Technology for Communication

Building European ecosystem on SOI to answer Societal challenges of Smart Mobility and Communication

F. Brunier
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Abstract
ECSEL projects open new paths in the European collaborative landscape enabling Full Value chains and increasing communication between technology and application.
OCEAN12 and REFERENCE tackle the challenges of Smart Mobility and communication using the RFSOI and FDSOI technologies.

With 28 European partners OCEAN12 aims to answer the energetic challenge of Autonomous Driving by offering a palate of FDSOI based energy efficient solutions integrated from the substrate to components and systems. Real case demonstrators such as "Always-on wake-up systems", "mm-Wave radar SoCs" and "high performance Neural processors for edge computing" are developed on FDSOI making a link between application needs and technology disruption. Electronic components already represent an important vector of valorization and differentiation for the automotive industry but increased autonomy levels will require a very strong build-up of computational capacities. Following this trend a fully autonomous car would require a power consumption equivalent to that of more than 50 computers running continuously. The power consumption of these components becomes a key element in the choice of technologies.

With 16 partners REFERENCE ambitions to demonstrate sustainable Radio Frequency SOI technology platforms (RFSOI and FDSOI) to cover the frequency range from 0.7GHz to more than 100GHz, and to demonstrate the technical superiority of SOI when combining large scale integration, low power consumption, cost competitiveness and higher reliability; thus, resulting in high volume production of trusted components with low environmental impact in Europe.

Biography
François Brunier graduated as physics and electronics Engineer from SUPELEC Paris, in 1997. From 1998 to 2002 he worked in STMicroelectronics Crolles as a device integration engineer for embedded DRAM products on 0.25 and 0.18µm CMOS technology. In 2002, he joined Soitec R&D department as group manager. From 2002 to 2009 he built and led the advanced characterization laboratory. From 2009 to 2011, as a product line manager, he led the SOI product development and offering, for RF and Smart-Power market segments, developing a strong interface with Soitec customers worldwide. Since March 2012, he is partnership program manager, in charge of more than 10 national or European collaborative programs every year.

5G radios – commercial challenges and opportunities

F. Tillman
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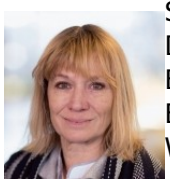
Abstract
5G is on a quest to transform connectivity and change network deployment strategies in a profound way, e.g. by the introduction of mm-waves, much lower latency, and spatial filtering. Given the advent of new NR bands beyond 20GHz and more spectrum to follow in new band ranges, commercial radio variants are facing a new level of diversity. To provide attractive market offerings, a combination of multiband techniques and flexible architectures must be further developed. In parallel, the rise of massive MIMO functionality enhances the need for integration and scalability. This TechARENA presentation highlights some of these challenges related to the radio building practice, antenna integration, and commercial deployment.

Biography
Fredrik Tillman received his Msc and PhD in Circuit Design from Lund University in 2000 and 2005 respectively. From 2006 through 2007 he worked on CMOS RF ASIC design at Ericsson Mobile Platforms in Lund (Sweden) and Raleigh (USA). Since 2008 Dr. Tillman has been a technical manager at Ericsson Research with focus on CMOS circuit design, and acted as the Ericsson responsible for several European collaboration projects. In 2015 Dr. Tillman worked on the Ericsson radio DOT system in Ottawa (Canada) and is currently heading the Integrated Radio Systems department at Ericsson Research.

Wireless research beyond 5G



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Abstract
Wireless technologies, in particular 5G, are perceived as reaching a high level of maturity. Therefore, it appears as if there is not much room for research anymore. Nothing is less true. There are still a vast number of topics that require further investigation as well as many new wireless research areas that are opened due to advances in various technologies.
The use cases are well known: ubiquitous sensors, access to broadband and media everywhere, smart vehicles and transportation systems, critical control of remote devices, human-IoT interaction, infrastructure monitoring and control, etc. These have dictated the challenges for the future 5G infrastructure: orders of magnitude improvements of access network capacity, per-user data rates, latency, and energy consumption, in conjunction with high reliability and security. Beyond 5G, new paradigms, applications and application domains are envisaged, requiring technologies that push the boundaries.
In this talk, we will present the wireless research challenges that lie ahead, and the way the Center for Wireless Technology Eindhoven (CWTe) intends to contribute to this.

Biography
Sonia Heemstra de Groot holds M.Sc. degrees in Electrical Engineering from Universidad Nacional de Mar del Plata, Argentina and Philips International Institute/NUFFIC, The Netherlands. She obtained the Ph.D. degree in Electrical Engineering at the University of Twente, The Netherlands, in 1990. Since 2012 she is a full professor at Eindhoven University of Technology where she holds the part-time chair in Heterogeneous Network Architectures. In September 2016 she became the director of the Center for Wireless Technology Eindhoven. Before she has held assistant and associate professor positions at the University of Twente and a full-professor position at the Delft University of Technology in Personal and Ambient Networking. After having worked some years as a senior researcher at Ericsson EuroLab, The Netherlands, she co-founded the Twente Institute for Wireless and Mobile where she has been Chief Scientist from 2003 to 2014. Her expertise and interests are in the areas of wireless and mobile communications, 5G, vehicular networks, wireless indoor communications, Internet of Things, and wireless security.

From 4G to 6G: do the networks of the future care about the technologies of the past?

M. Peeters
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Abstract
The traffic in today's networks, 4G, 5G, mobile or otherwise, seems to be following nicely the exponential expectations projected each year. On the one hand, this is driven by and drives further CMOS scaling for the digital processing of information; on the other hand, this has pushed communication channels to use ever wider bandwidths. Unfortunately, not only the individual endpoint throughputs are increasing, but the amount of endpoints and their capabilities is skyrocketing as well. Moreover, capacity as a KPI is being complemented by reliability and latency as use-cases branch out beyond the traditional human-centric communications and entertainment into e.g. industrial automation, AR/VR and autonomous vehicles.

This is creating a perfect storm at the interface of the analog and digital world, where traditional scaling does not necessarily buy you performance; physical dimensions are dictated not by atom sizes but by quarter-wavelengths of one kind or another; and speeds seem to all be converging at a point where switching frequencies venture far into the super-100GHz territory. For the first time in history, this is true for chip-to-chip, board-to-board, rack-to-rack, datacenter-to-datacenter, fiber and mobile wireless access systems.

Across the design space, this (finally!) has generated renewed interested into solution spaces that are less obvious, or were considered distinctly niche only a couple years ago. We take a look at how we can tackle this, not only from an RFIC circuit design space, but also how new network capacity, reliability and latency requirements can drive technology choices for the next 10 years. This includes novel design and integration options for III-V, more exotic telluride and graphene approaches, but also dielectrics, ceramics and nanostructured materials.

Biography
A passionate leader with a background in both research and strategy, Dr. Ir. Michael Peeters is Program Director Connectivity+Humanized Technology at imec. Michael has been identifying and implementing state-of-the art technology opportunities in telecommunications through a career that spans two decades.

Both as Head of the Nokia Incubator and the Innovation Portfolio at Nokia, as well as CTO for the Wireless Division at Alcatel-Lucent, his role required him to make sense out of the uncertainty that exists when technological possibilities have to be balanced with business case realities. His team's responsibility: to see beyond the business analysis and help customers envision how emerging technologies and trends, such as 5G and AI, will impact their networks and end-user community.

Prior to his role as CTO for the Wireless Division, he was CTO for the Wireline Division. The team looked beyond the product roadmap and identified what new trends, technologies and tools were on the horizon and determined how those future opportunities fit into the Alcatel-Lucent pipeline. It was also during this period that the business commercialized VDSL2 Vectoring, an idea conceived 7 years earlier while leading the Bell Labs Access Nodes and DSL Technology department.

He has authored more than 100 peer-reviewed publications, many white papers and holds patents in the access and photonics domains. Michael earned a Ph.D. in Applied Physics and Photonics from Vrije Universiteit Brussel as well as a master's degree in Electrotechnical Engineering.

Outside of work, Michael is passionate about cooking and continues to refine the recipe for the perfect lasagna, balanced by bouts of long-distance running to offset the caloric intake inherent with such a quest.

5G's impact on RF Front-End: from Telecom Infrastructure to Hand sets

C. Troadec
Division Director, Power & Wireless
Yole Développement, Villeurbanne, France

Abstract
The telecom infrastructure market has not moved much in the past decade interms of the value of operators' investments. Customer pricing also keeps decreasing, and building new infrastructure keeps showing smaller and smaller returns on investments for telecom operators. In this context, an attempt to create new markets and enlarge operators' reach to customers beyond hand sets created 5G.

The global landscape at network level will not move much before 2025. But it will definitely change in terms of technology and antenna systems, thus completely restructuring the radiofrequency (RF) component industry. On one hand frequencies are going from less than 3 GHzto up to 6 GHz for macro deployments, while small cells exploit millimetre-wavelengths (mm-waves). Meanwhile RF line power levels in front-ends will decrease from a few hundred watts to down to a few watts in macro site antenna systems, thanks to massive MIMO and active antenna systems implementation.

At Hand set level, the main phone manufacturers differentiate from each other on the RF field by adopting either an integrated or a discrete approach. The market leaders Samsung, Apple, as well as smaller OEMs such as Sony, LG, Google or ZTE are moving towards integration using complex RF modules from Broadcom, Skyworks, Qorvo, Qualcomm and Murata, while the markets challengers, Huawei, Xiaomi, Oppo and Vivo, which drive as much volume as the market leaders, differentiate by favouring a discrete approach whenever possible.

In our presentation, we will review how 5G is reshaping the RF Front-End industry. We will explain the positioning of the main component and module suppliers and review the technology mix needed to support 5G (Bulk Silicon, SiGe, GaAs, RFSOI, GaN,…) both at Telecom Infrastructure level and Hand set level.

Biography
Claire Troadec is Director of the Power & Wireless Division at Yole Développement (Yole), part of Yole Group of Companies. These activities are covering power electronics, batteries & energy management, compound semiconductors and emerging materials and RF electronics.
Based on her valuable experience in the semiconductor industry, Claire is managing the expansion of the technical and market expertise of Power & Wireless team. Daily interactions with leading companies allow these analysts to collect a large amount of data and cross their vision of market segments' evolution and technology breakthroughs.
In addition, Claire's mission is focused on the management of business relationships with leading companies of this sector and the development of market research and strategy consulting activities inside the Yole group.
Claire Troadec holds a Master's degree in Applied Physics specializing in Microelectronics from INSA (Rennes, France). She then joined NXP Semiconductors, and worked for 7 years as a complementary metal-on-silicon oxide semiconductor (CMOS) process integration engineer at the IMEC R&D facility. During this time, she oversaw the isolation and performance boosting of CMOS technology node devices from 90 nm down to 45 nm. She has authored or co-authored seven US patents and nine international publications in the semiconductor field and managed her own distribution company before joining Yole Développement in 2013.