-spread usage in any system dealing with information for operations of acquisition, manipulation and exploitation in all kinds of media: from next-generation audio and video systems to whatever development of "virtual reality". Telecommunications networks are expanding and their paradigm is exported also to non-telecom sectors (consider, for example, smart-grids) and in general this technology provides the basic infrastructure for any development of the concept of Smart City. Remote sensing, performed with a growing network of observation satellites, has become an essential practice for any application related to the monitoring of human activities (geo-reference), to the territorial security and sustainable development issues. Electromagnetic technologies are experiencing tremendous developments that combine together miniaturization (silicon-photonics), performance and power. The research area of Telecommunications is organized into five main lines of research: Information Transmission; Telecommunication Networks; Remote Sensing; Digital Signal Processing for multimedia and telecommunications; Applied Electromagnetics. The staff involved in each of these areas is very active, operates at the edge of the related field and maintains a strong level of cooperation with the National and European industry. This allows rapid development of research results its deployment in systems, applications and services.

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