

5G, características e tecnologias de suporte



Francisco Fontes

Senior Researcher @IT/Aveiro, fontes@av.it.pt
Senior Consultant @AlticeLabs, fontes@alticelabs.com

Encontro Ciência 2018

Lisbon/Portugal

Centro de Congressos de Lisboa

4/Jun/2018

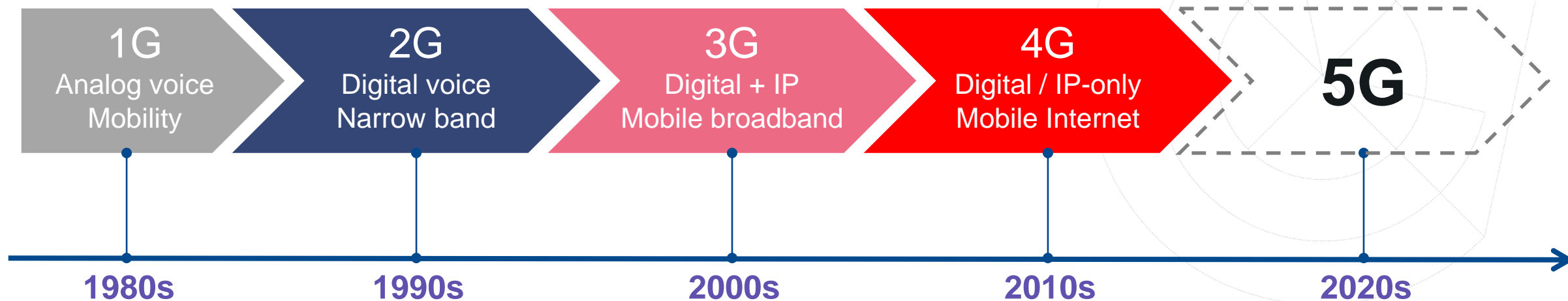


instituto de
telecomunicações

INSTITUIÇÕES ASSOCIADAS



The path to 5G



Enabling a seamlessly connected society in the 2020 timeframe and beyond that brings together people along with things, data, applications, transport systems and cities in a smart networked communications environment

ITU-R (International Telecommunication Union)

5G scope

Usage scenarios of IMT for 2020 and beyond

Enhanced mobile broadband

4G++

Gigabytes in a second



3D video, UHD screens



Work and play in the cloud



Augmented reality



Industry automation



Mission critical application



Self driving car

Voice



Future IMT



Smart home/building

Smart city

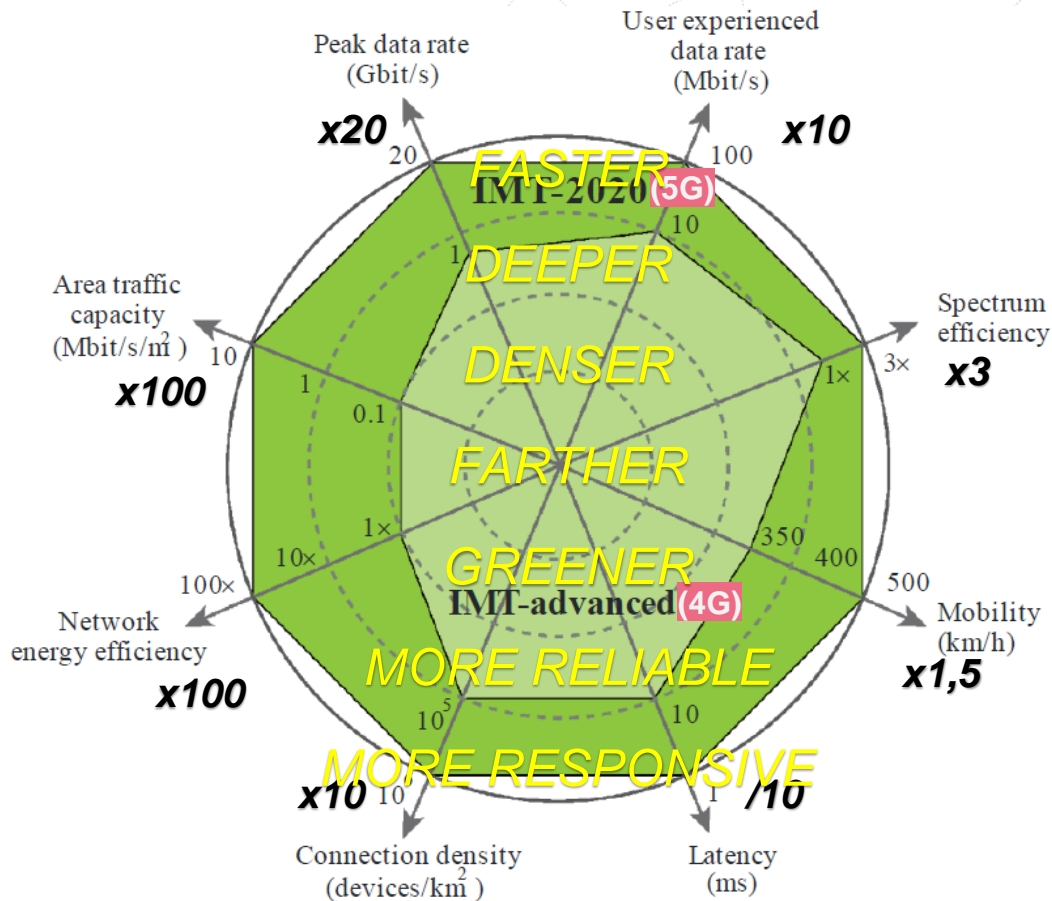
Massive machine type communications

massive IoT

Ultra-reliable and low latency communications

critical IoT

Requirements 'quantification' (Enhancement of key capabilities)

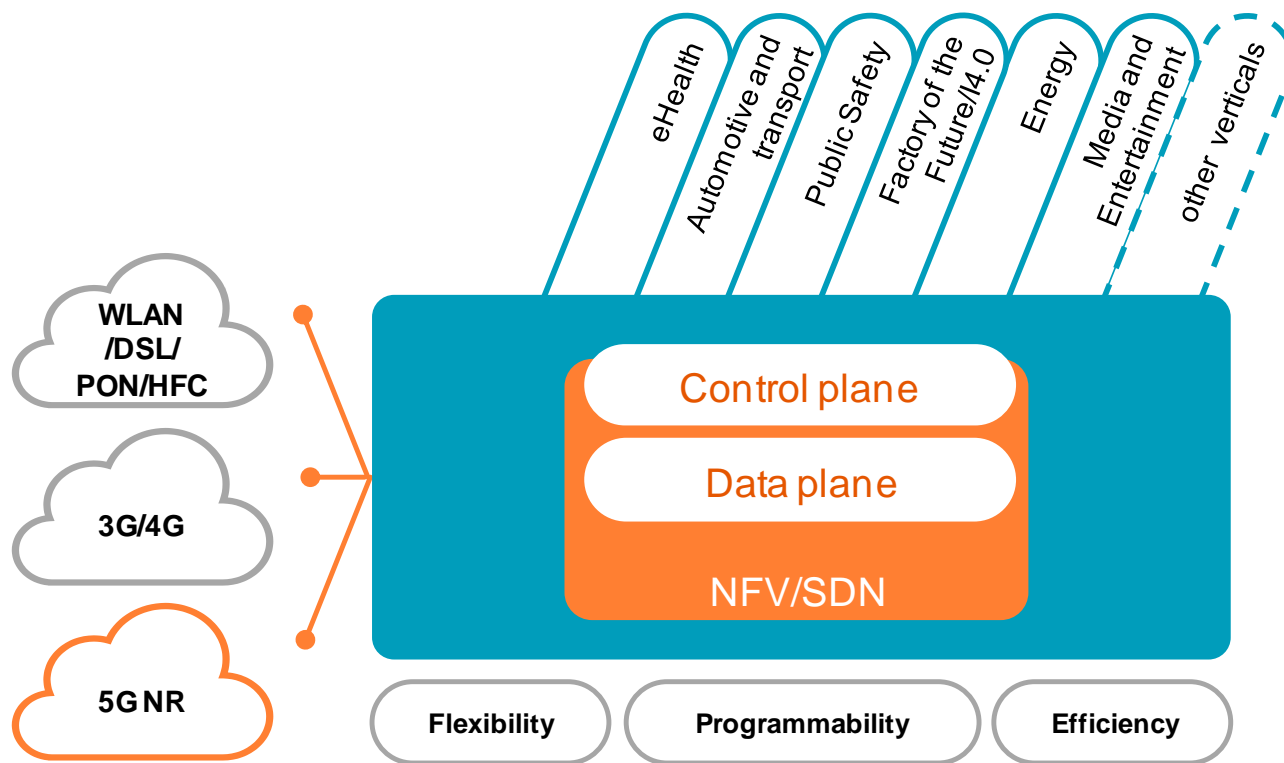


M.2083-03

With **5G**, wireless/mobile communications will become a **GPT** (General Purpose Technology)

(IHS: "GPTs lead to deep and sustained impacts across a broad range of industries that often redefine economic competitiveness and transform societies")

Technically, 5G is ...



5G New Radio (NR) to “connect everything”: a **unified air interface**

You will be seeing 5G NR connectivity in your smartphones, cars, utility meters, wearables and much more (Qualcomm)

5G new architecture to “interconnect everything”: a **common core network**

The new architecture shall support at least the new RAT(s), the Evolved E-UTRA, non-3GPP accesses and minimize access dependencies (3GPP TR 23.799)

Next generation of (mobile) communications

Based on a **new, unified, air interface** (NR) and a **new network architecture**, to connect everything

Providing **significant performance improvements** over current (4G/LTE Adv) networks (KPI)

Able to **embrace all sort of wireless/wired accesses**, sharing a common core (5G CN)

To be **built on technologies (NFV&SDN)** which provide a high level of flexibility and programmability

To start commercial **deployments around 2020**

“Mobilizador 5G”, Project overview

Research, development, validation and integrated demonstration of a set of products for the future 5G networks, gathering and harmonizing the efforts of different agents in order to create innovative solutions for the global market



- **Designation:**
 - “Mobilizador 5G”
 - “Components and services for 5G networks”
- **Duration:** Jan/18 to Dec/20 (36 months)
- **Investment:** 9,7 M€
- **Financing:** 6,2 M€
- **Leader:** Altice Labs, S.A.
- **Advisory Board:**

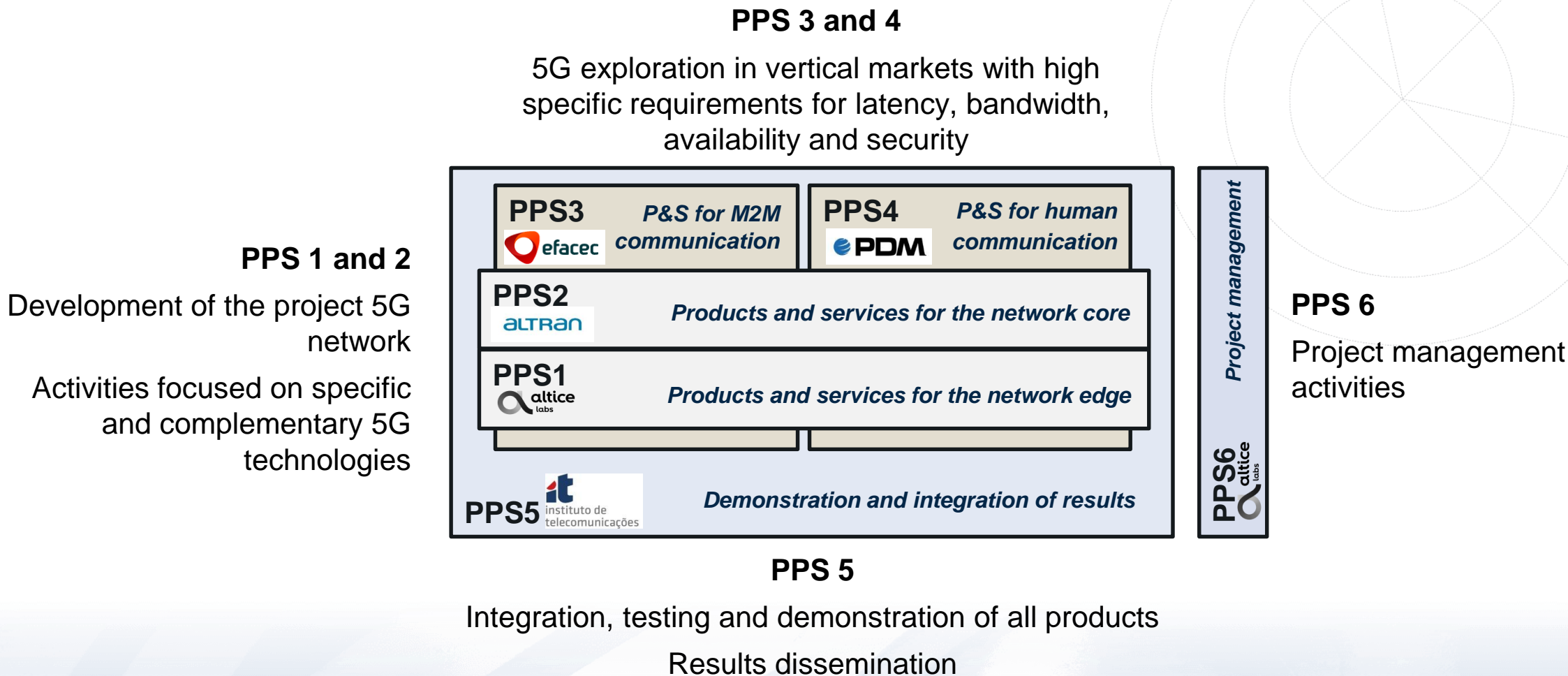
Partners:



Project financed by



Project organization



IT main activities in the project

Optical Fronthauls for 5G

IT is developing Optical Fronthaul architectures to satisfy the unprecedented demands of future 5G wireless networks in a cost-effective manner including the requirements of high capacity and low latency.

Advanced network operations in multi-technology and multi-vertical environments

These mechanisms have a special emphasis on the isolation of network resources in the development of actions associated with mobility and virtual representation of resources. Critical communications and in the use of proximity mechanisms / end of the network in order to reduce aspects of latency.

Machine Learning for network operation

Learning mechanisms to know and predict the state of the network and its services, considering the various scenarios of action, from the collection of sensor information to the distribution of high-definition video.

Drones control and communications platform

Surveillance and emergency situations: collection of sensory data through aerial drones, use of drones as mobile hotspots, and as elements of message dissemination.

Radio Access Network (RAN) evolution needs

More wireless bandwidth (BW) → higher frequencies,
more cells, more BW in the xHaul

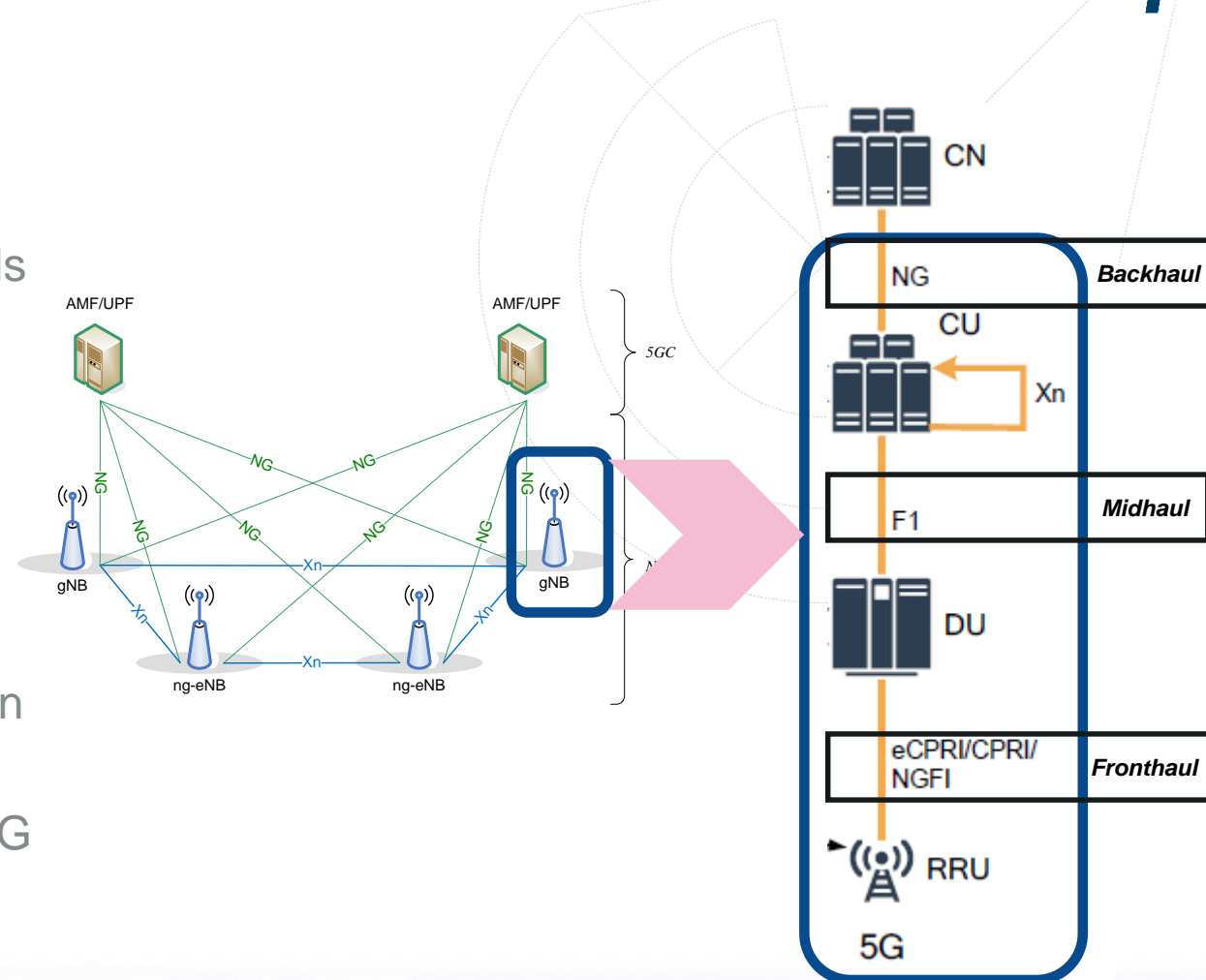
Higher frequencies → Smaller cells → even more cells

More cells → need for cheaper technology

Cheaper technology → simplified cell sites

SOLUTION:

- RAN functional split
- Adoption of centralization (CRAN) and Virtualization (NFV)
- Adopt cost effective optical networks to transport 5G data (Fixed-Mobile Convergence), in the front/mid/backhaul



RRH: Remote Radio Head

DU: Distributed Unit

CU: Centralized Unit

CN: Core Network

(e)CPRI: (enhanced) Common Public Radio Interface

NG: Next Generation

Facility infrastructure – 5G deployment options with NG-PON2

