

Prof. Dr.-Ing. Dr. h.c. G. Fettweis  
Vodafone Chair  
01062 Dresden, Germany  
Tel.: +49 351 463 41000  
Fax: +49 351 463 41099  
www.vodafone-chair.com

**Vodafone Chair contact:**

Dr. Jobin Francis

**Funded by:**



**Project Partners:**



**Motivation and Objectives:**

To meet the demanding and diverse requirements of 5G use cases and services, current best effort internet connections or a smooth migration from existing network architectures and technology deployments to next generation solutions do not suffice. It calls for a paradigm change by transforming the traditional closed, static and inelastic network infrastructures into open, scalable and elastic ecosystems.

The objective of 5G-PICTURE is to develop and demonstrate a converged fronthaul and backhaul infrastructure integrating advanced wireless and novel optical network solutions, which will interconnect a large number of disaggregated compute, storage, and network elements. This will enable the provisioning of any service across the infrastructure by flexibly and efficiently mixing-and-matching network, compute, and storage resources.

**Approach:**

To address the limitations of the current distributed radio access network (RAN) and cloud RAN approaches, 5G-PICTURE proposes flexible functional splits of baseband functions between remote unit and central unit that can be dynamically configured to optimize resource and energy efficiency. This leads to *disaggregated RAN* (DA-RAN), where hardware and software components are disaggregated across the wireless, optical and compute/storage domains. This creates a pool of resources that can be independently selected and allocated on demand to compose any infrastructure service.

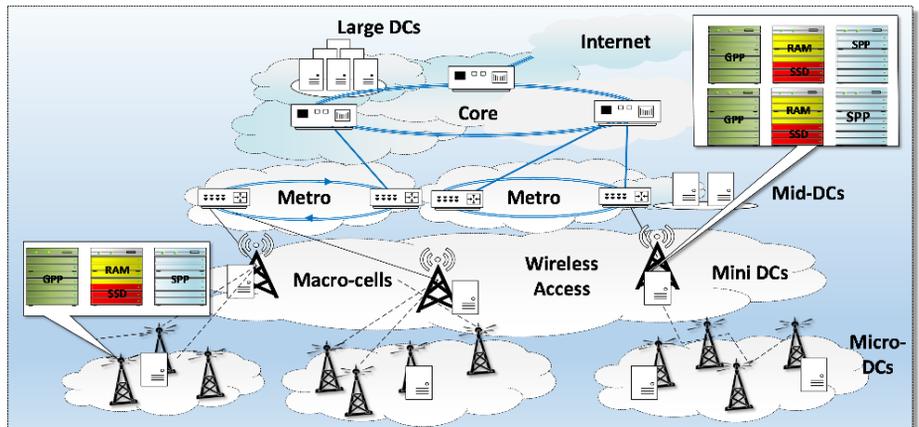


Key enablers for DA-RAN are: 1) *network softwareization* by moving away from the conventional closed networking model to an open reference platform, supported through 2) *hardware programmability*, where hardware is configured directly by network functions. To validate these capabilities, 5G-PICTURE will demonstrate converged fronthaul and backhaul services in a smart city environment, a railway experimental testbed, and a stadium environment.

**Vodafone Chair Contributions:**

Given the expertise of the Vodafone chair in the physical layer design of wireless cellular systems, it shall make the following contributions towards the project:

- Defining the key network performance requirements for smart city use case and Tactile Internet applications.
- Evaluating the computational requirements of different functional splits, specifically, for massive MIMO.
- Developing novel algorithms to improve the performance of massive MIMO while considering the computational limitations of the hardware platform and the capacity constraints on the transport network.
- Testing and evaluating the integration of massive MIMO radio head with the fronthaul network.



5G-PICTURE Integrated Infrastructure