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# 5G NORMA

A **NO**vel **R**adio **M**ultiservice adaptive  
network **A**rchitecture for the 5G era

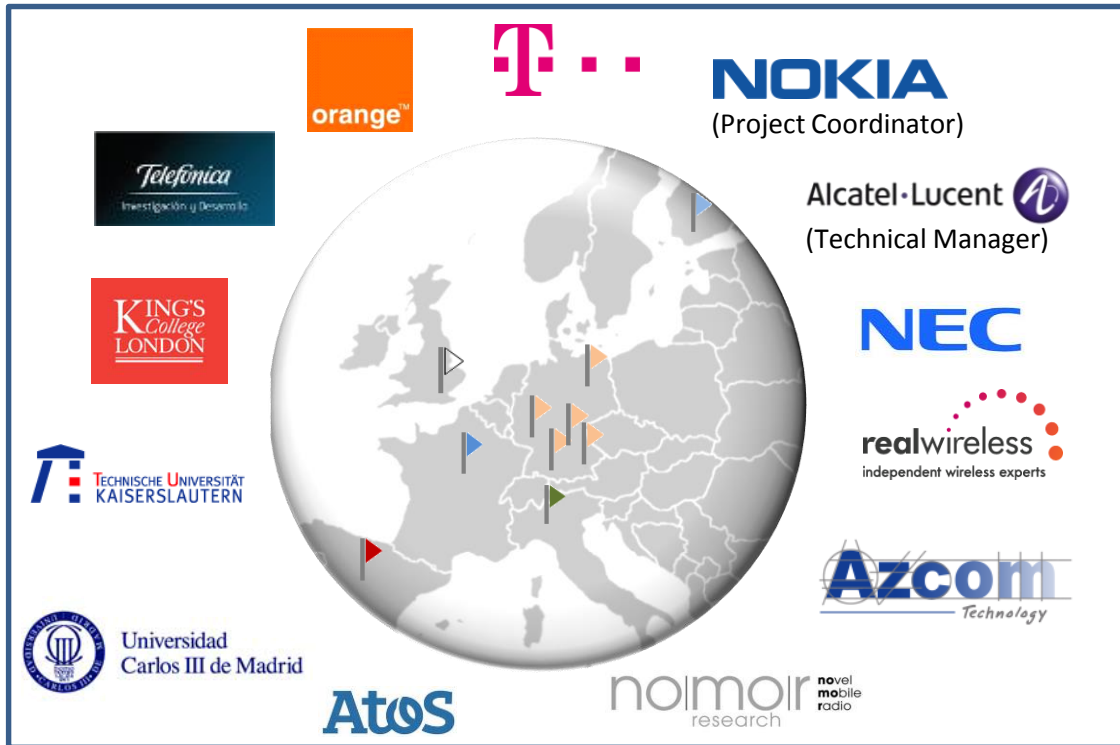
Christian Mannweiler

Nokia Networks, T&I Research

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# 5G NORMA Consortium



## **5G NORMA in a nutshell**

EU funded R&D project within 5GPPP Initiative

Flagship project to build consensus on “Novel E2E Mobile Network Architecture” and rapid implementation

## **Duration**

July 1<sup>st</sup>, 2015 – Dec 31<sup>st</sup>, 2017 (30 months)

## **Project Coordinator**

Simone Redana, Nokia

## **Connect to 5G NORMA**

**Webpage:** <https://5gnorma.5g-ppp.eu/>

**Twitter:** 5G NORMA project @5G\_NORMA

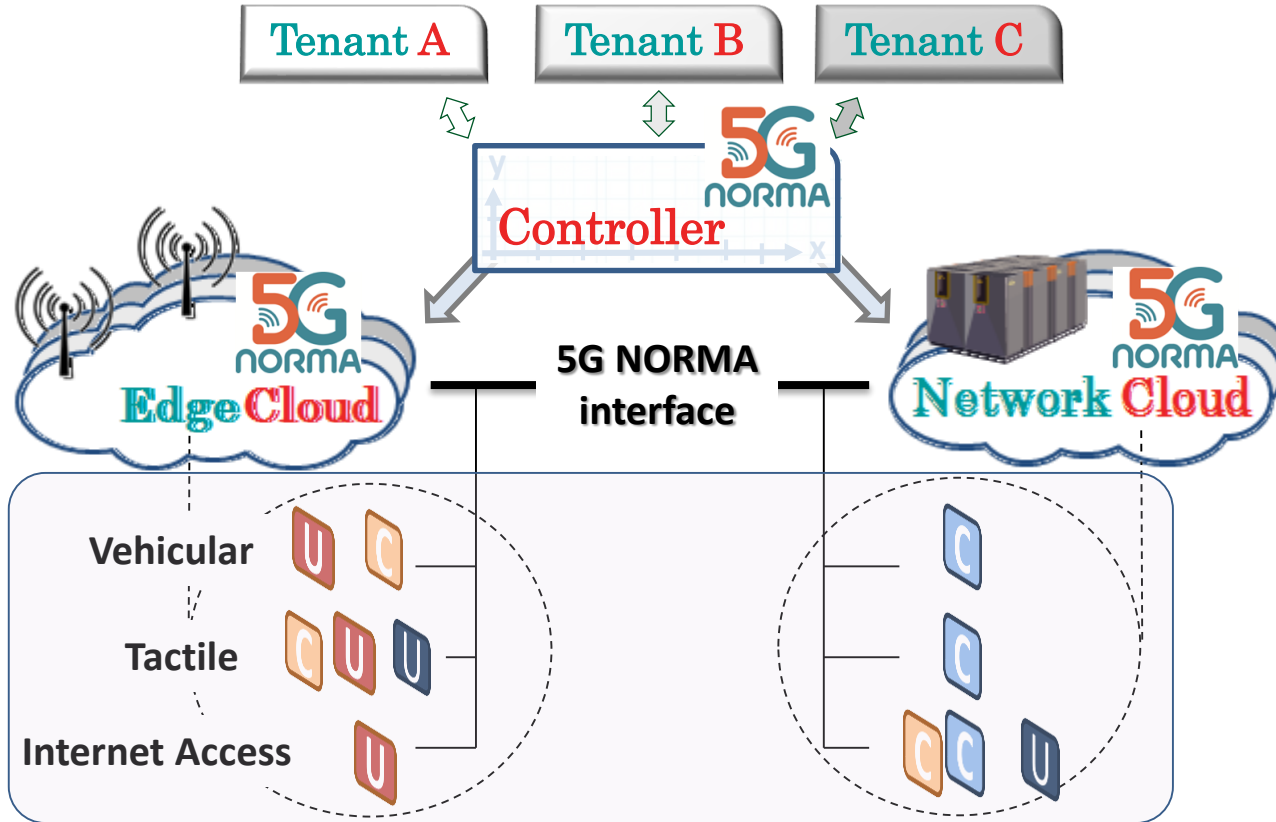
**5GPPP:** <https://5g-ppp.eu/>

## **Contact 5G NORMA**

[5G-NORMA-Contact@5g-ppp.eu](mailto:5G-NORMA-Contact@5g-ppp.eu)



# 5 x 5G NORMA Innovations



**1. Mobile Network Multi-tenancy**  
to support on-demand allocation of edge and network cloud resources in a fully multi-tenant environment

**2. Multi-service- and context-aware adaptation of network functions**  
to support a variety of services and corresponding QoE/QoS requirements

**3. Software Defined Mobile network Control (SDMC)**  
applies SDN principles to mobile network

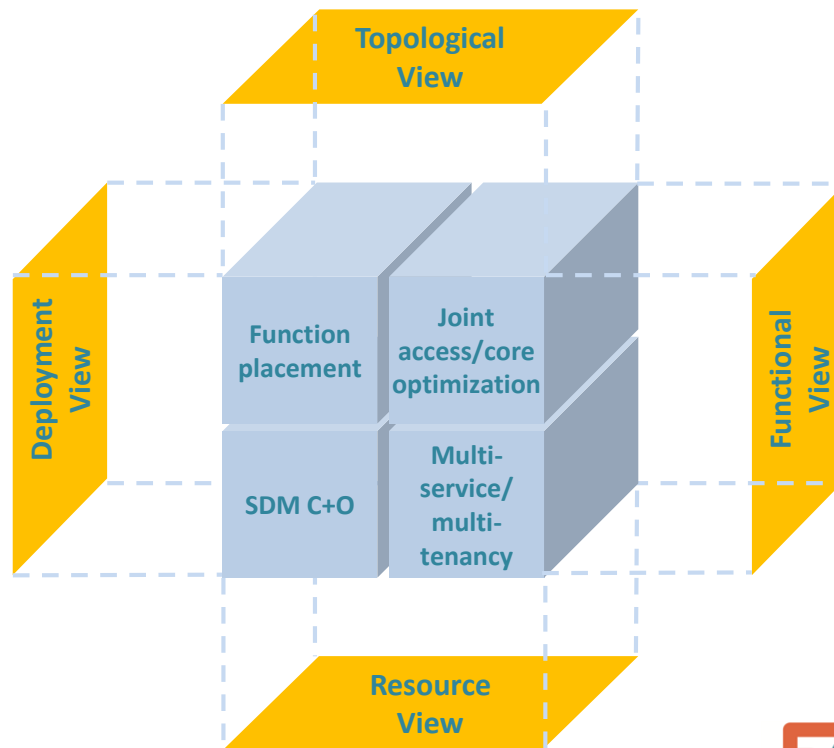
**4. Adaptive (de)composition and allocation of mobile network functions (c-plane and u-plane)**  
between network and edge cloud that depends on the service and deployment

**5. Joint optimization of mobile access/core network functions**  
when located together in the network or edge cloud

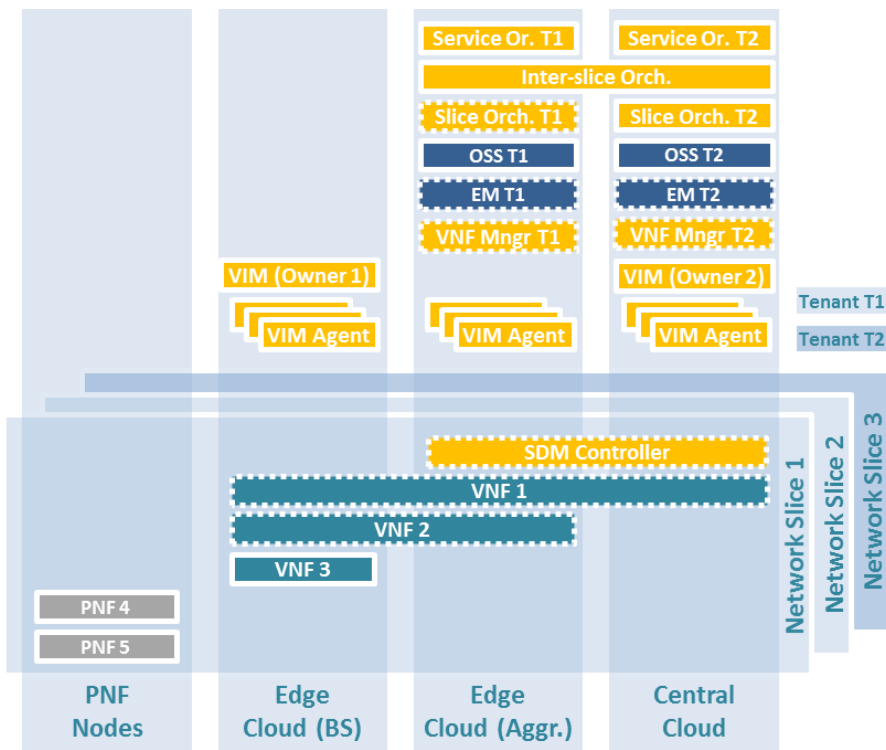
# 5G NORMA Architecture Innovations and Views

Covering all layers: Control and Data Layer, Management & Orchestration, and Service

- The “5 Innovations” of 5G NORMA
  1. Mobile network multi-tenancy
  2. Multi-service and context-aware adaptation of network functions
  3. Adaptive function (de)composition and flexible placement
  4. Joint optimization of access/core functions
  5. Software defined mobile network control and orchestration (SDM C+O)
- Different architectural views for clarity
  - each highlighting specific aspects of 5G NORMA architecture and innovations



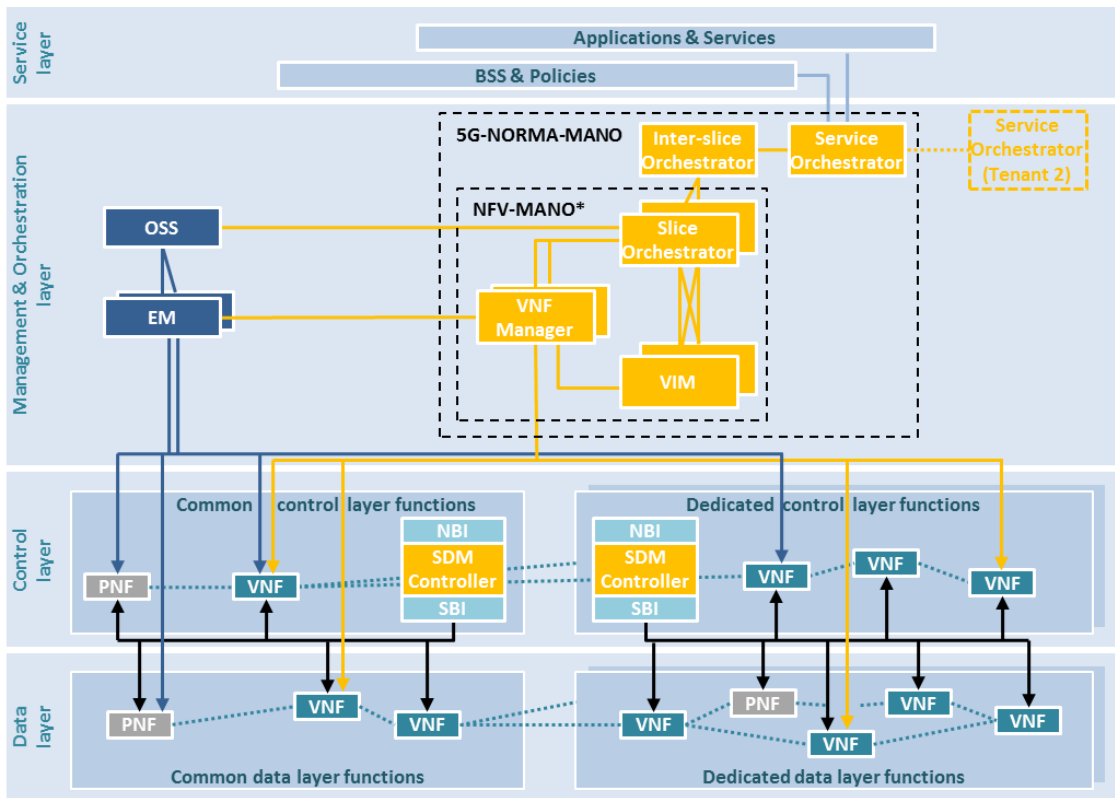
# Deployment View – Multi-tenancy



Illustrative deployment example with two tenants and two infrastructure providers (owners)

- Illustration of ...
  - Dependencies between infrastructure providers and tenants
  - Mapping of functions to infrastructure elements
  - Decomposition of functions and their flexible placement
  - Service-specific set of functions
  - SDM Control & Coordination

# Functional View – Management and Orchestration



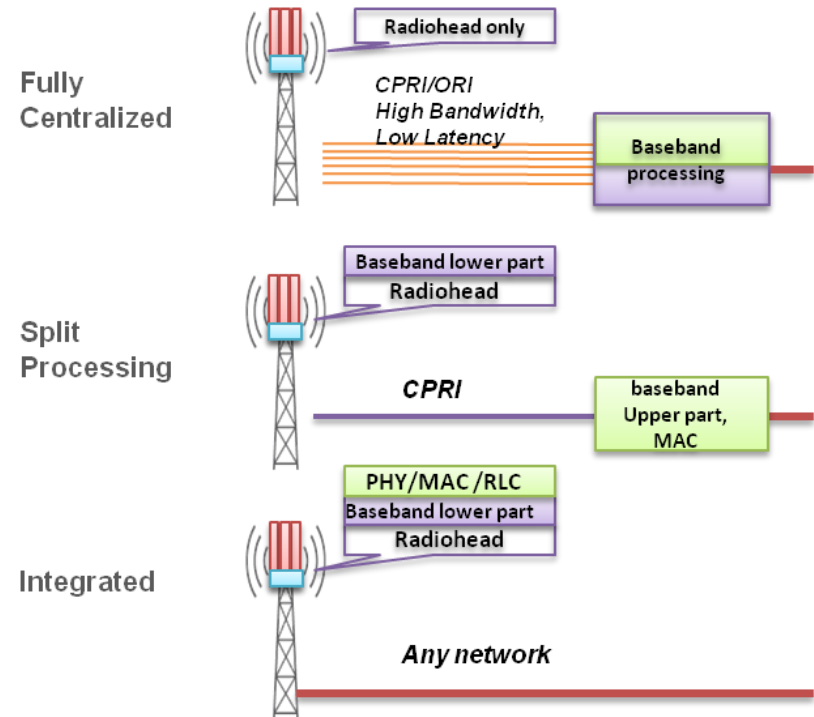
- Relations between functional entities from different layers
  - independent of a function's deployment location
- Customized control and data plane functionality („service graph“)
  - Commissioning of customized mobile network architectures
- Multi-service capable meta-architecture

## Novel 5G NORMA functions include:

- Service orchestrator
- (Inter-)Slice Orchestrator
- SDM Controller
  - For shared network functions
  - For dedicated network functions

# Functional (De)Composition – Flexible RAN

1. Flexible (de)composition and allocation of RAN functions
2. Optimal placement of RAN functionality within the mobile network
3. Select and activate network functions optimally for the multi-service nature of the 5G network
4. Leverage on Network Function Virtualization (NFV) and Software-defined Mobile Networking (SDMC) techniques





# Expected 5G NORMA Impact

## Manufacturers: novel products

- Enhanced and flexible 5G base stations: light, flexible and efficient
- Software-based centralized controllers: based on software and hence easy to modify and to adapt to different scenarios and services

## End-users and society

- Support for more and better services

## Standardization

- Novel architecture contributions: 3GPP
- Interfaces with the software-design controller: ONF
- Network-related protocols: IETF

## Operators: novel and flexible services

- Flexibility to adapt network operation as desired
- Reduction of the cost of operating the network
- Support for new and diverse services, thereby increasing revenue

## Vertical markets

- Network able to adapt to their needs in terms of latency, reliability, security, QoS, etc.

## Prototypes

- Multi-Service and Multi-Tenant support
- SW Defined Mobile Network Control



## Connect to 5G NORMA:



<https://5gnorma.5g-ppp.eu/>



<https://goo.gl/hGfa8H>



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<https://5g-ppp.eu/>

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