COREALIS D.3.1 Webinar

Cutting-Edge and Disruptive Technologies for Smart-Terminal Operations

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**Internet of Things** – already used in variety of use cases:

- Common connectivity platform still missing;

5G Networks – coming commercially available from 2019-2020 onwards:

- Potential common connectivity platform for future ports;

**Machine Learning** – currently utilised in isolated sub-systems:

- When combined with IoT and 5G, could be simultaneously applied to multiple port operations and to the whole port infrastructure.
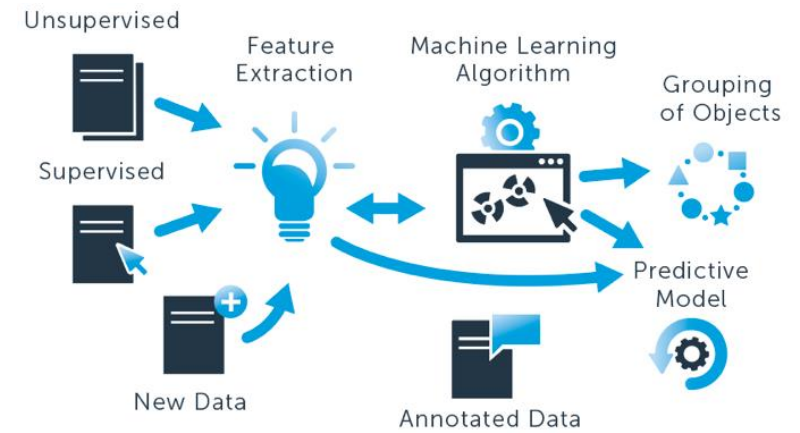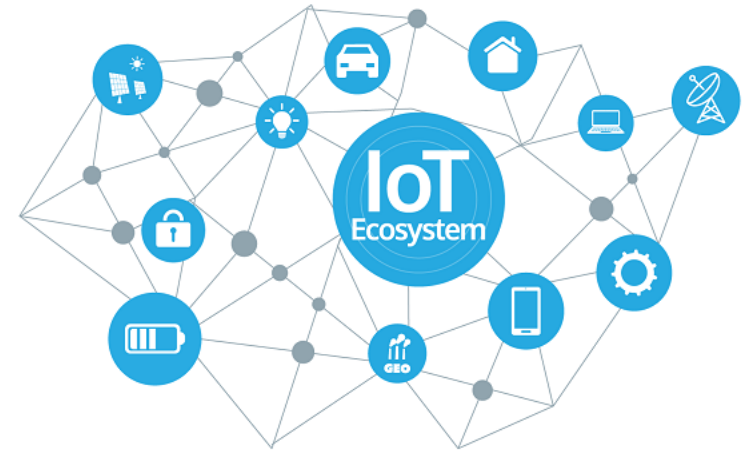
5G as a Connectivity Platform for Ports

- 5G can flexibly provide higher data rates, lower latencies, better communication reliability and enhanced support for IoT than 4G;

- Cloud-Based programmable infrastructure supporting virtualisation and slicing;

- Features edge computing support and enhanced security features.
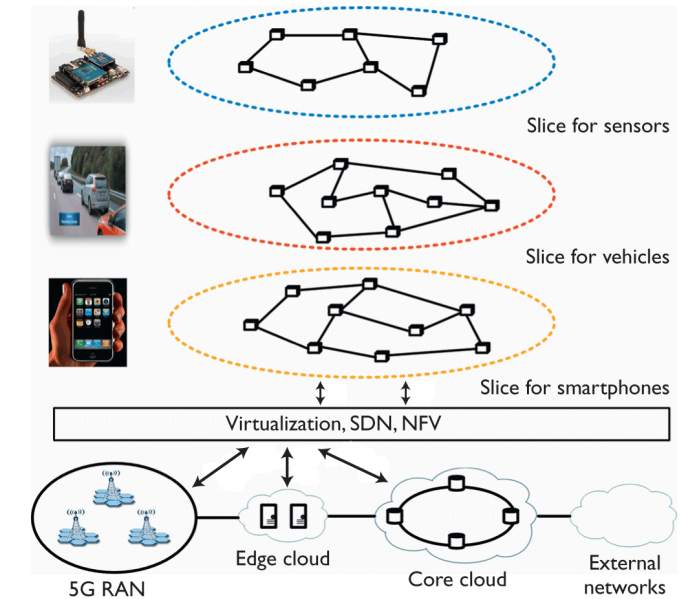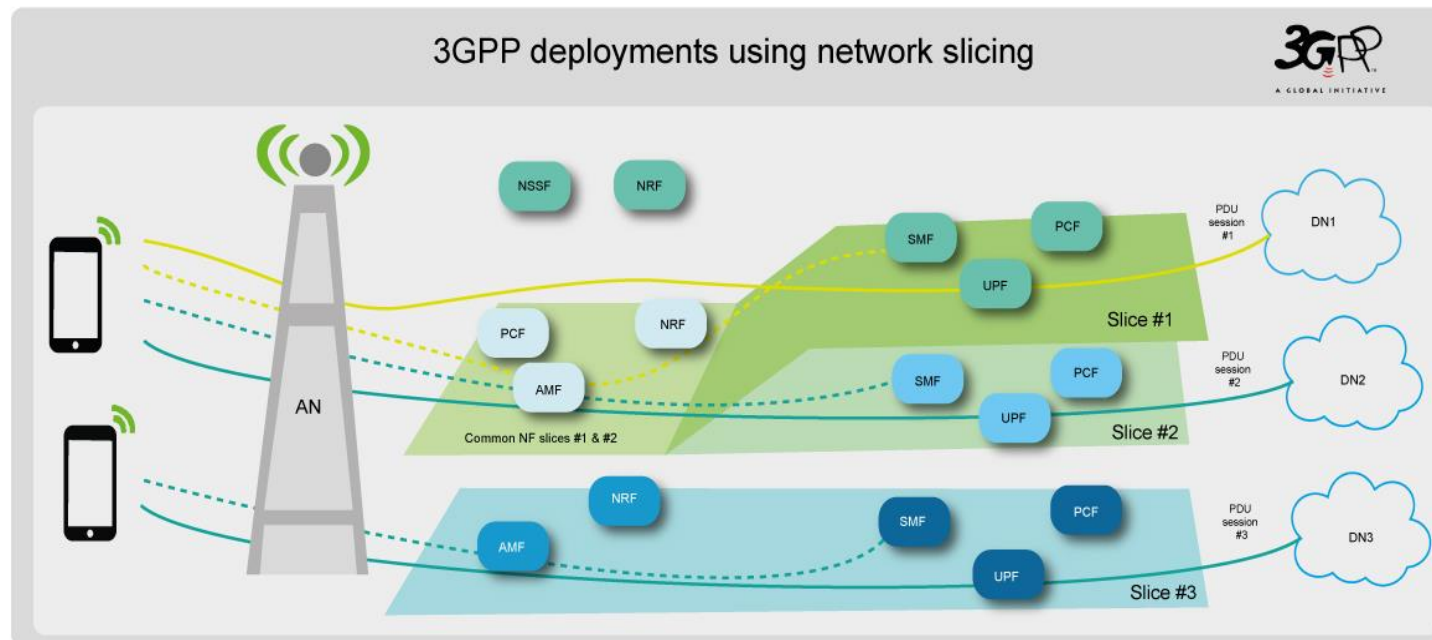
Source: 3GPP
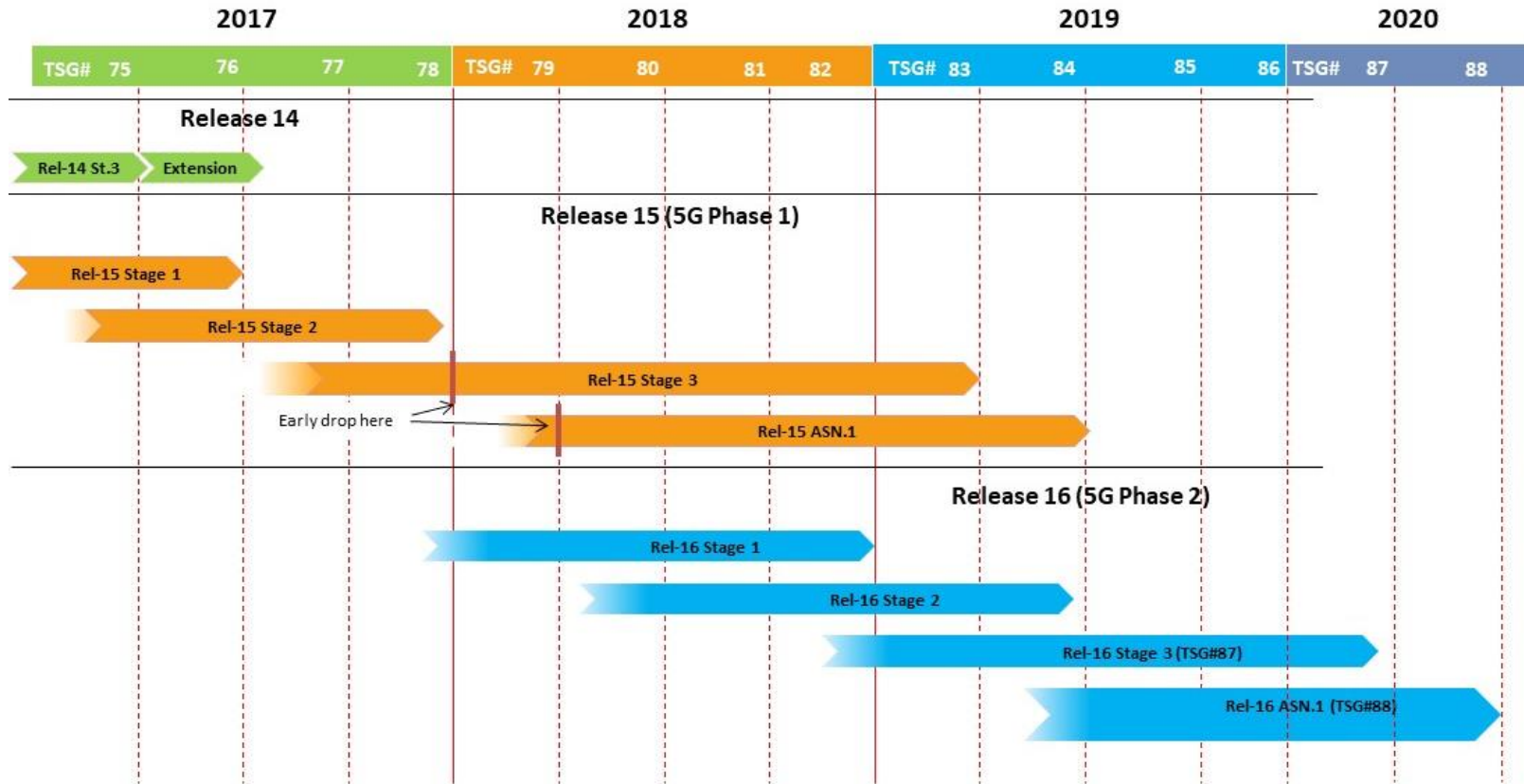
Phase #1 (Release 15)

The completition of NSA and SA specifications for the 5G-NR has been achieved during the 2018.

Phase #2 (release 16)

Will meet the ITU IMT-2020 submission requirements and should be completed in December 2019.

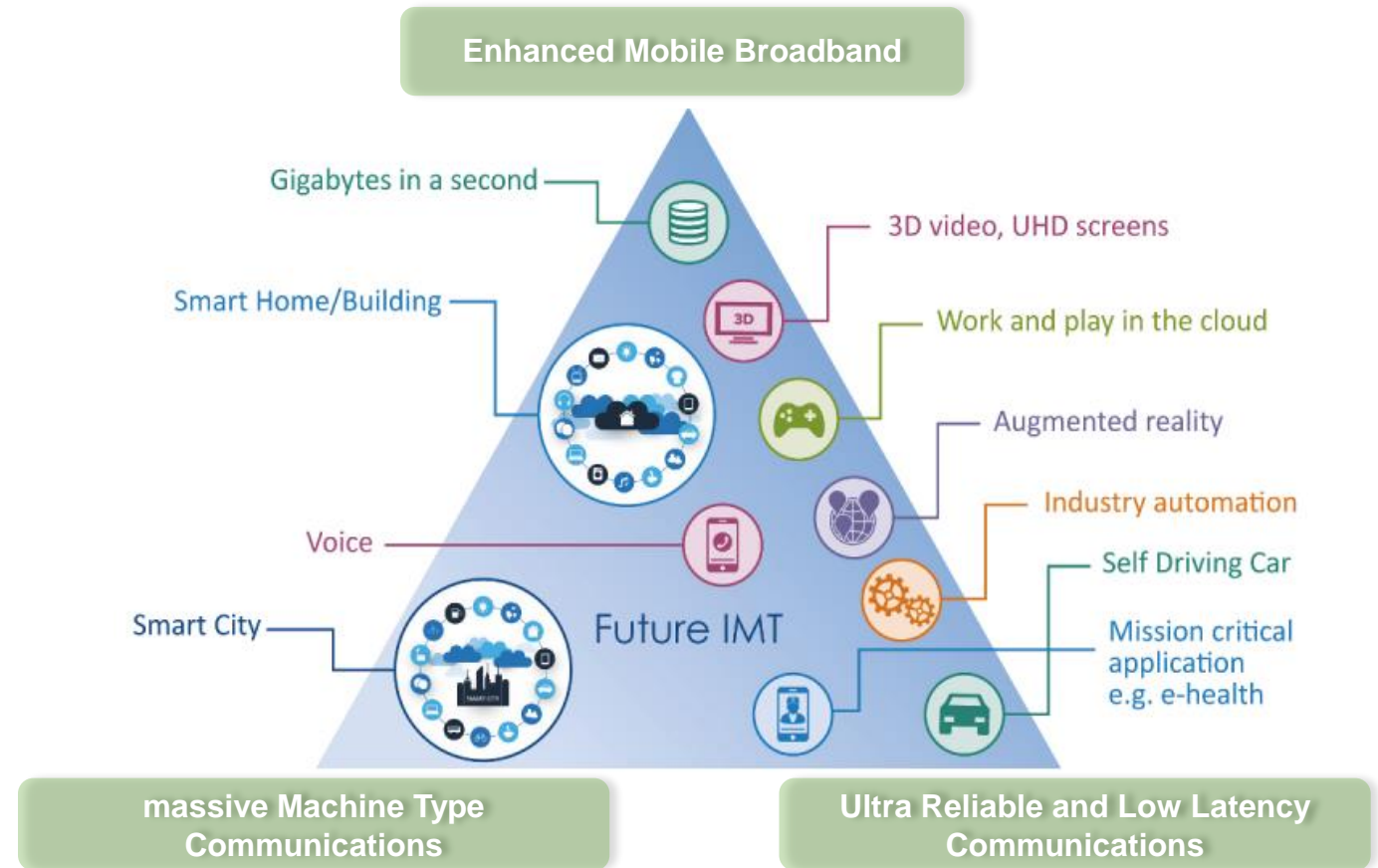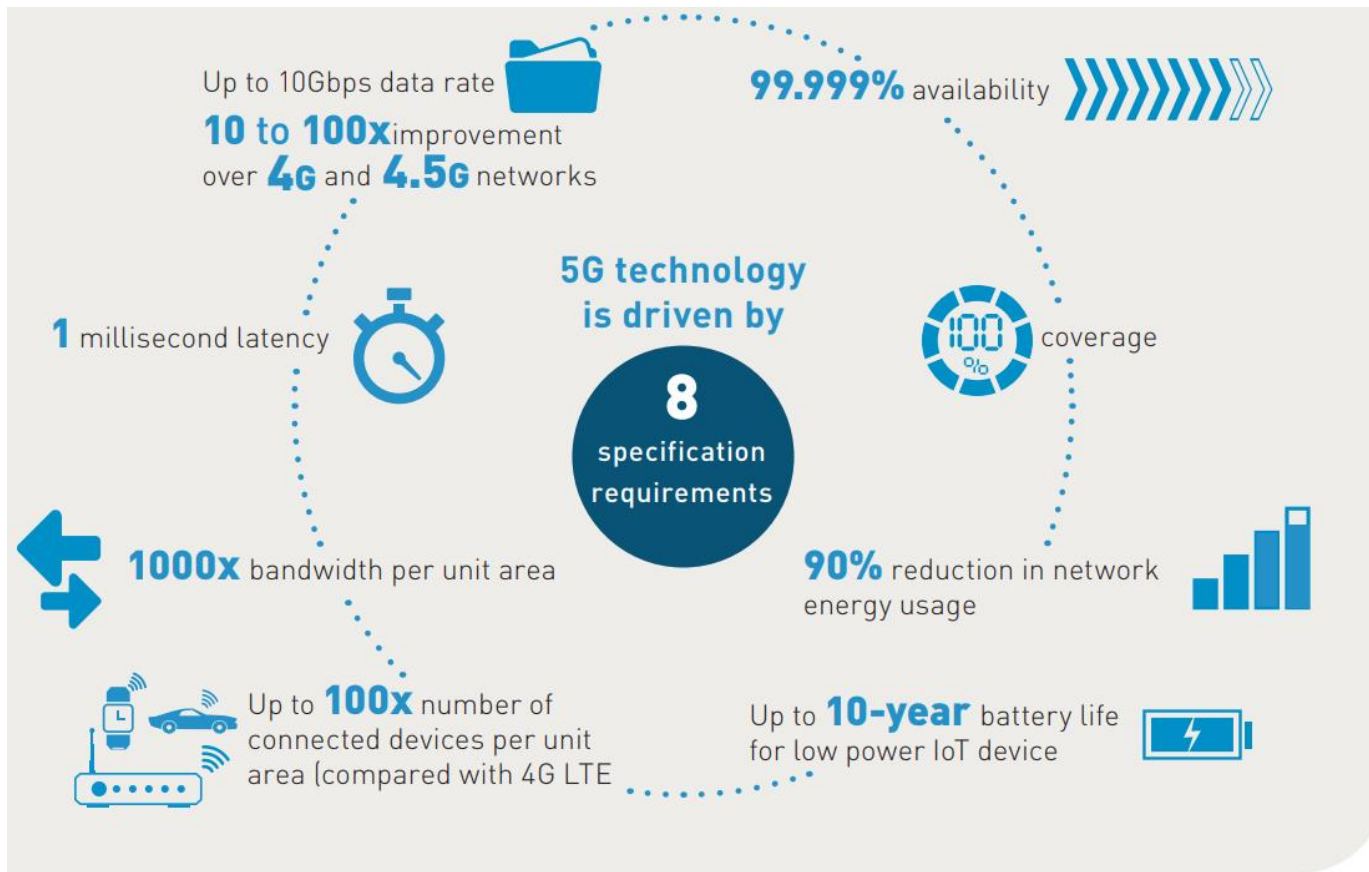The 5G requirements and the application fields have been already defined within the Release 15 (3GPP):

- **Automotive**
- **Transport & Logistics**
- **Public Safety**
- **Healthcare**
- **Smart Cities**
- **Media & Entertainment**

5G – Performance Aspects

Up to 10Gbps data rate
10 to 100x improvement over **4G** and **4.5G** networks

99.999% availability

1 millisecond latency

5G technology is driven by

8 specification requirements

100% coverage

1000x bandwidth per unit area

90% reduction in network energy usage

Up to **100x** number of connected devices per unit area (compared with 4G LTE

Up to **10-year** battery life for low power IoT device
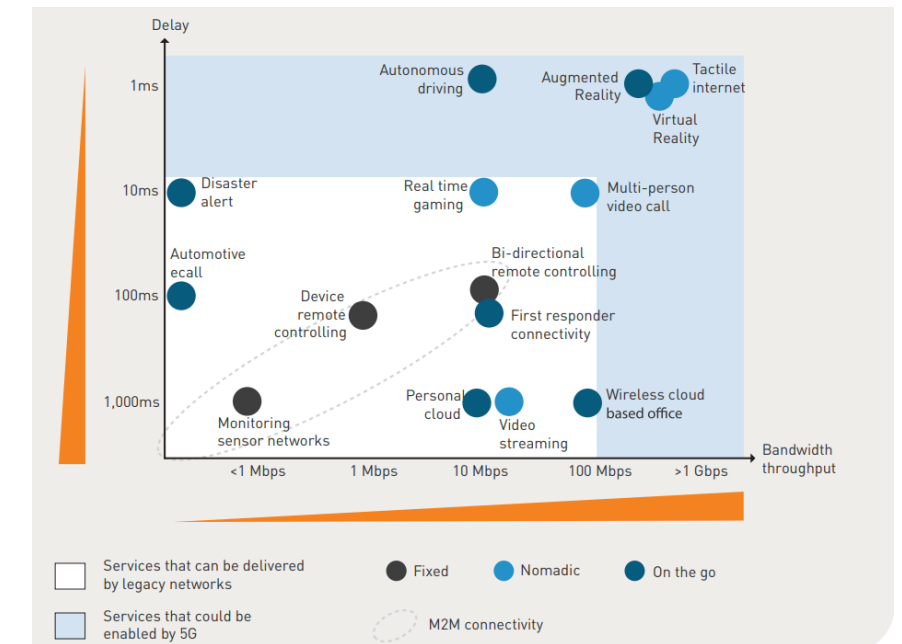
Source: gemalto.com

The main evolution compared with today's 4G and 4.5G (LTE advanced) is that beyond data speed improvements, new IoT and critical communication use cases will require new types of improved performance.

Source: gemalto.com

5G – Trials

Seul – March 2019

Autonomous Driving (Level 4)

South Korea – March 2019

AR-based Enterteinment Service

Port of Quingdao – February 2019

5G Smart Harbour

Athens – May 2019

100Gbps Data Rates

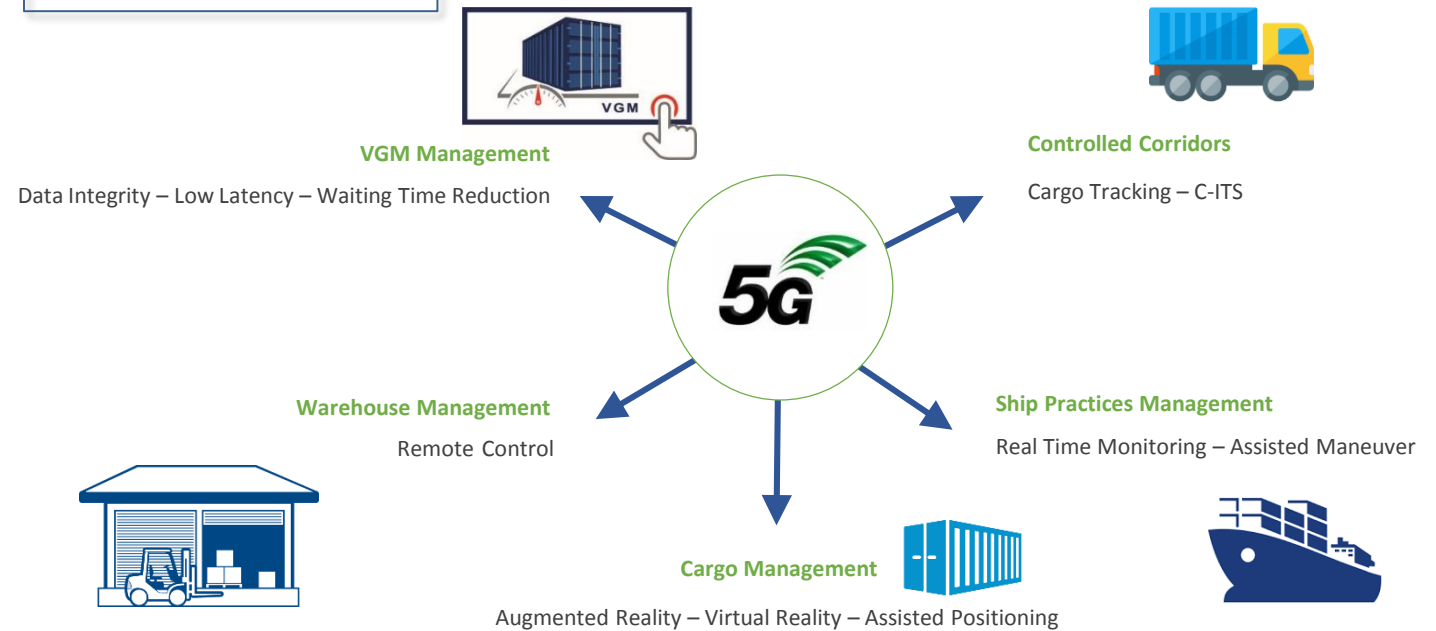**Turin – October 2018**

Remote Driving

Korea – May 2019

Autonomous Drones

ERICSSON

ZTE

NOKIA

verizon

SAMSUNG

HUAWEI

Qualcomm

5G – Intra Terminal Operations

Automation	Transport/Logistics	Sustainable Development & Personnel Safety	Cyber Security	Smart Cities
Warehouse Management **VGM Management** **Cargo Management** **Ship Practices Management:** • **Mooring/Unmooring** • **Piloting**	**Warehouse Management** **VGM Management** **Cargo Management** **Ship Practices Management:** • **Mooring/Unmooring** • **Piloting** **Controlled Corridors**	**Cargo Management** **Ship Practices Management:** • **Mooring/Unmooring** • **Piloting**	**Cargo Management**	**Controlled Corridors**

There are several application fields: it is possible to identify some of the main processess related to the intra-terminal operations that could benefit from the 5G deployment.

VGM Management

Data Integrity – Low Latency – Waiting Time Reduction

Controlled Corridors

Cargo Tracking – C-ITS

Warehouse Management

Remote Control

Ship Practices Management

Real Time Monitoring – Assisted Maneuver

Cargo Management

Augmented Reality – Virtual Reality – Assisted Positioning

THANK YOU FOR YOUR ATTENTION

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