Empowered by Innovation NEC

Integrating Fronthaul and Backhaul

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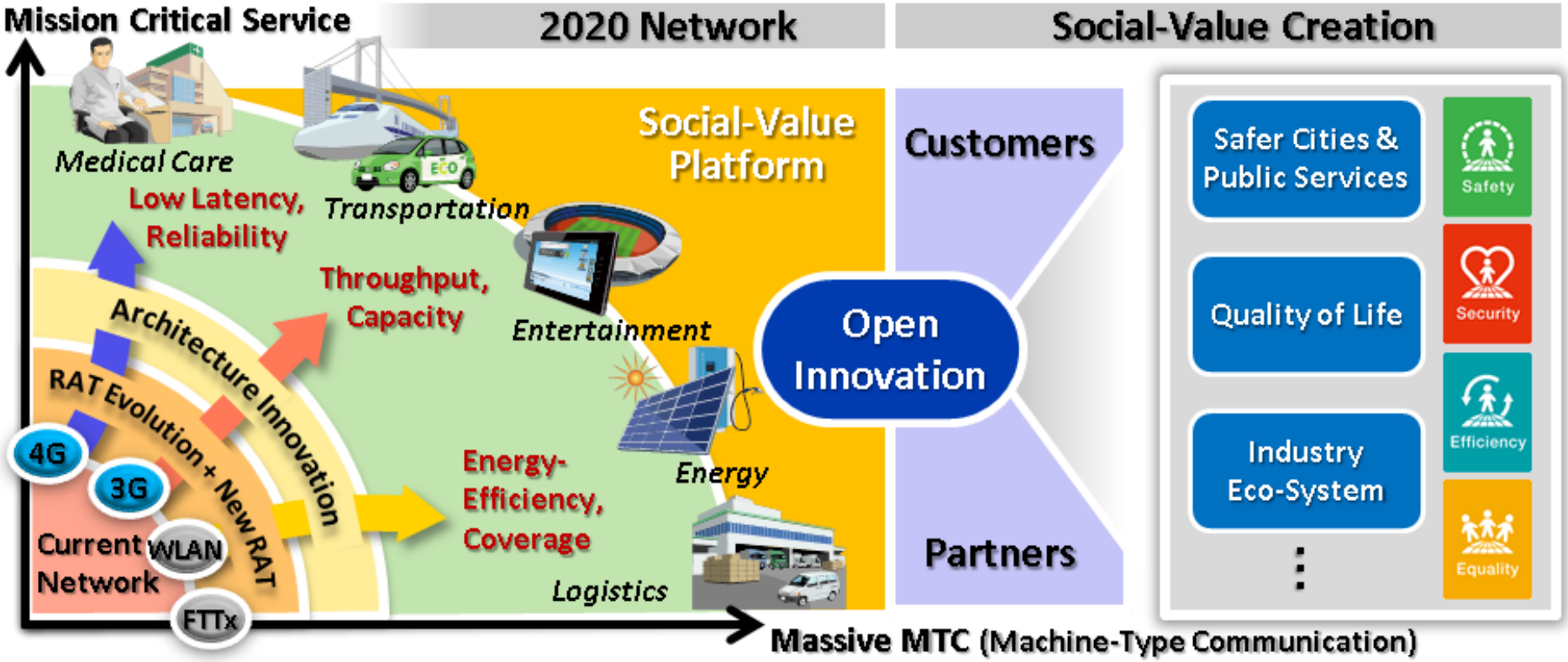
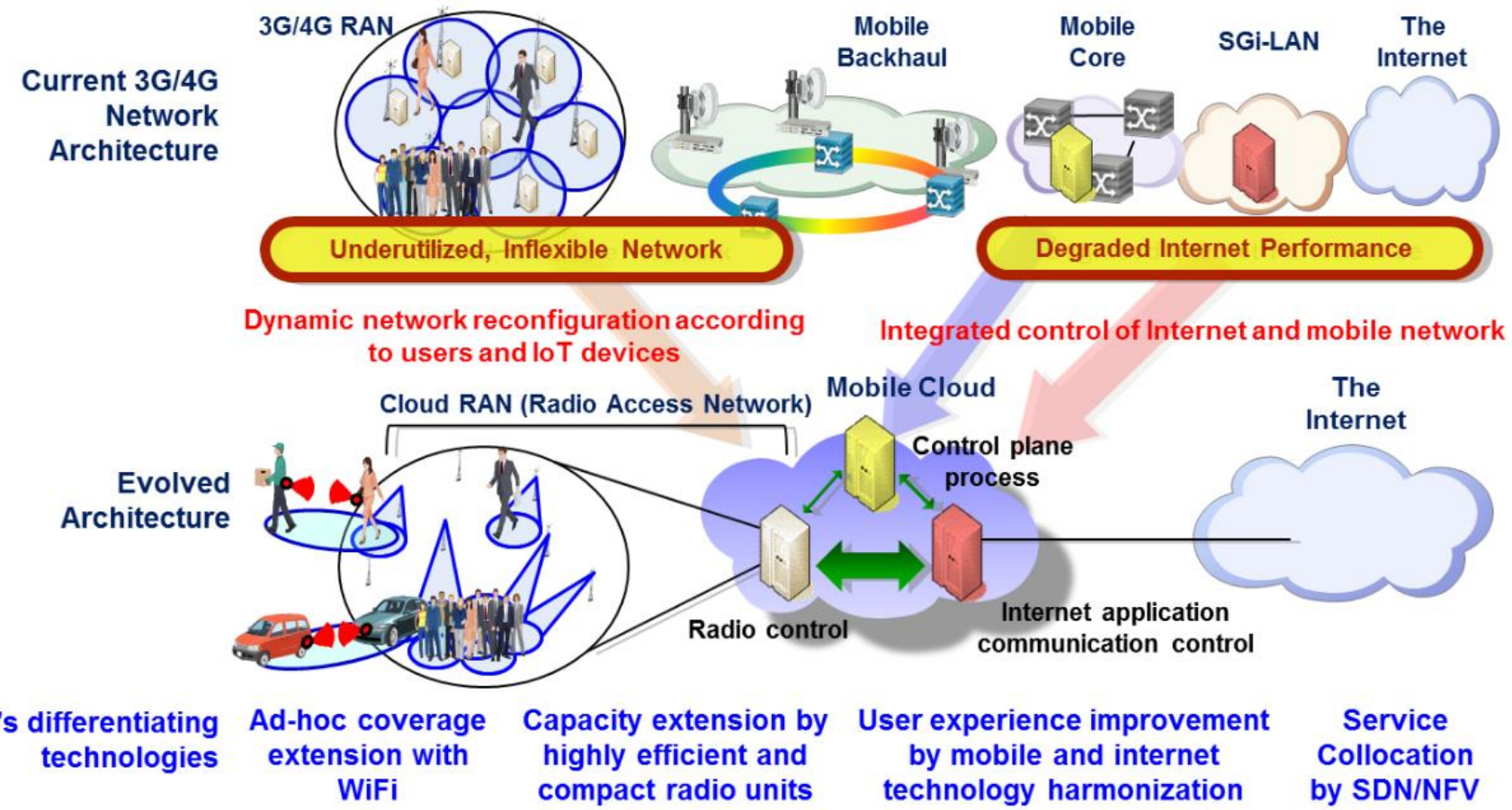
NEC's Network 2020 Vision



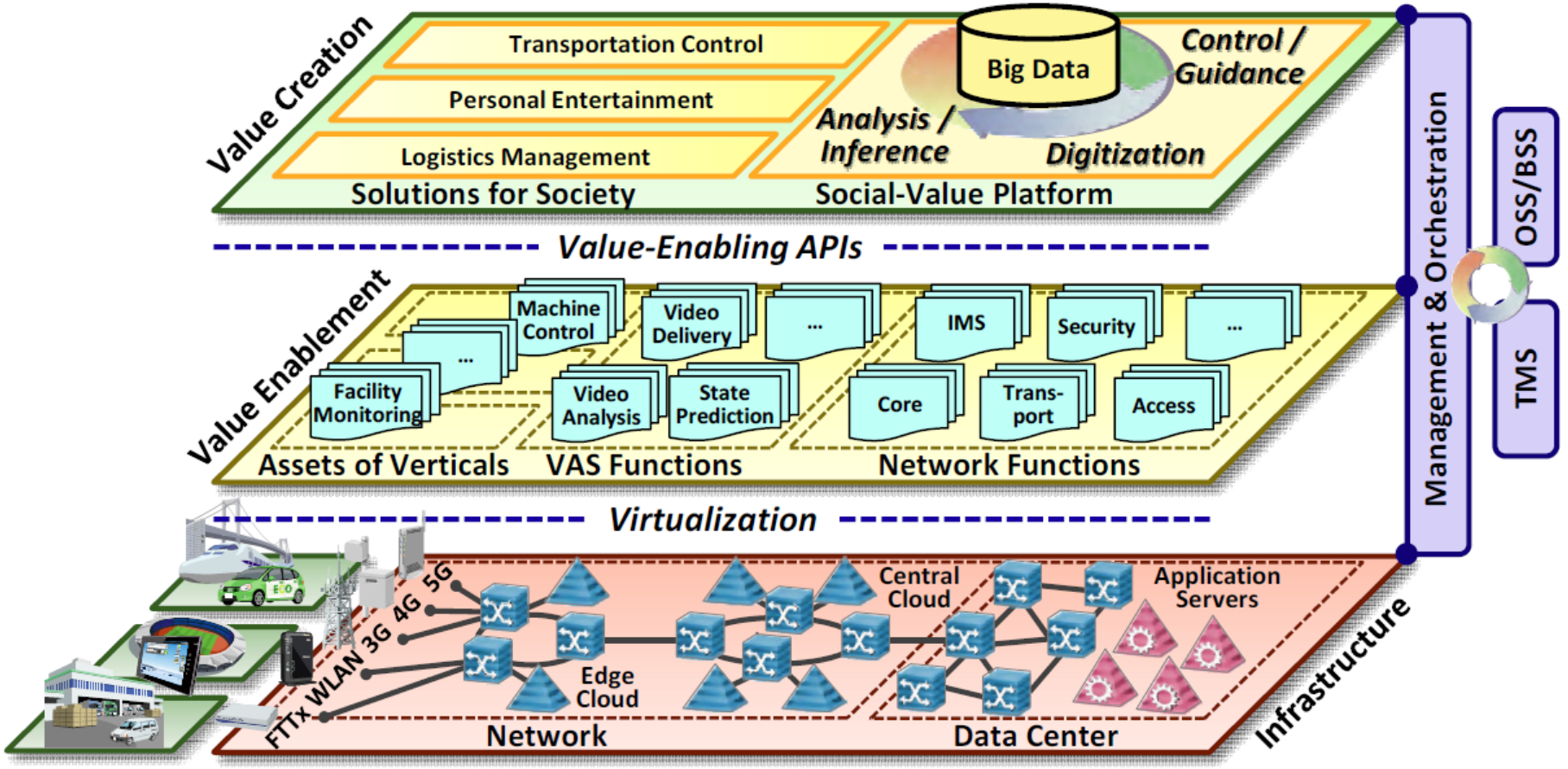
5G NEC‘s View – White Paper at MWC

MOBILE WORLD CONGRESS
BARCELONA 2-5 MAR 2015



5G goes beyond an evolutionary approach

NEC's 5G Architecture



5GPPP PROJECT ON
5G BH/FH INTEGRATION

5GPPP Project on 5G BH/FH Integration

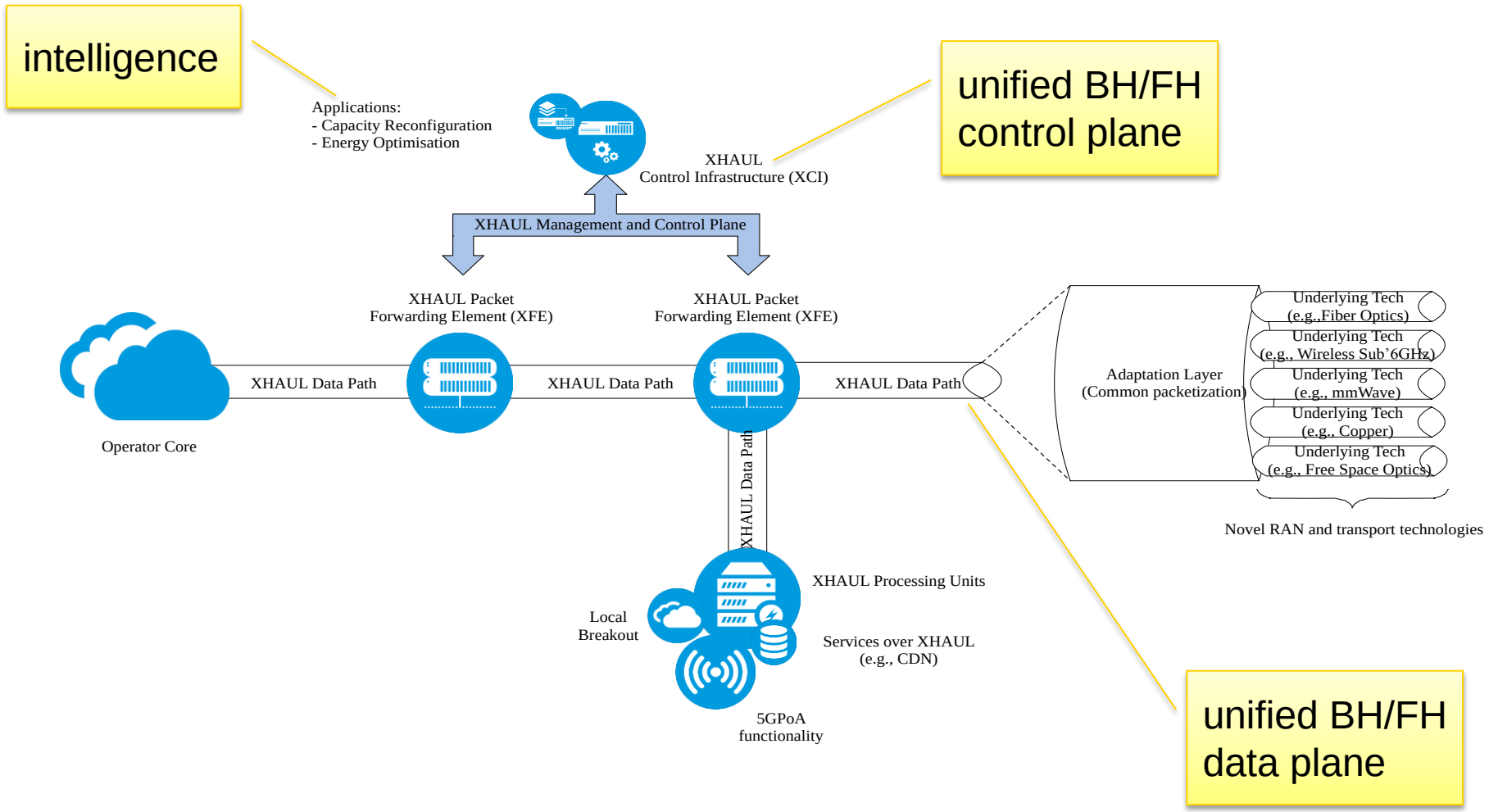
- Project duration: 30 Months, project starts from 1st of July 2015
- Xavier Costa, NEC, Technical Manager of the project

#	Participant organisation name	Short Name	Country
1	Universidad Carlos III de Madrid	UC3M	ES
2	NEC Europe LTD	NEC	UK
3	Ericsson AB	EAB	SE
4	Ericsson Telecomunicazioni	TEI	IT
5	Atos Spain SA	ATOS	ES
6	Nokia Solutions and Networks GMBH & CO KG	NOK-N	DE
7	InterDigital Europe LTD	IDCC	UK
8	Telefónica Investigación y Desarrollo SA	TID	ES
9	Telecom Italia Spa	TI	IT
10	Orange SA	ORANGE	FR
11	Visiona IP	VISIONA	ES
12	EBlink	EBlink	FR
13	Nextworks	NXW	IT
14	Core Network Dynamics	CND	DE
15	TELNET Redes Inteligentes	TELNET	ES
16	Fraunhofer-Gesellschaft zur Foerderung der angewandten Forschung e.V.	FhG-HHI	DE
17	Centre Tecnològic de Telecomunicacions de Catalunya	CTTC	ES
18	Center for research and telecommunication experimentation for networked communities	CREATE-NET	IT
19	Politecnico di Torino	POLITO	IT
20	Lunds Universitet	ULUND	SE
21	Industrial Technology Research Institute (ITRI)	ITRI	TW

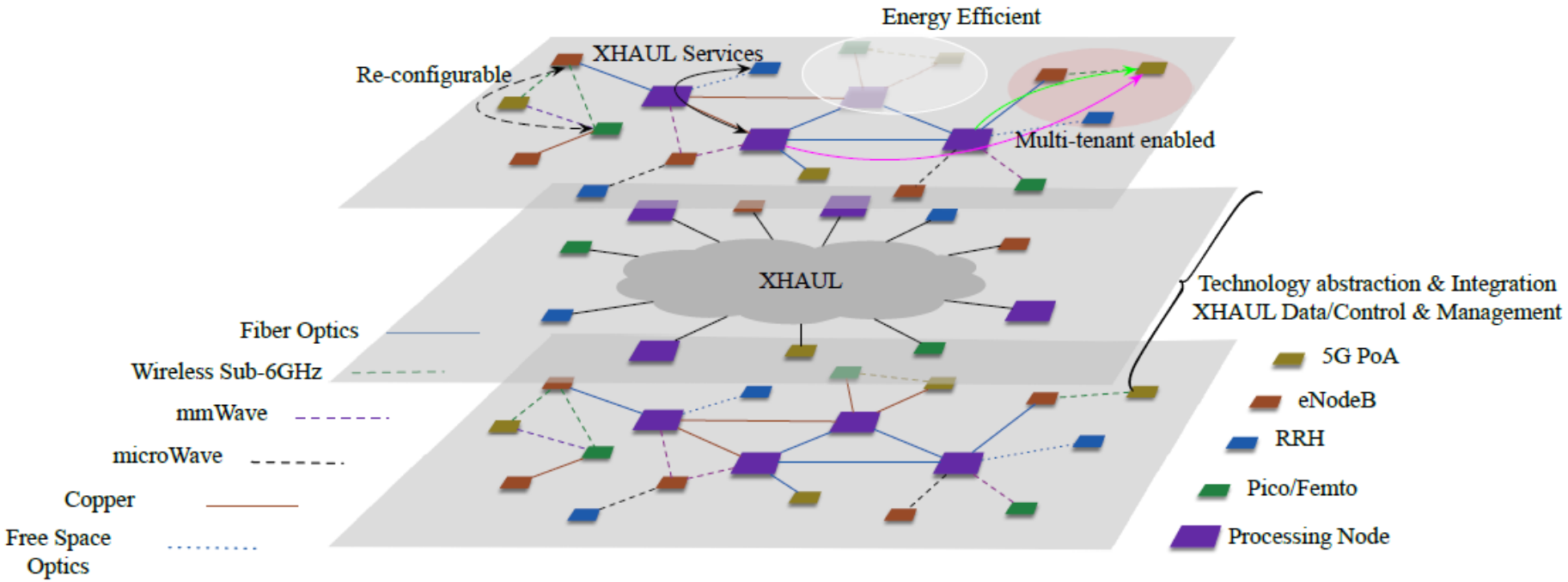
Project Scope

- **Develop novel physical and link layer technologies meeting 5G requirements**
- **Develop a unified data plane for backhaul and fronthaul**
  - Supporting all RAN functional splits
  - Supporting required synchronization
  - With one versatile frame format
  - Requires new packet switch architectures
- **Develop a unified control plane for backhaul and fronthaul based on SDN**
  - Common network model
  - Common set of API functions
  - Resulting in abstraction layer for BH/FH
- **Develop enabling and exploiting “SDN apps” on top of abstraction**
  - Monitoring and prediction framework
  - Backhaul/fronthaul infrastructure planning and dimensioning
  - Context-aware resource management (RAN policies, routing, function placement)
  - Network-aware media distribution framework
- **Evaluate the developed Xhaul technologies integrated on a 5G testbed in a real-world environment under realistic system constrains**

Xhaul Concept and Approach



Xhaul Concept and Approach



Work Packages

WP1: System Requirements, Scenarios and Economic Analysis

Define and prioritize the Xhaul requirements and use cases, design baseline architecture and assert the economic viability of the solutions for real-world deployment.

WP2: Physical and link layer of Xhaul

Investigate the applicability of different latest access, aggregation and transport technologies (at both physical and link layer) as well as develop network architecture for integration of different technologies to realize a novel integrated fronthaul and backhaul network, capable of meeting the tight 5G requirements in terms of synchronization, latency, jitter, etc.

WP3: Xhaul Control and Data Planes

- Design the Xhaul data plane to create a common transport network by designing a unfiled and versatile frame format and the corresponding protocol suit to support flexible split of radio and 5GPoA functionalities and to transport the fronthaul and backhaul traffic on the same physical link.
- Design a common control and management plane based on SDN approach, with a novel design of SDN controller and the corresponding southbound and northbound interface.

WP4: Enabled innovations through Xhaul

- Develop enabling methods including dimensioning and planning of the Xhaul infrastructure, end-to-end monitoring and prediction framework, Xhaul-aware media distribution framework.
- Develop context-aware Xhaul resource orchestration algorithms for joint optimization of RAN policies (e.g. scheduling, CoMP, shaping, handover), routing policies and RAN/Xhaul function placement (e.g. BBU, virtual IP edge, traffic offload).

WP5: Validation and proof of concept

Set up a 5G testbed to integrate the technology components and solutions developed in WP2, WP3 and WP4, to perform evaluation and experimentation of various PoC of key Xhaul technologies in a real-world environment under realistic system constrains.

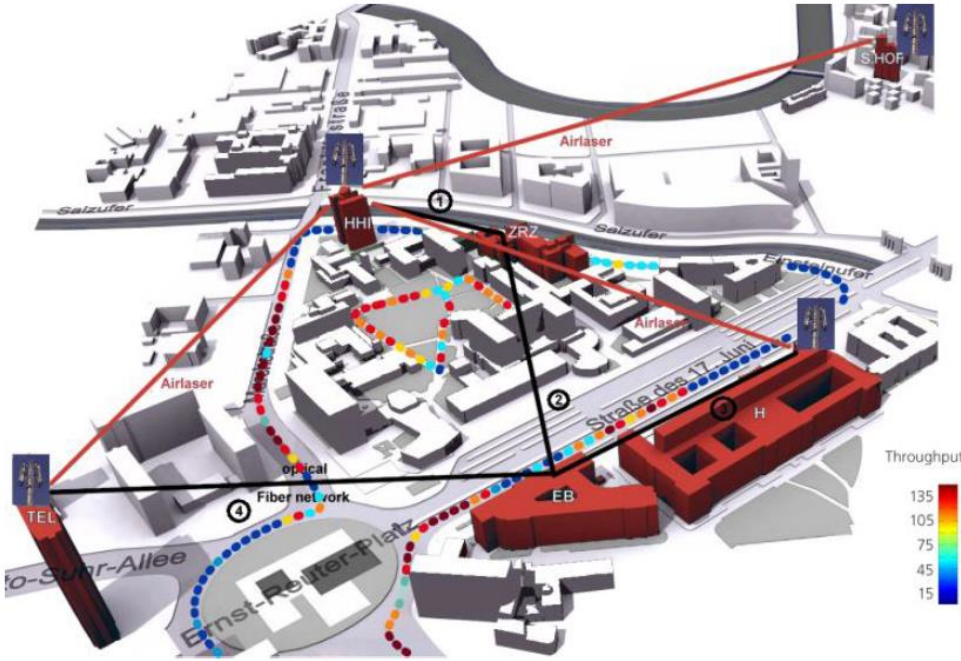
WP6: Communication, Dissemination and Exploitation

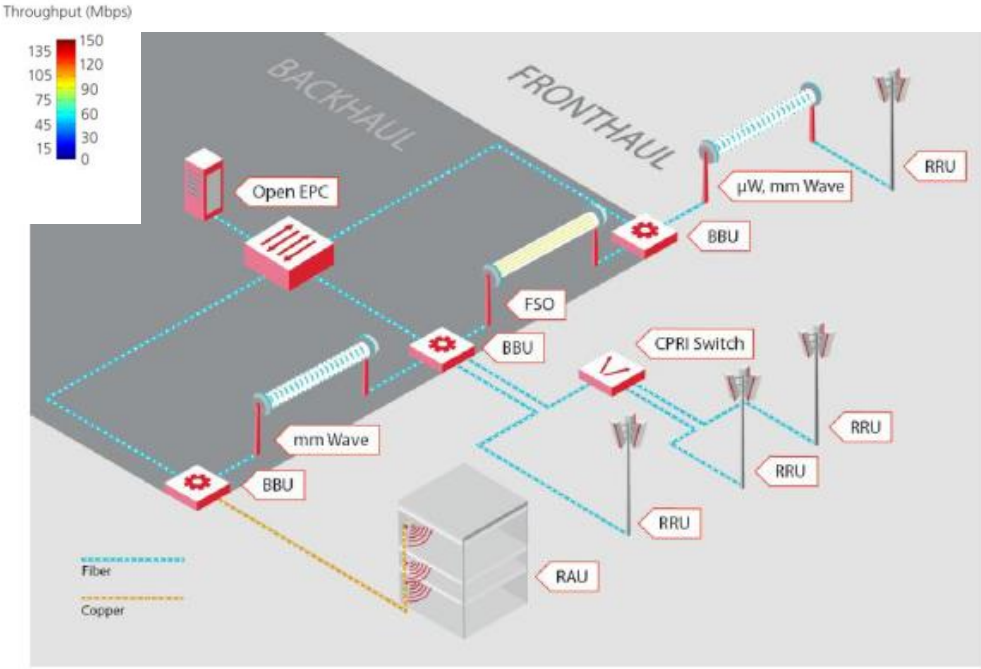
Set up and execute viable plans for Xhaul communication, dissemination and exploitation activities with the aim to achieve high measurable impact of project results, leading to successful adoption of novel Xhaul technologies into future standards and innovation products.

WP7: Project Management

Project administrative, finical and legal management, technical innovation and quality management, and interaction with other projects of the H2020 5G PPP and other EU initiatives.

Xhaul FH/BH Integration Demonstration





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