SW4 - Advances in Active Phased Array Antennas: Modeling, Integration, and Characterization

Abstract:

Phased array antennas are essential building blocks for modern terrestrial and non-terrestrial communication and radar systems. As active components such as power amplifiers, low-noise amplifiers, and beamforming circuits are increasingly integrated with these antennas, strong interactions occur that can significantly affect the overall system performance. This session focuses on the joint modeling, integration, and characterization of active components and phased array antennas. Speakers from leading European research institutions and industrial organizations will present their latest and ongoing R&D activities in this field.

Workshop outline:

The workshop will feature five 15-minute talks, each followed by a 5-minute Q&A. First, Aymeric Cailleux from ESA will discuss the modeling and interaction of power amplifiers with phased array antennas. Second, Martijn De Kok from TNO will address the co-design of power amplifiers and antennas for radar applications. Next, David Gustafsson will cover active components and related antenna challenges from the perspective of Ericsson, a telecommunications equipment provider. Then, Jean-Philippe Fraysse will outline recent active antenna R&D activities of Thales Alenia Space France, a satellite manufacturer. Lastly, Teun van den Biggelaar from Antennex will present new measurement capabilities for active antennas using reverberation chambers.

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ANTERRA — COVERAGE EVERYWHERE

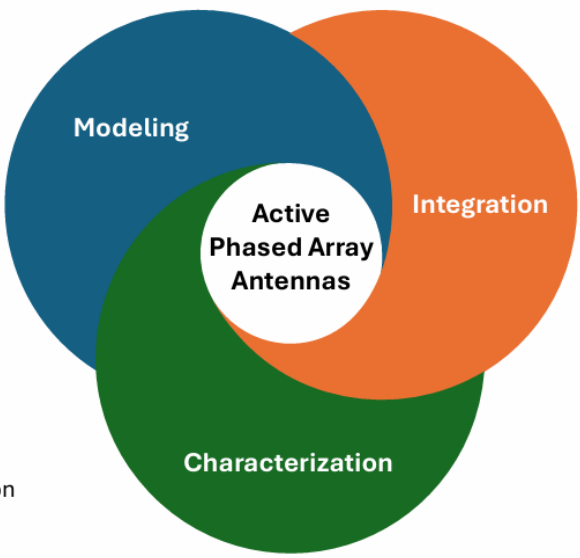
esa — Aymeric Cailleux – Modeling RF Frontend of Active Integrated Antenna Array for Direct-to-Device Communications

TNO — Martijn de Kok – Direct-matched Amplifiers and Radiating Elements in Active Phased Array Antennas

ERICSSON — David Gustafsson – Analog RF Front-Ends for Phased Array Antennas: Advancements and Challenges

ThalesAlenia Space — Jean-Philippe Fraysse – Research Activities on Active Antennas at Thales Alenia Space – France

ANTENNEX — Teun van den Biggelaar – Over-the-Air Characterization of Integrated Active Antenna Systems



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Agenda:

Time	Speaker (Affiliation)	Title
15:50 – 15:55	Sören Harms and Héctor Ortega González	Welcome and Introduction ANTERRA
15:55 – 16:14	Aymeric Cailleux (ESA)	Modeling RF Frontend of Active Integrated Antenna Array for Direct-to-Device Communications
16:14 – 16:33	Martijn De Kok (TNO)	Direct-matched Amplifiers and Radiating Elements in Active Phased Array Antennas
16:33 – 16:52	David Gustafsson (Ericsson)	Analog RF Front-Ends for Phased Array Antennas: Advancements and Challenges
16:52 – 17:11	Jean-Philippe Fraysse (Thales Alenia Space France)	Research Activities on Active Antennas at Thales Alenia Space – France
17:11 – 17:30	Teun van den Biggelaar (Antennex)	Over-the-Air Characterization of Integrated Active Antenna Systems
17:30	Sören Harms and Héctor Ortega González	Closing of the Session

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Speakers:

Aymeric Cailleux completed his Electronic & Telecommunication Engineering studies through an apprenticeship at INSA Rennes and Thales SIX GTS FRANCE Laval, specializing in aeronautics, in 2022. He undertook an internship at the European Space Agency (ESOC) on electro-photonic sampling and later an exchange at Chalmers University, working on power amplifier behavioral modeling. Currently, he is a System Engineer in SatCom at ESA-ESTEC and pursuing an MSCA Ph.D. within the HARMONY program, titled “Modeling RF Frontend of Active Integrated Antenna Array for Satellite Communications.” His research focuses on active phased arrays, behavioral models, and satellite communications.

Martijn De Kok received the B.Sc. and M.Sc. degrees in Electrical Engineering (both cum laude) from Eindhoven University of Technology (TU/e), The Netherlands, in 2018 and 2020, respectively. He is currently pursuing a Ph.D. degree at TU/e. In 2019 he was a visiting student at the Advanced RF & Optical Technologies Group of the Jet Propulsion Laboratory, California Institute of Technology. In September 2021 he became a guest researcher at the Radar Technology Group of TNO Defense, Safety and Security in The Hague. Since 2025 he joined TNO as a scientist. His research interests include integrated millimeter-wave antenna systems and phased arrays for next-generation (satellite) communications and radar sensing.

David Gustafsson received his Ph.D. degree in Microtechnology and Nanoscience from Chalmers University of Technology, Gothenburg, Sweden in 2014. Since then, he has been with Ericsson Research, Gothenburg, where he is currently leading Ericsson's analog front-end and power amplifier research program.

Jean-Philippe Fraysse received the M.Sc. degree in Microwaves and a Ph.D. degree in Electronics from the University of Limoges in 1995 and 1999, respectively. He joined the research department of Alcatel Space, Toulouse, France, in 1999 where he was a MMIC designer. He is currently with the Research, Technology and Product Department, Thales Alenia Space, where he is an expert in integrated active antenna architectures. His research interests include advanced designs of key building blocks of active antennas, RF/antenna co-design with enabling technologies, and architecture trade-offs for advanced active antenna systems.

Teun van den Biggelaar received his MSc and PhD degree in Electrical Engineering (EE) with distinction from the Eindhoven University of Technology (TU/e), the Netherlands, in 2016 and 2020, respectively. During his PhD, he worked on a project supported by NXP Semiconductors and worked as guest researcher at NIST in Boulder, USA. Teun also worked for a period of two years at Ericsson in Gothenburg, Sweden, as Antenna Developer in the millimeter-wave team of the Antenna Systems and Technology division. From 2023 onwards, he is CTO and co-founder of ANTENNEX in Eindhoven, the Netherlands.