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METIS II and Xhaul Projects in 5G PPP

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On behave of METIS II and Xhaul Consortia

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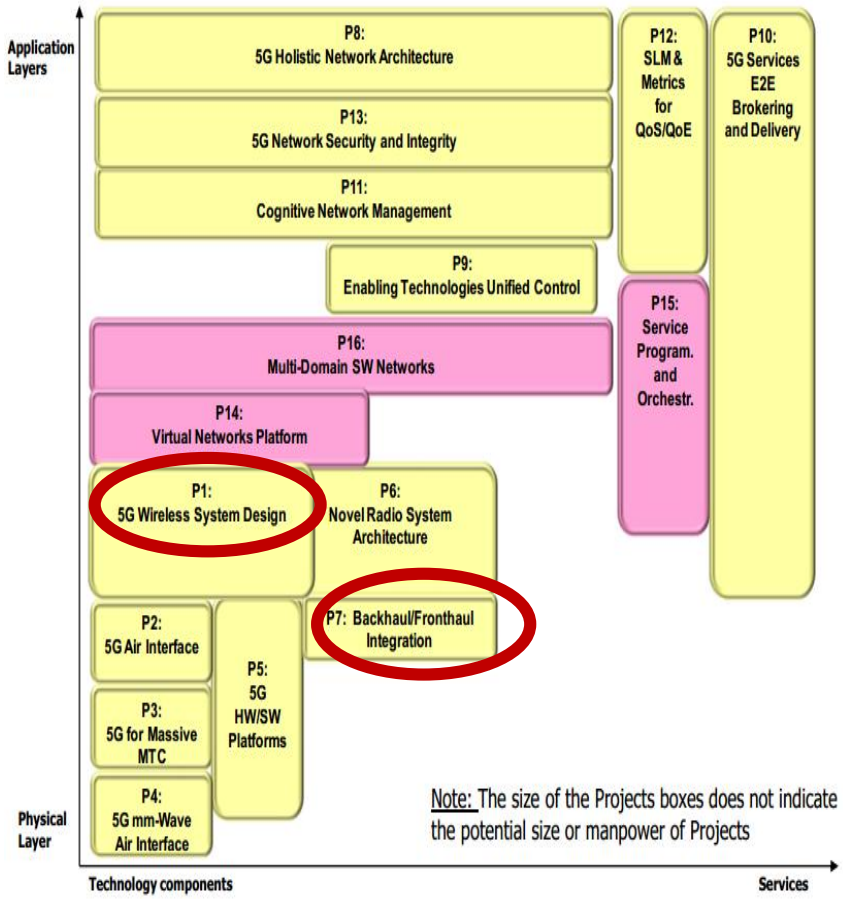
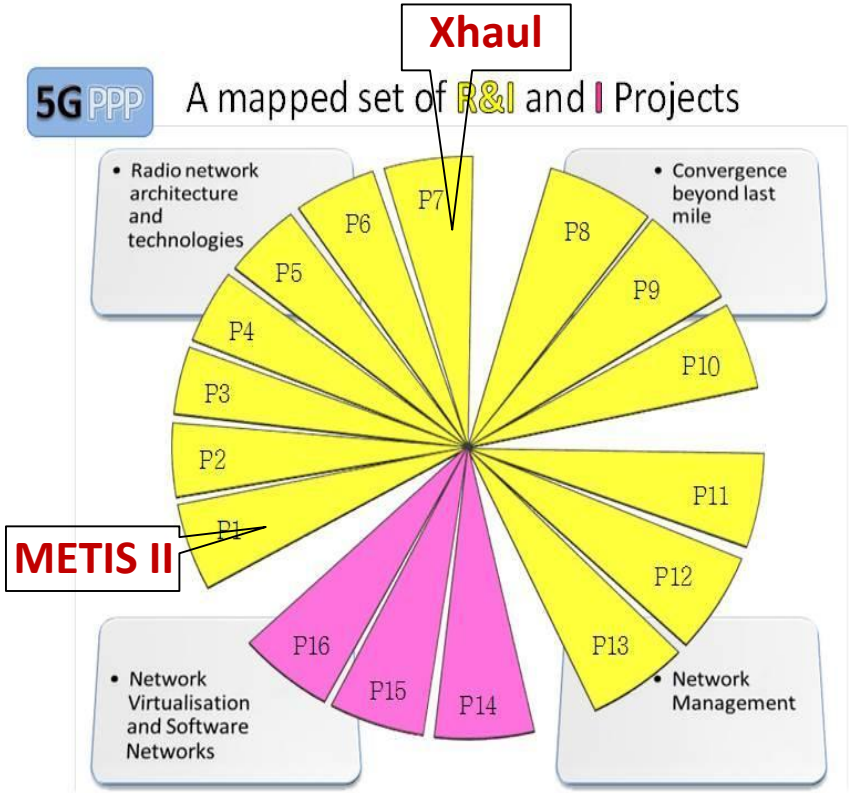
ITRI's Participation in ICT-14 5GPPP Projects - METIS II and Xhaul

METIS – II : 5G Radio Access Network Design

Xhaul : the 5G Integrated Fronthaul / Backhaul





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METIS-II Objectives & Partners

1. Develop the overall 5G radio access network design
2. Provide the 5G collaboration framework within 5G-PPP for a common evaluation of 5G radio access network concepts
3. Prepare concerted action towards regulatory and standardisation bodies

19 Partners:

- Operators: NTT Docomo, Orange, DTAG, Telefonica, Telecom Italia
- Vendors: Ericsson, Nokia, Huawei, ALU, Samsung, Intel
- Academia (in Europe): KTH, Uni Valencia, Uni Kaiserslautern
- SMEs: iDate, Janmedia
- Non-European partners: NYU, Winlab, ITRI

Project coordinator: Olav Queseth, Ericsson

Technical manager: Patrick Marsch, Nokia

https://metis-ii.5g-ppp.eu

“5G RAN design” from METIS-II

- a summary of the potential spectrum usage foreseen and spectrum roadmap recommended in 5G,
- a description of the air interface variants expected to be introduced in the context of 5G, and the air interfaces to be evolved from existing standards,
- a description of how tight novel air interface variants are expected to be integrated with each other and with legacy technologies (e.g. LTE evolution and Wi-Fi), to which extent they should be harmonized or have common functionality in the protocol stack, and on which level different transmission forms should be aggregated,
- a clarification of various key RAN design questions in 5G
- a description of a comprehensive control and user plane design of a 5G RAN, to the level of detail corresponding to “technology readiness level 2”

Protocol layers in focus:
- **PHY** will be investigated from harmonization / integration perspective
- **MAC RLC, PDCP, RRC** functionality will be designed in detail

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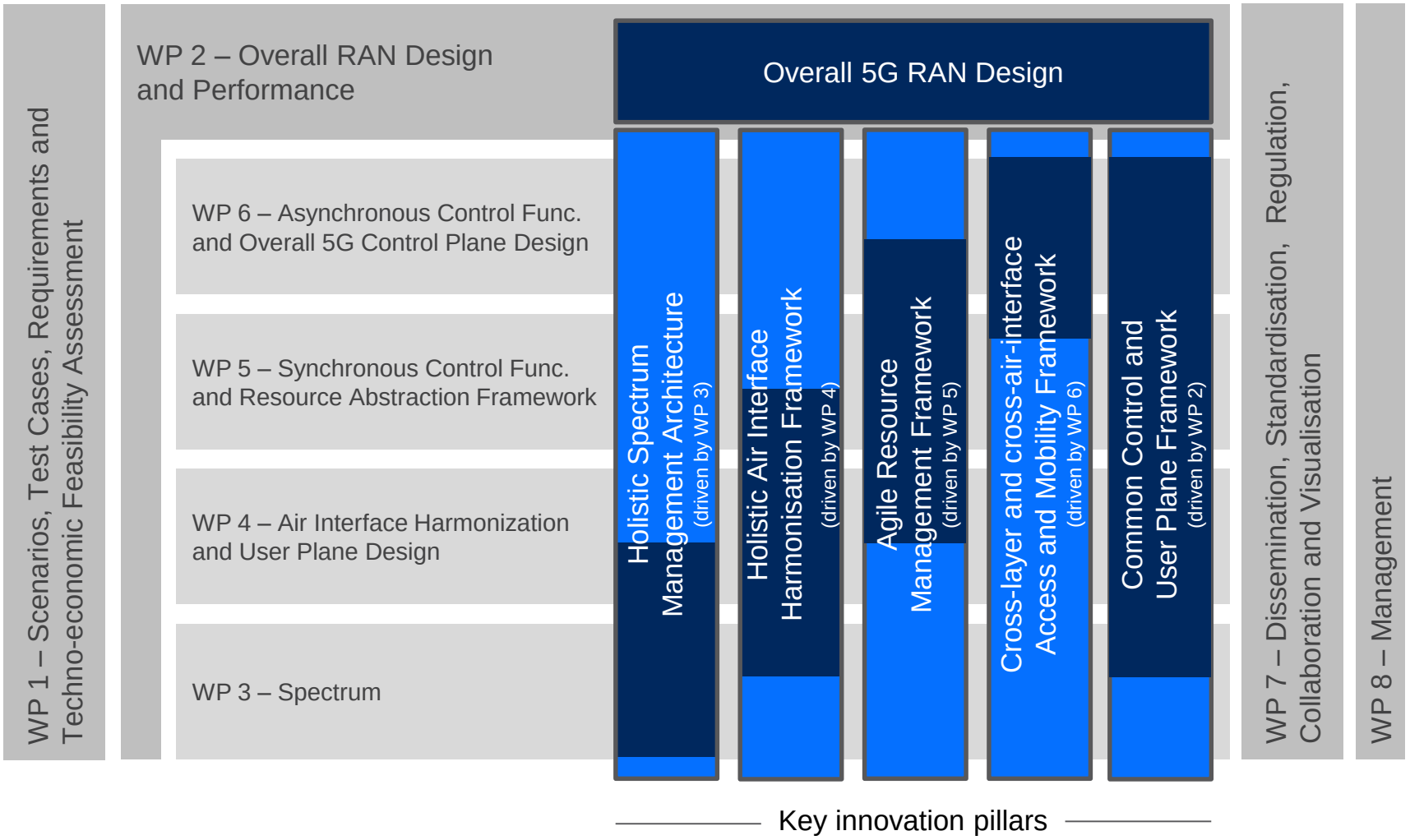
METIS-II Project Structure



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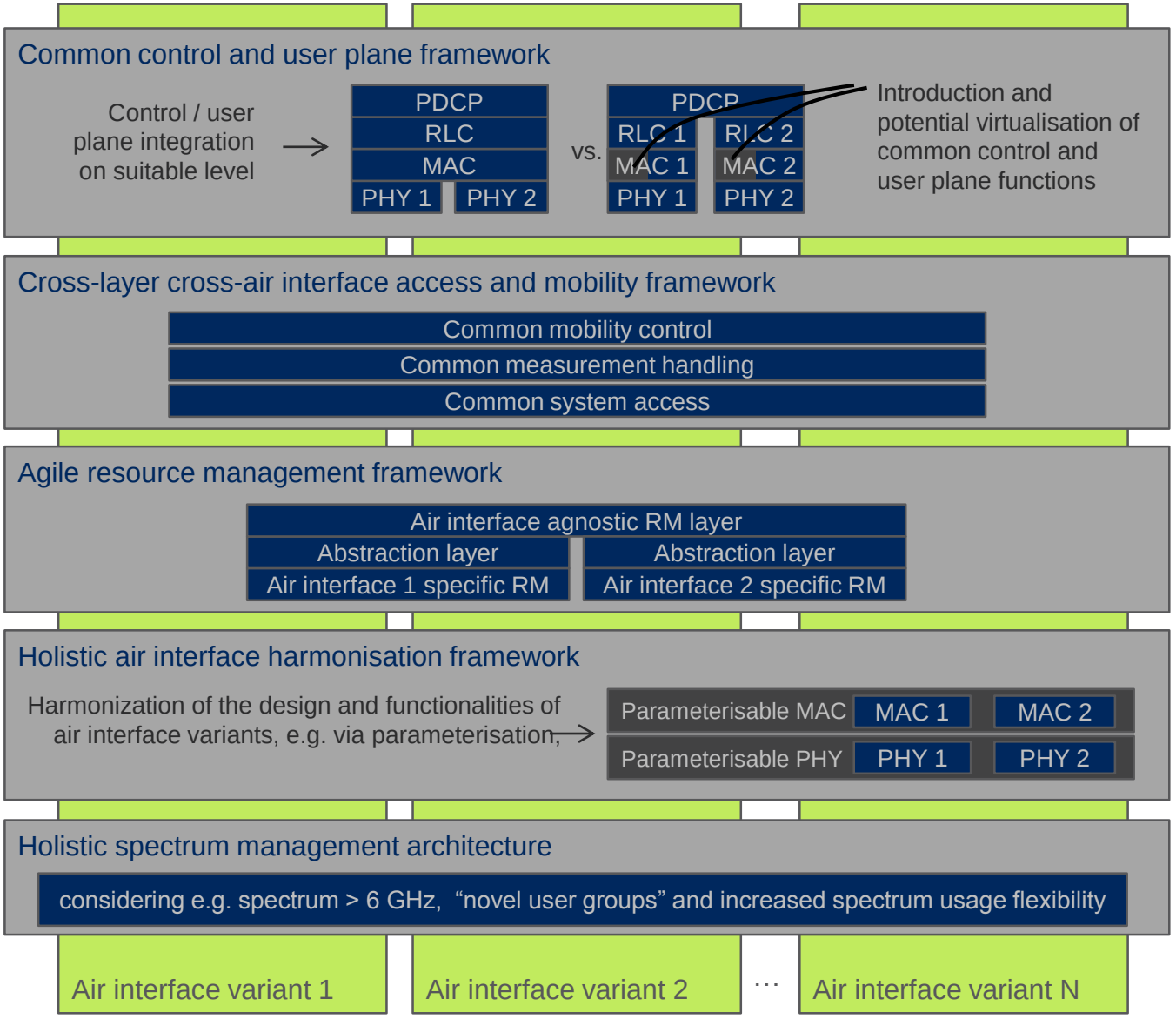
METIS-II Details on Key Innovation Pillars



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Xhaul

Xhaul Objectives & Partners

1. developing an adaptive, sharable, cost-efficient 5G transport network solution integrating the fronthaul and backhaul segments of the network
2. flexibly interconnect distributed 5G radio access and core network functions
3. enable system-wide optimisation of QoS and energy usage as well as network-aware application development

21 Partners:

- Operators: Orange, Telefonica, Telecom Italia
- Vendors: Ericsson AB, Ericsson TI, Nokia, NEC Europe, ATOS, Interdigital Europe
- Academia (in Europe): UC3M, FhG-HHI, Lunds University, CTTC, CREATE-NET, POLITO
- SMEs: CND, Telnet, EBlink, Visiona IP, Nextworks
- Non-European partners: ITRI

Project coordinator: UC3M

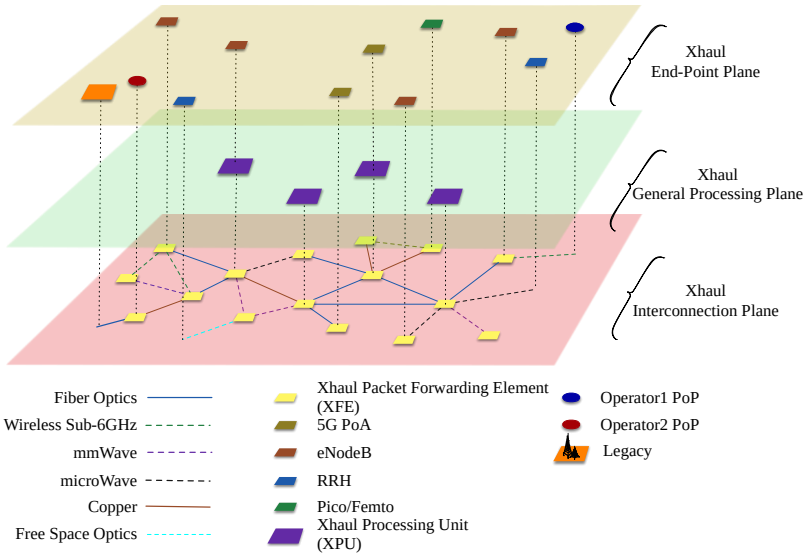
Technical manager: NEC

www.xhaul.eu

Motivation

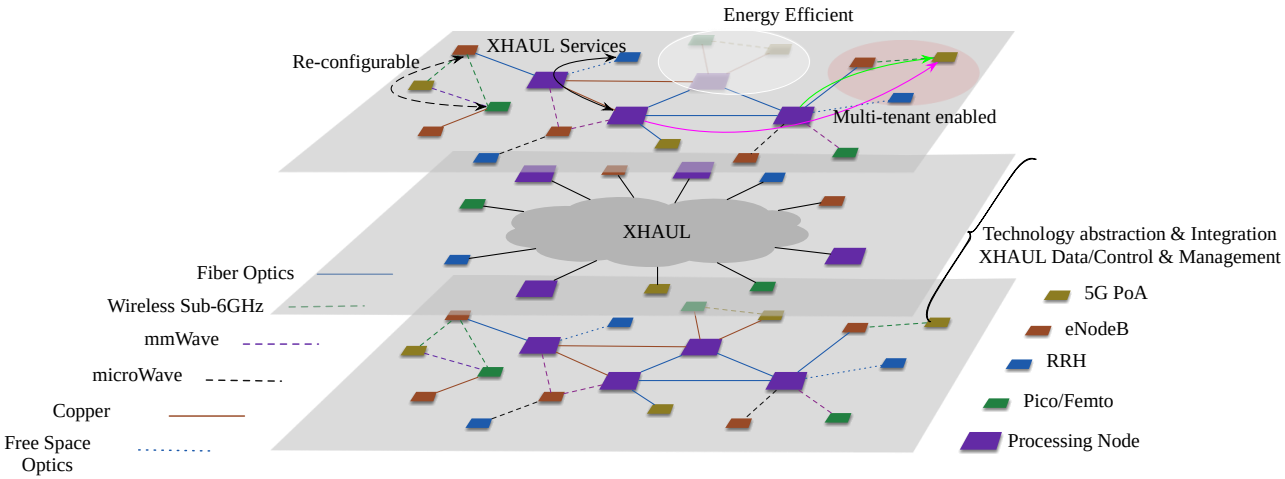
- Operators looking for mechanisms to reduce CAPEX/OPEX in an scenario with reduced ARPU and increased needs in terms of infrastructure
- C-RAN is an effective way of reducing cost of deployment but it poses several challenges for 5G:
  - Point to point links between REs and RECs, does not allow to take advantage of cloud.
  - Two distinct and separated networks to manage, increased OPEX
  - Fiber deployments required and current technologies use too much BW for 5G (order of tens of Gbps)

Physical Infrastructure of Xhaul



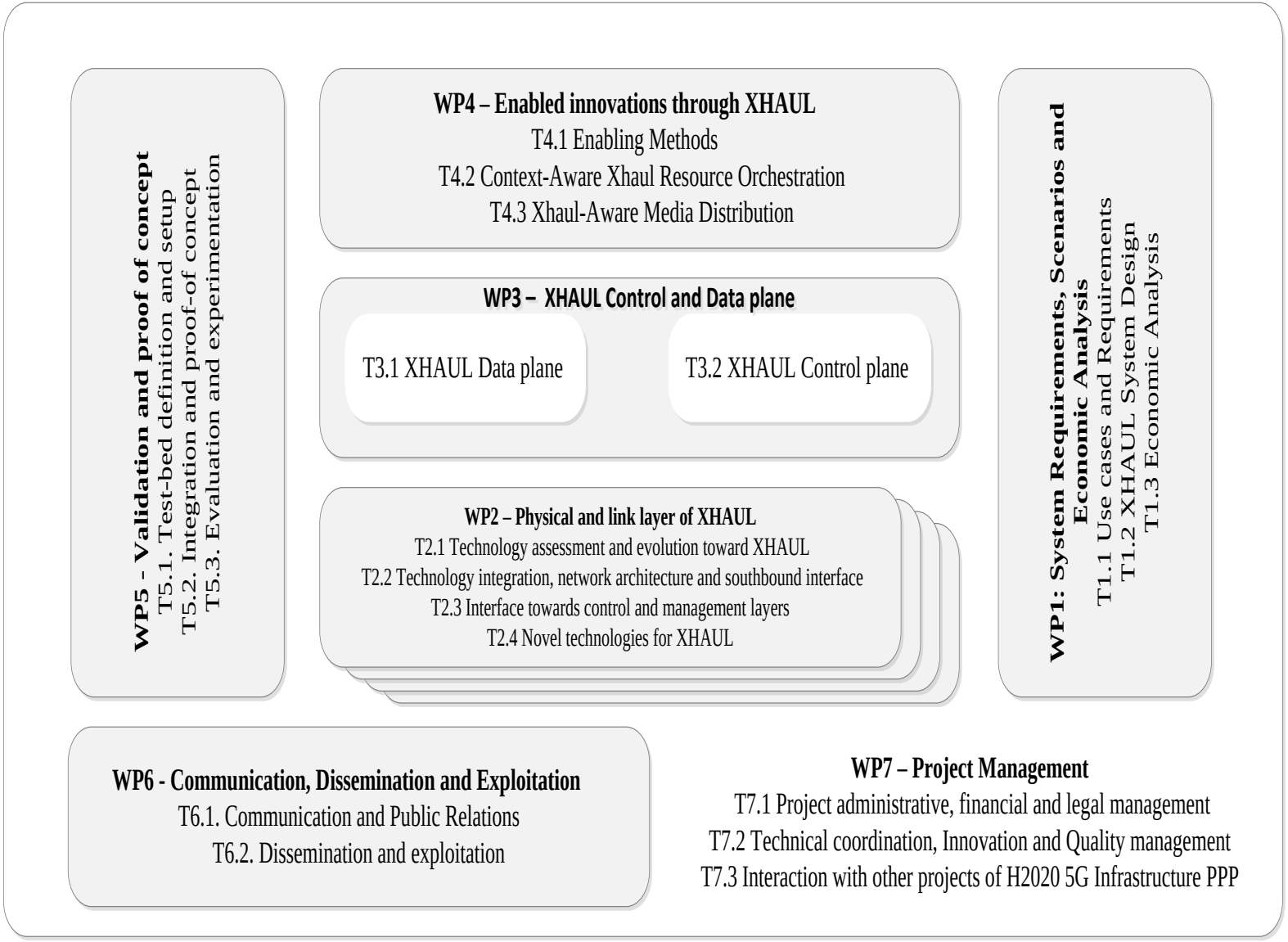
- The "Interconnection Plane" makes use of **Xhaul Packet Forwarding Elements (XFE)** to **interconnect a broad set of novel technologies to create a packet-based network** that can meet the demands of 5G networks.
- The "Xhaul General Processing Plane" shows the different Xhaul Processing Units (XPUs) that carry out the bulk of the operations in the Xhaul.
- The different functional distributions between 5GPoA and XPU relation and the different services that can be hosted in the XPUs are represented by the different connection options between the uppermost ("End-Point Plane") and the middle layer.

Functional Architecture of Xhaul



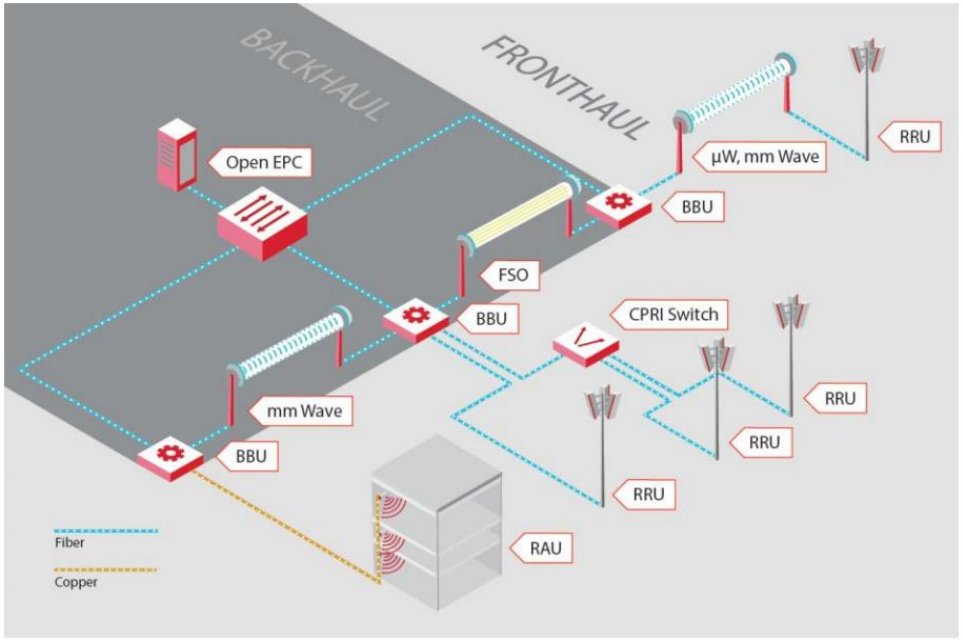
- The middle layer represents one of the key concepts associated to Xhaul: the integration of the different technologies (including **fronthaul and backhaul**) in a common packet network based on **technology abstraction, unified framing and common data, control and management planes**.
- Finally, the upper layer presents a selection of the features offered by the Xhaul infrastructure

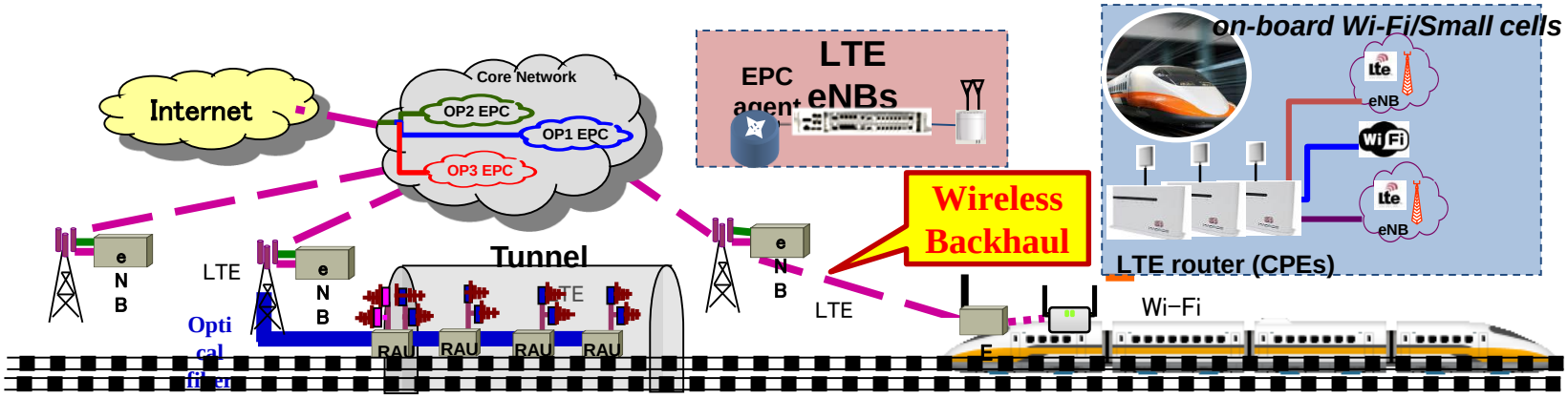
Project Structure



Xhaul Test Beds

- FhF-HHI in Berlin
  - A real world end to end network for early evaluation of Xhaul concepts.
- HSR Test Bed in Taiwan
  - Evalutaion of Xhaul Mobility





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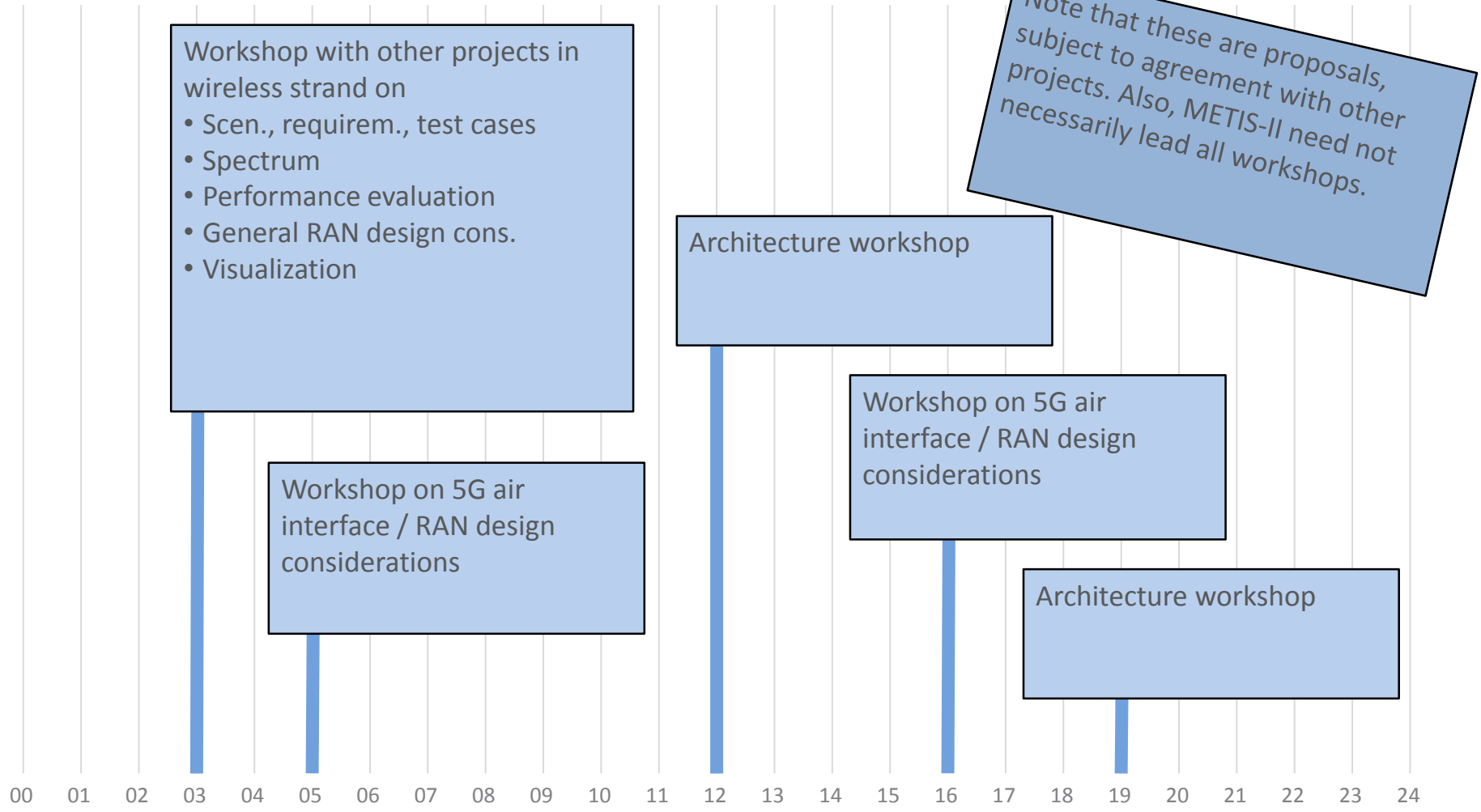
Considerations on Cross-Project Workshops



Thank you