5G-Crosshaul Architecture Overview

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The 5G Integrated Fronthaul/Backhaul Tranport Network
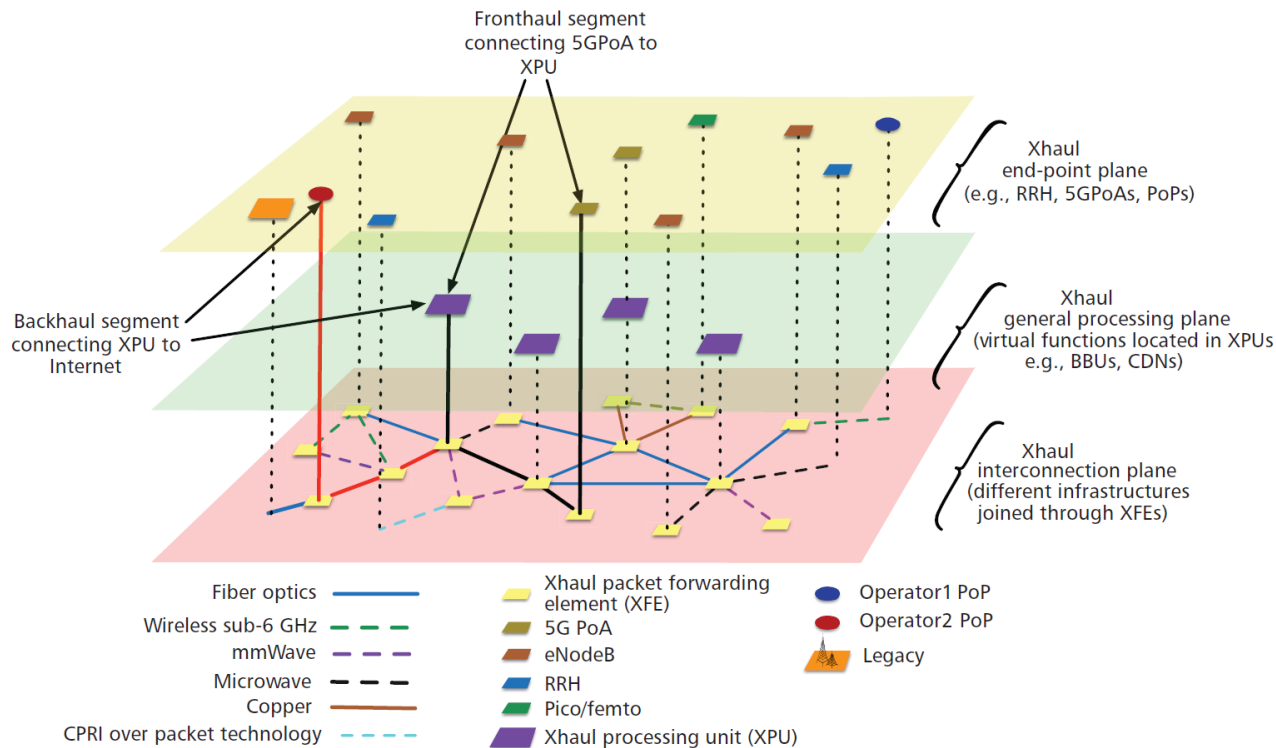
5GXCrosshaul

▌ Formerly: Xhaul project

▌ Website: www.5g-crosshaul.eu

▌ Project overview: 'Xhaul: Toward an integrated fronthaul backhaul architecture in 5G networks', IEEE Wireless Communications Magazine, Oct 2015

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5G-Crosshaul Overview

Fronthaul segment connecting 5GPoA to XPU

Backhaul segment connecting XPU to Internet

Xhaul end-point plane (e.g., RRH, 5GPoAs, PoPs)

Xhaul general processing plane (virtual functions located in XPUs e.g., BBUs, CDNs)

Xhaul interconnection plane (different infrastructures joined through XFEs)

Fiber optics
Wireless sub-6 GHz
mmWave
Microwave
Copper
CPRI over packet technology

Xhaul packet forwarding element (XFE)
5G PoA
eNodeB
RRH
Pico/femto
Xhaul processing unit (XPU)

Operator1 PoP
Operator2 PoP
Legacy

Project Consortium

Operators
Orange, Telefonica, Telecom Italia

Vendors
ATOS, Ericsson, Interdigital, NEC, Nokia

Broadcaster/ Tech. Provider
Visiona, Telnet

SMEs
Eblink, Nextworks, CND,

R&D Centers
Create-net, CTTC, Fraunhofer HHI, ITRI

Universities
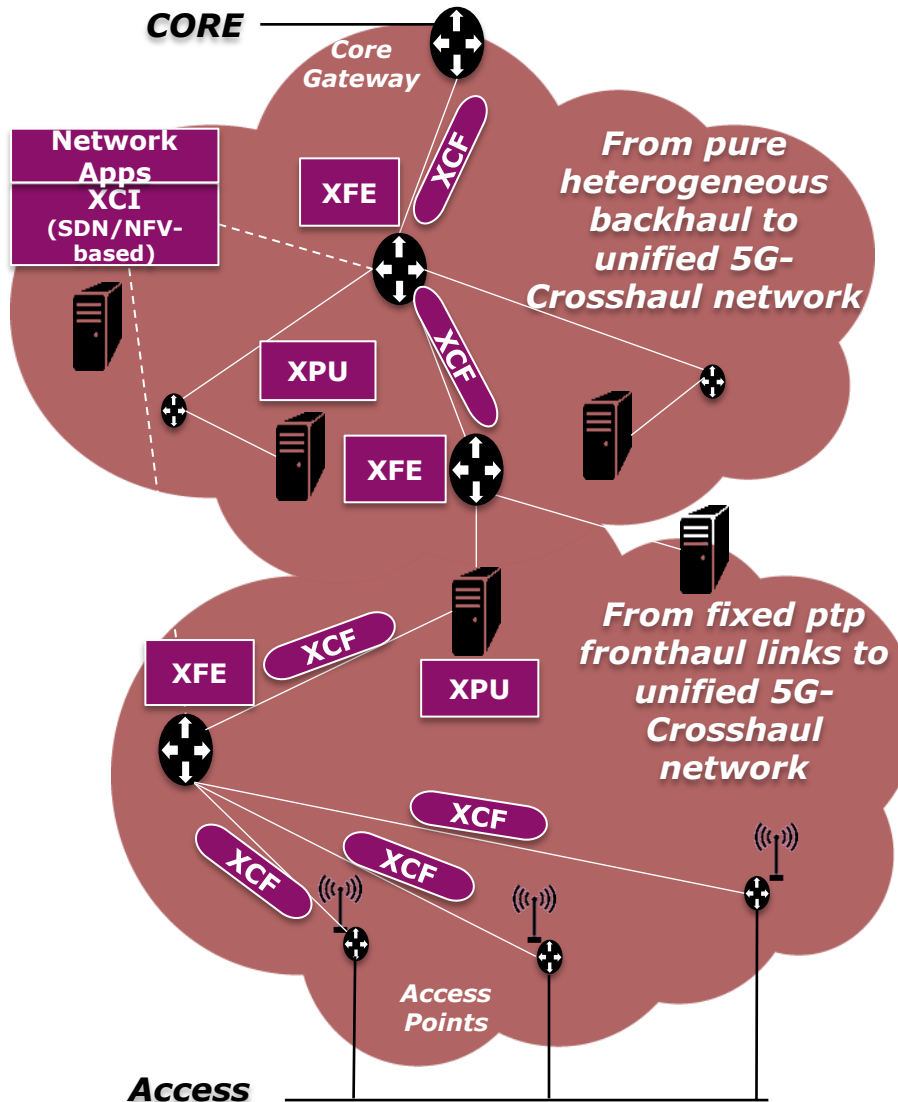Univ. Carlos III, Univ. Lund, Pol.Torino

PM – Arturo Azcorra (UC3M)

TM - Xavier Costa (NEC)

R&D Areas

▌Unified control plane for fronthaul/backhaul SDN/NFV-based (XCI)

▌Unified data plane for fronthaul/backhaul technologies (XCF, XFE)

▌5G-enabling transm. techs, e.g., mmWave, uWave, optical and copper

▌UCs: Dense Urban Society, Multi-Tenancy, Media Distr, MEC, Vehicular

▌5G-Crosshaul demonstration testbeds in Berlin, Madrid, Barcelona, Taiwan
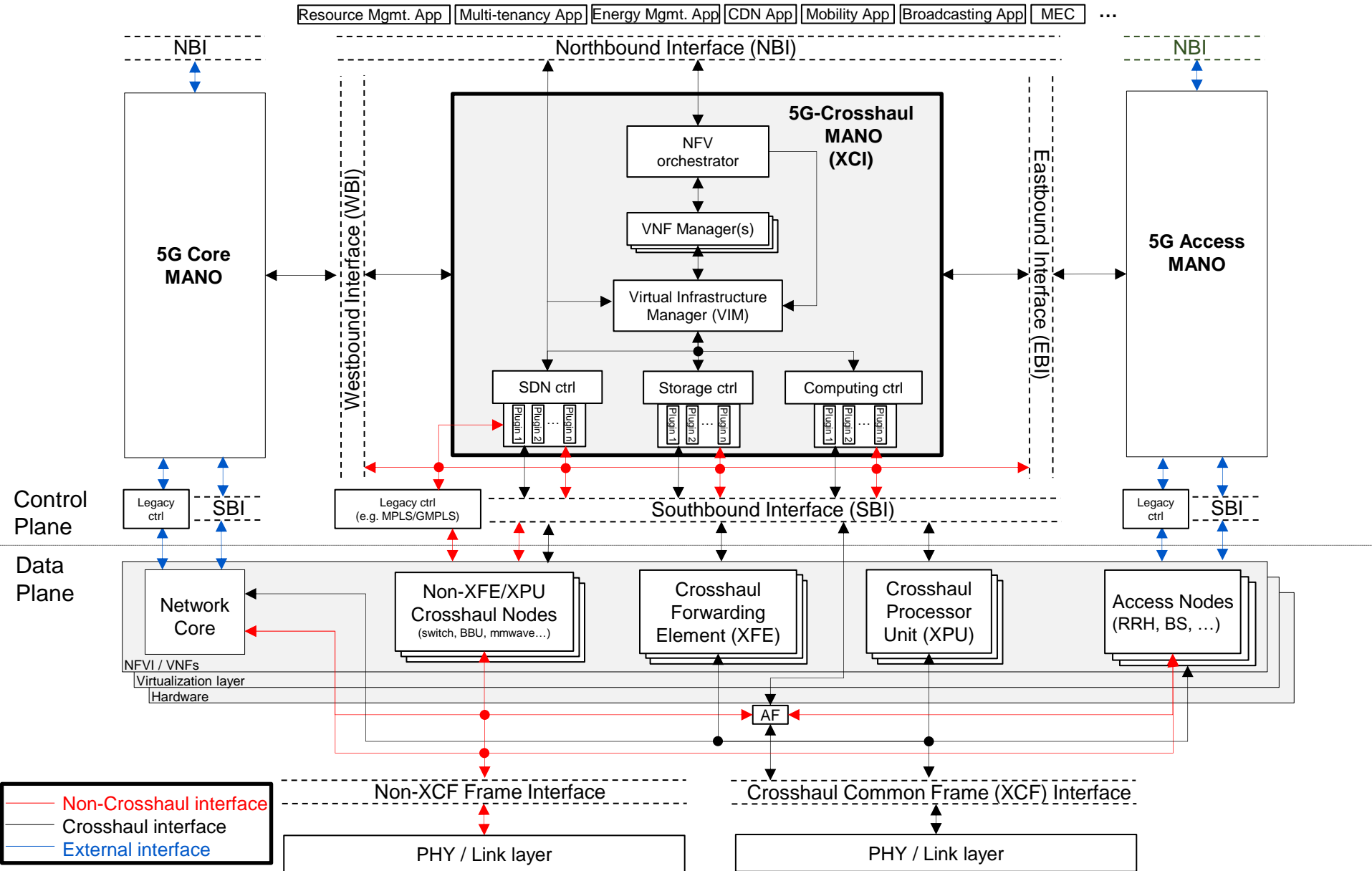
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A holistic approach for converged Fronthaul and Backhaul under common SDN/NFV-based control, capable of supporting new 5G RAN architectures (vRAN) and performance requirements
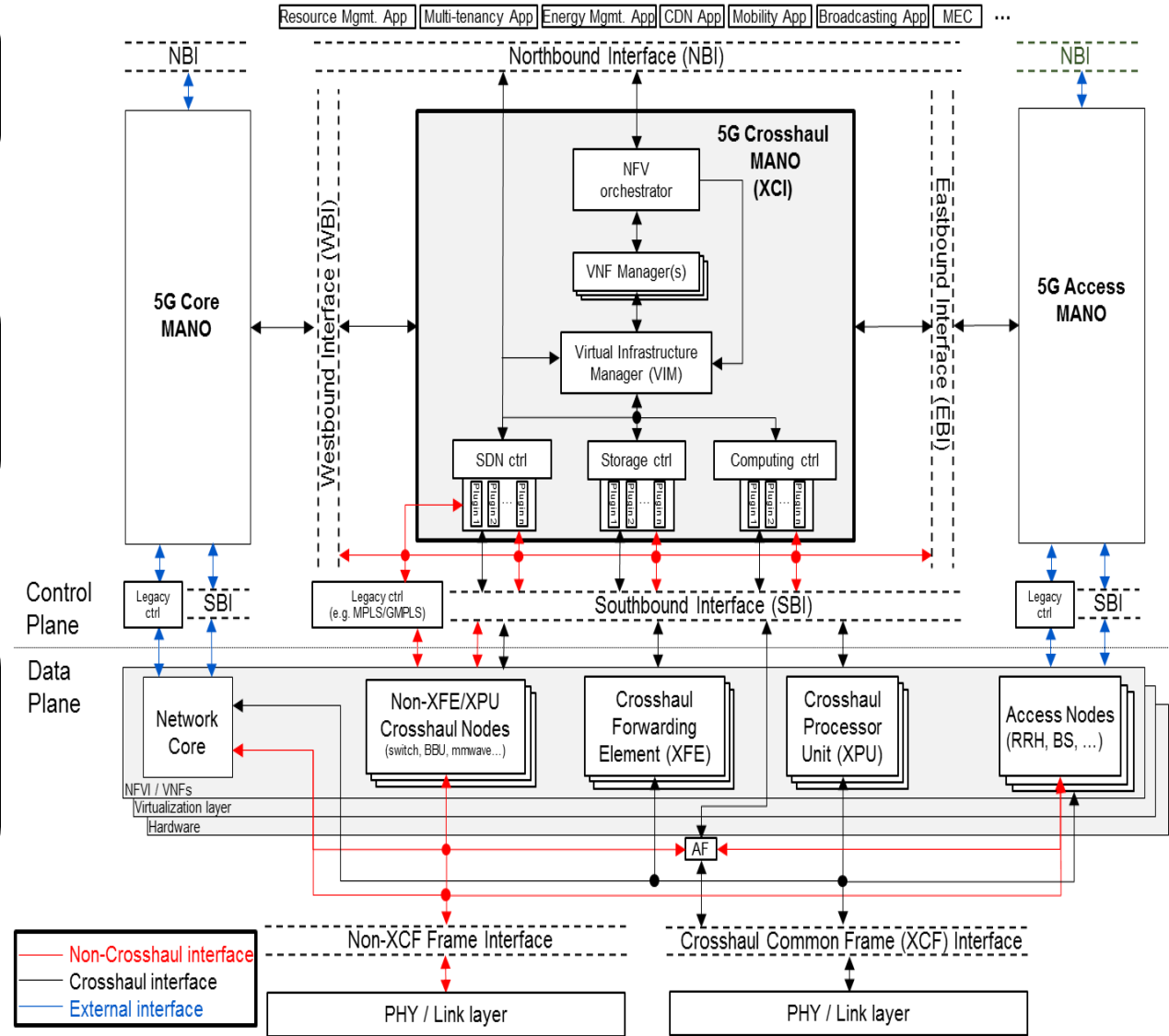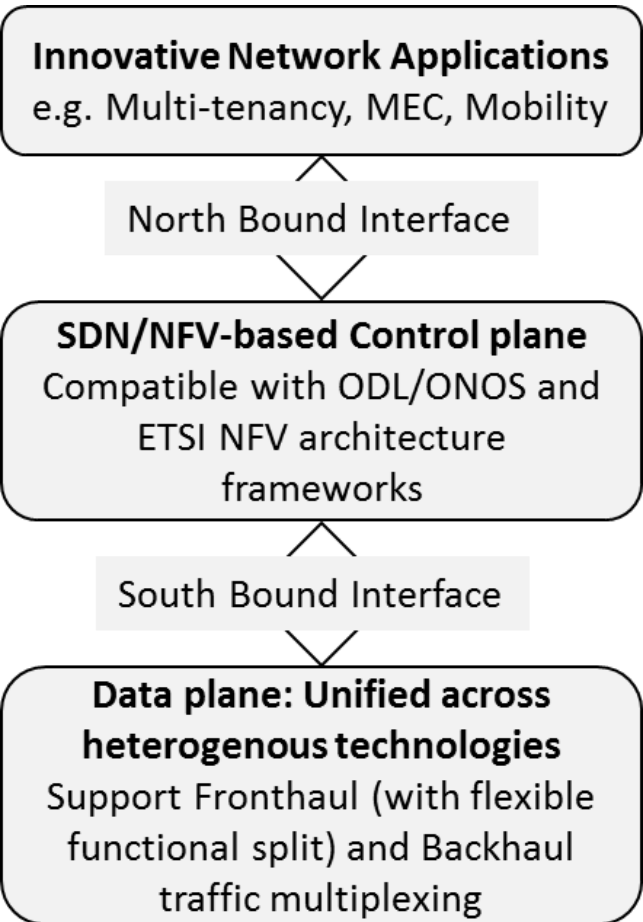
Main building blocks

- **XCF – Common Frame** capable of transporting the mixture of various Fronthaul and backhaul traffic

- **XFE – Forwarding Element** for forwarding the Crosshaul traffic in the XCF format under the XCI control

- **XPU – Processing Unit** for executing virtualized network functions and/or centralized access protocol functions (vRAN)

- **XCI – Control Infrastructure** that is SDN-based and NFV-enabled for executing the orchestrator's resource allocation decisions

- **Novel network apps** on top to achieve certain KPIs or services

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5G-Crosshaul Architecture - Overall view

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