NANCY Use Cases
&
Market Opportunities„

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Focus Area of mobile technology

What about 6G?

6G will contribute to fill the gap between beyond-2020 societal and business demands and what 5G (and its predecessors) can support
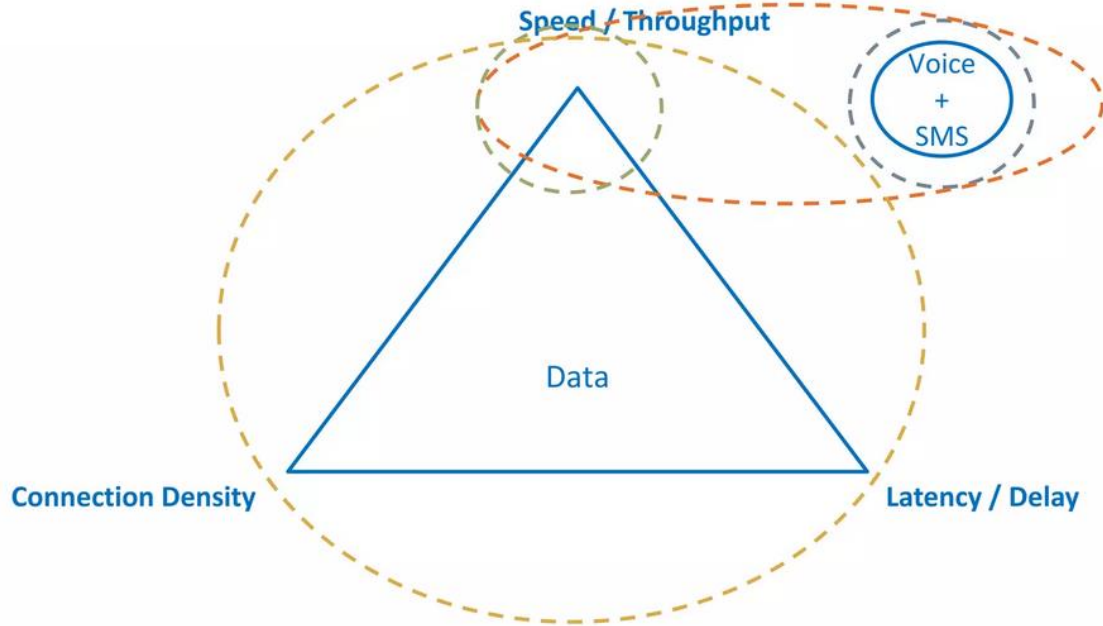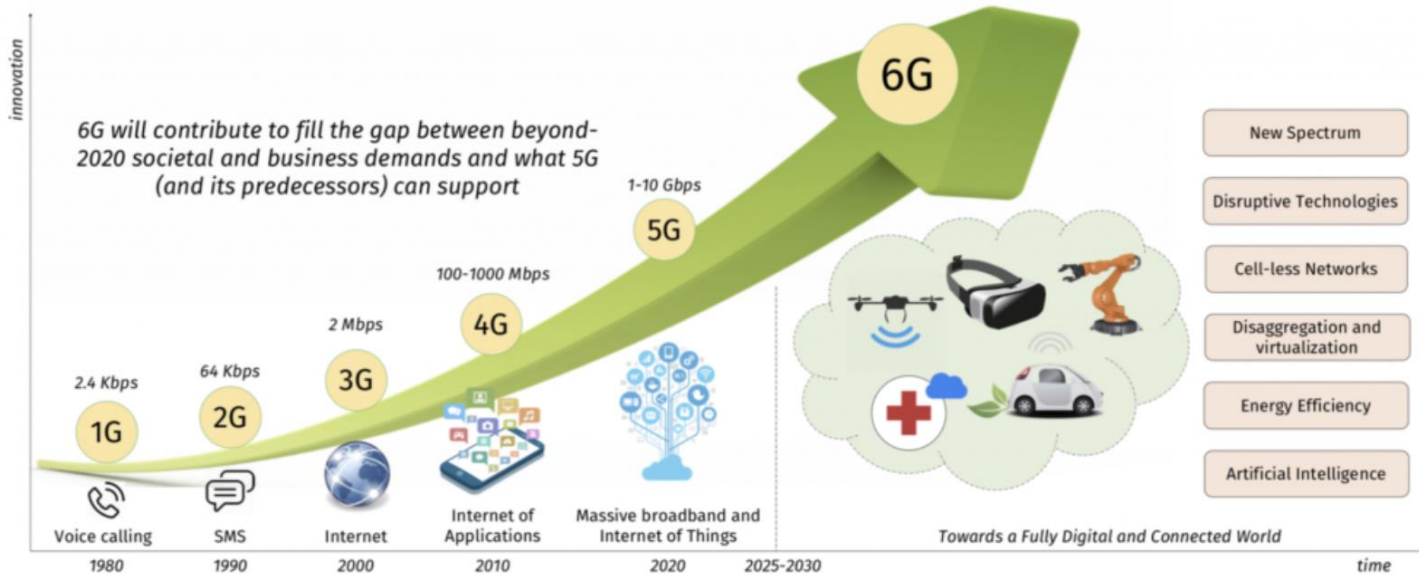
Each generation has been designed to meet the specific needs of end-users and network operators
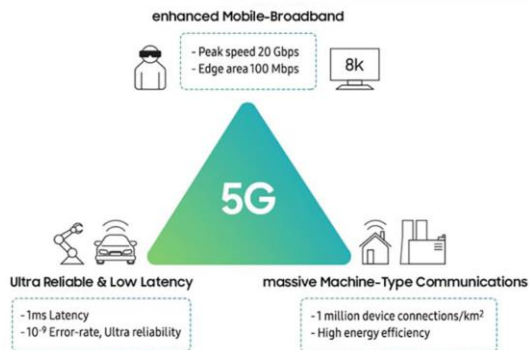
[Source: Giordani, M., Mezzavilla, et al. (2020): Towards 6G Networks: Use Cases and Technologies. IEEE Communications Magazine, 58(3), 55-61]

Use Cases Evolution

5G

enhanced Mobile-Broadband
- Peak speed 20 Gbps
- Edge area 100 Mbps
- 8k

5G

Ultra Reliable & Low Latency
- 1ms Latency
- 10⁻⁹ Error-rate, Ultra reliability

massive Machine-Type Communications
- 1 million device connections/km²
- High energy efficiency

6G

eMBB+
- AR,VR
- Video streaming
- Multimedia application
- Internet
- Download & Upload

URLLC+
- Factory
- Motion Control
- Autonomous vehicles
- Intelligent robots to cyborgs
- Motion control

AI
- Autonomous network management
- Intelligent edge computing

Sensing
- High Accuracy localization and tracking
- Mapping,Localizatio
- Augmented human sense
- Industrial IOT

mMTC+
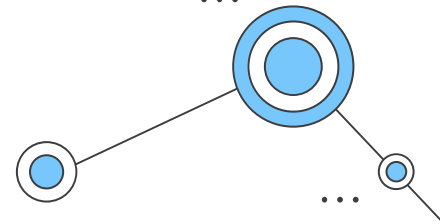- Smart building
- Smart healthcare
- Smart services enables by UAV
- Wide range IOT services

5G vs. 6G Use Cases Comparison

Use case (capability)	5G	6G
Augmented Reality for Industry	Low resolution / high level tasks	High resolution, multi-sensory / detailed tasks, co-design
Telepresence (capacity)	High video quality, limited scale	Mixed reality / Holographic
Security surveillance, defect detection (positioning & sensing)	External sensing, limited automation	Integrated radio sensing, fully automated
Distributed computing, Automation (time synchronization)	Microsecond-level tasks	Higher precision nanosecond-level tasks
Dynamic digital twins and virtual worlds (real-time, multi-sensory mapping and rendering)	No	Yes
Wireless in Data Center (peak rate and capacity)	No	Yes
Zero Energy Devices (back scatter communications)	No	Yes
Swarms of robots or drones	Maybe	Yes
Bio sensors and AI	Limited	Yes

From Nokia Bell Labs 6G whitepaper

NANCY B5G use cases

eMBB

mMTC-MBB

URLLC-MBB

mMTC

URLLC

URLLC-mMTC

Extends both eMBB & mMTC by merging. Offers mobile broadband services and machine-type communications

Investigates the combination of enhanced mobile broadband and ultra-reliable low-latency communications use cases, paving the way for augmented reality

Significant fields like smart factories and real-time infrastructure monitoring, facilitates seamless interaction among critical applications and a broad range of IoT devices.

NANCY Vision

To introduce a secure and intelligent architecture for the beyond the fifth generation (B5G) wireless network.
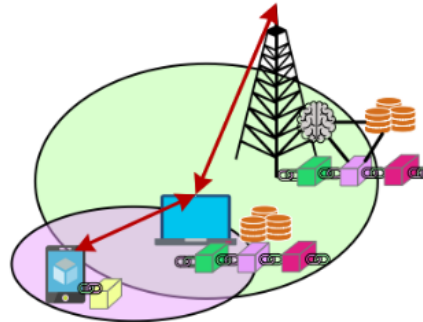

NANCY enables secure and intelligent resource management, flexible networking and orchestration.
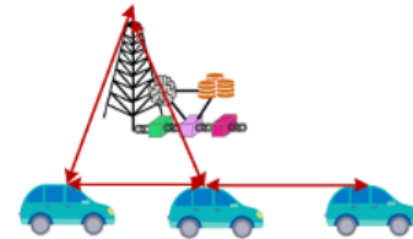
Usage Scenarios
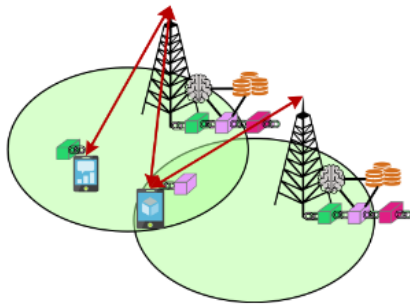
Usage scenario 1: Fronthaul network of fixed topology

- Direct connectivity
- CoMP connectivity
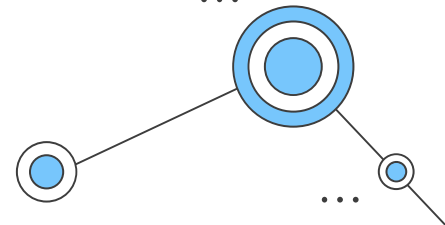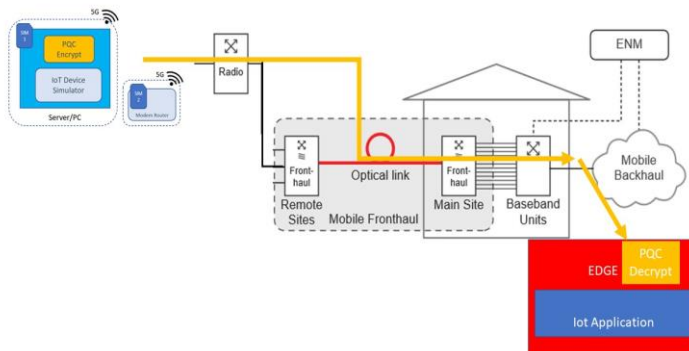
Usage scenario 2: Advanced coverage expansion

- Multi- Hop Connectivity
- Ad-Hoc Mesh
- Point –to- Multipoint Connectivity

Usage scenario 3: Advanced connectivity of mobile nodes

- UAV- to- AP
- UAV- to-UAV

Demonstrator 1

Traffic management (critical-MTC): IoT devices simulate traffic lights through 5G indoor links with the following requirements:

(i) *reliable and resilience connectivity;*

(ii) *the IoT devices (traffic lights) can be added/removed over time (ad-hoc connectivity), and;*

(iii) *data privacy and security are of high importance due to regulations.*

- PQC functionalities will improve end-to-end data communication security.

- Crypto-agile libraries shall be integrated to generate E2E encryption

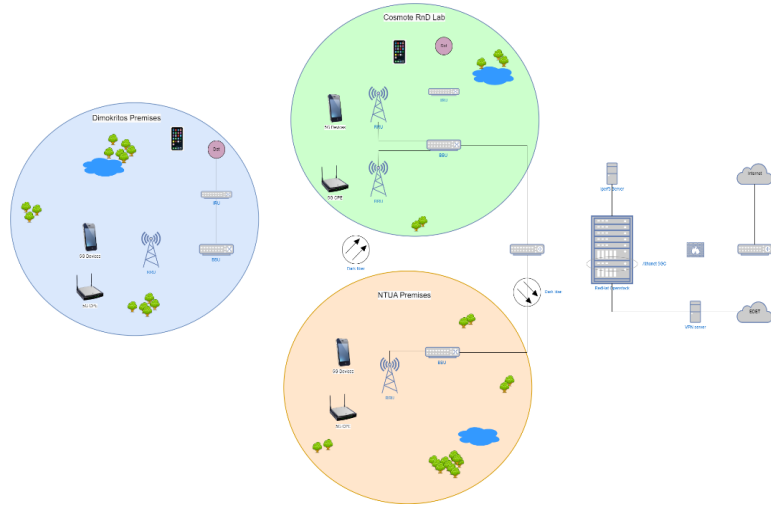**IoT sensors measurements (massive MTC):**

- IoT simulator: generates a large number of messages with the same format as the IoT sensors.

- Large volume connection client/server application will demonstrate crypto agility and will collect performances of new PQC algorithms to compare with the ones currently in use (e.g., RSA, DSA, etc.)

- The PQC Encrypt/decrypt modules will be able to deploy PQC cryptography.

Demonstrator 2
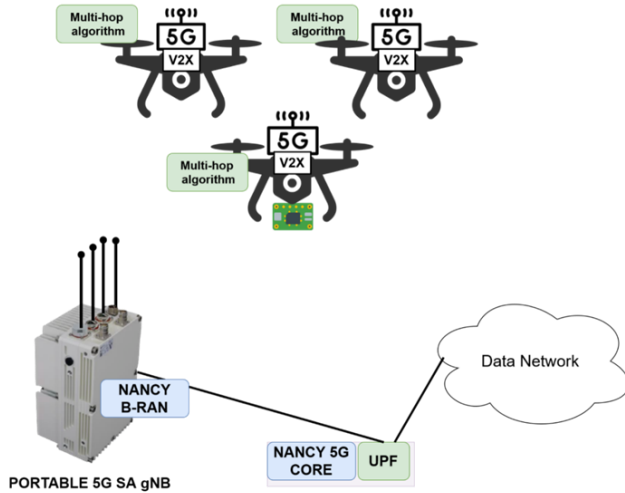
- It will employ MEC capabilities to validate the AI-based B-RAN orchestration mechanisms to optimize the vehicular network topology (including direct and multi-hop communications).

- One of the UAVs has some computational capabilities, enabling the demonstrator to employ the novel resource-aware policies and scaling mechanisms for computational offloading.

- Validation of NANCY mechanisms for efficient and trustworthy resource allocation and resource management through network slicing (URLL slice → latency of a few milliseconds).

- Validation of different policies and mechanisms that can maximize the energy efficiency and system scalability, whilst ensuring the latency and data rate requirements.

Demonstrator 3

A multi-domain deployment consisting of distinct Edge and Cloud compute domains providing:

- Advanced Security at Edge Cloud deployment, also enhanced by Blockchain algorithms.
- High availability and resilience through mesh architectures
- High capacity and low latency

- Provision of AR/VR content to end users in an urban environment
- Deployment of dedicated slices capable of delivering content at high data rates with extremely low latency, while providing high security and privacy as well as the necessary elasticity to exploit and adjust to the B-RAN resources
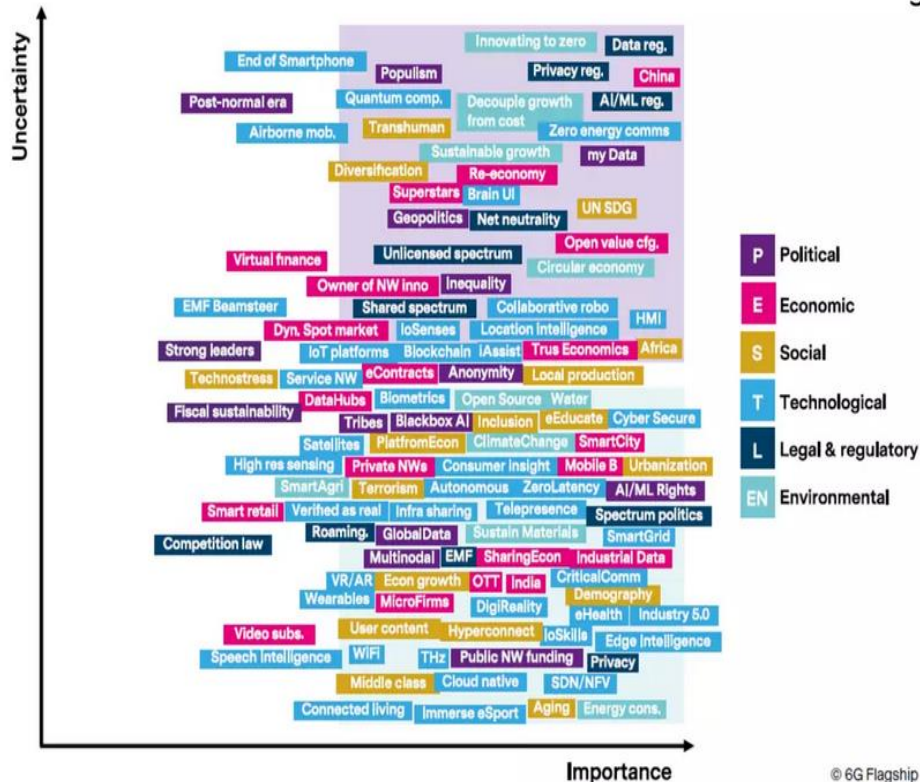
Sustainable Development Goals (SDGs)

- ❖ Known as "2030 Agenda"
- ❖ Adopted in 2015 (UN)
- ❖ Should be met by 2030
- ❖ 193 countries have committed
- ❖ Cover all major topics of sustainability (169 sub-goals)

Scenarios for 6G Business

Source: 6G Flagship Whitepapers

Thank you for your attention!

NANCY