SPACE ECONOMY

ROME

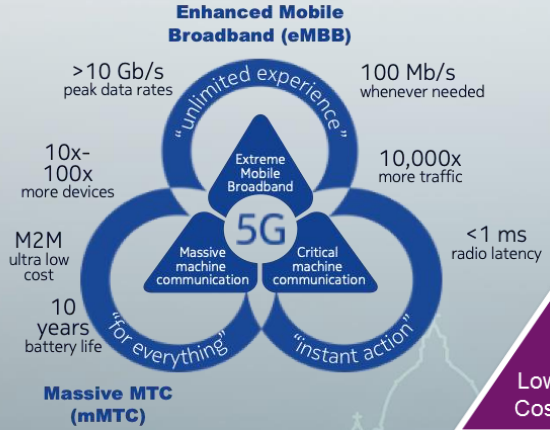
5G NR & Maritime Logistics

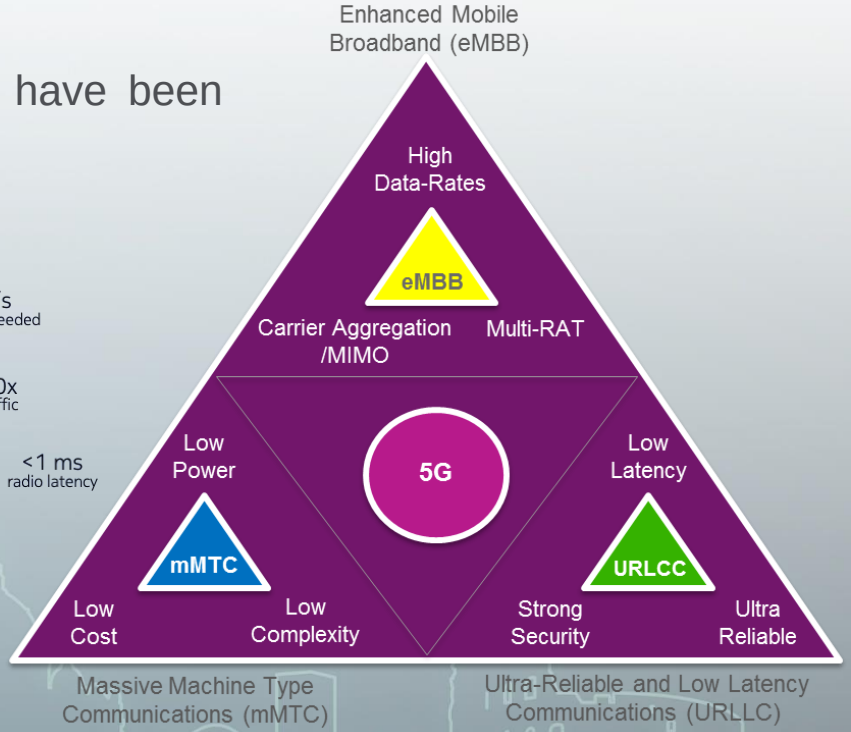
Alexandr Tardo, CNIT

5G NR Overview

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
- . . .





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

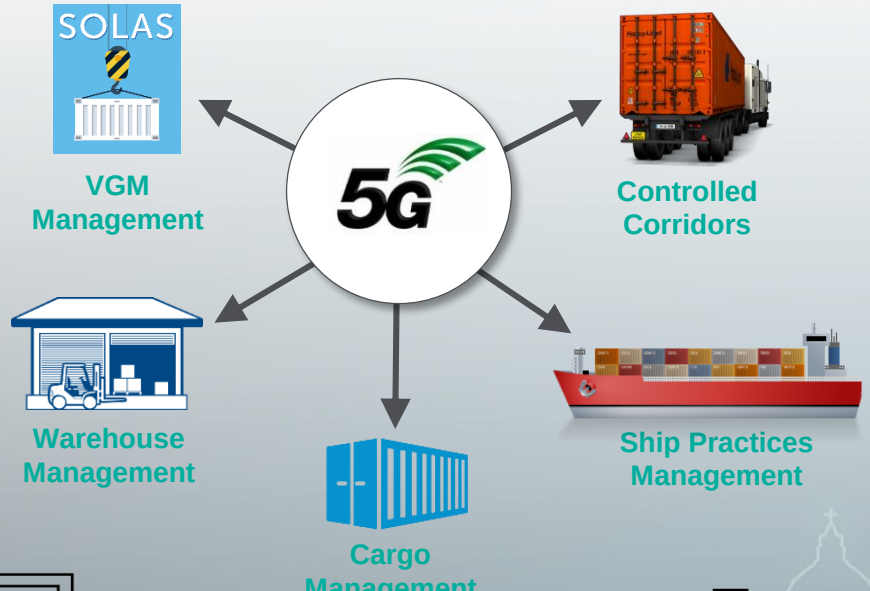
Remote Driving

Korea – May 2019

Autonomous Drones

ERICSSON
ZTE
NOKIA
verizon
SAMSUNG
HUAWEI
Qualcomm

Logistics Domain

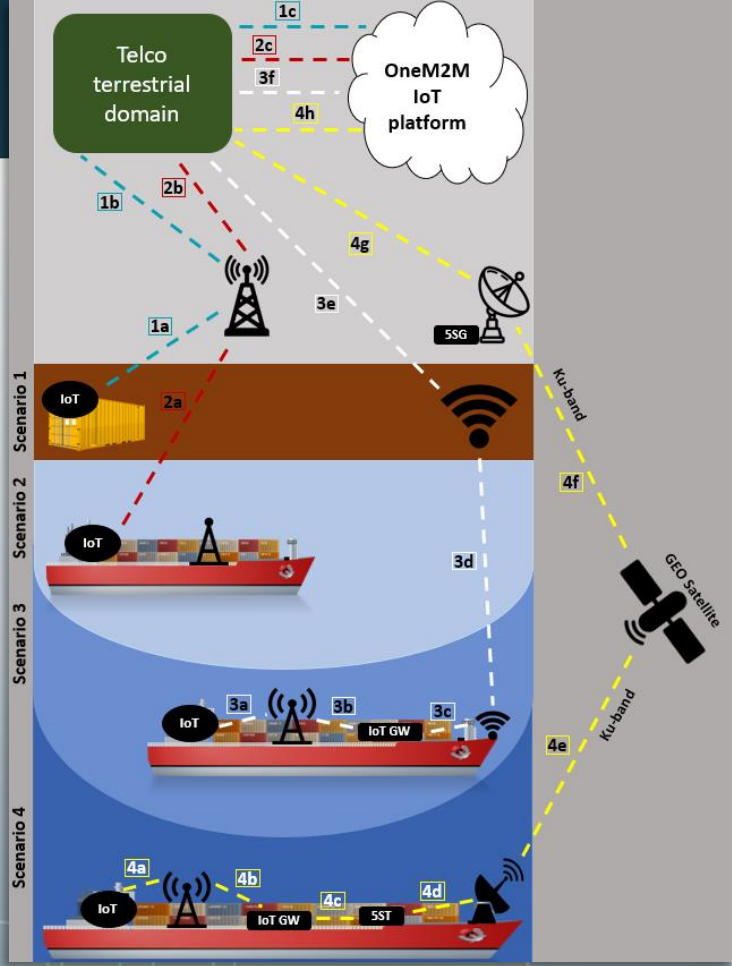


5G SENSOR@SEA Project

5G **S**mart **E**dge **N**ode and **S**mart **O**bjects enabling accu**R**ate **S**ervices **E**xtended **A**ll over the seas:

- To develop, deploy and validate the 5G massive Machine Type Communication (5G **mMTC**) testbed, relying on a hybrid terrestrial-satellite network and enabling massive IoT services in the context of maritime transport and intermodal logistics;

- The Use Case aims at demonstrating how the **integration** between IoT technologies, **cellular network** and **satellite network** shall support the main target business case, i.e. the continuous port-to-port (and terminal-to-terminal) tracking of large amount of goods carried by ships, even during deep sea journeys.

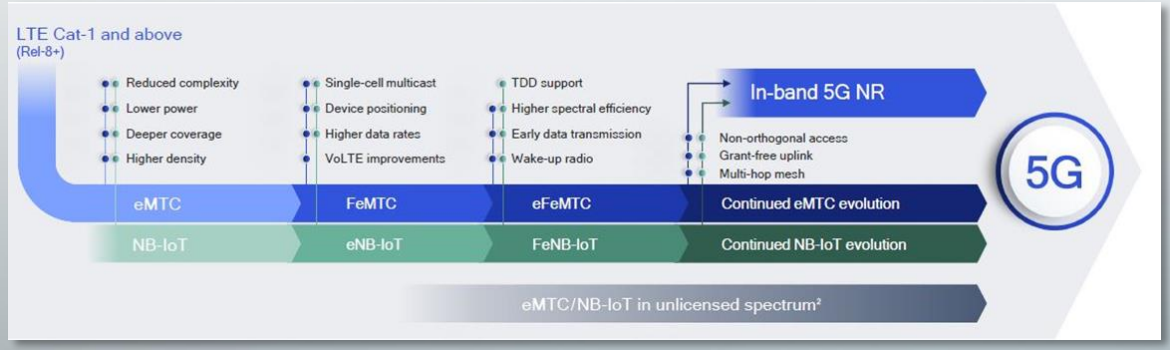


	Port terminal area
	Near sea
	Open sea covered by terrestrial WWAN
	Open sea
IoT	NB-IoT smart object
	Terrestrial cell
	On-board cell OFF

	On-board cell ON
IoT GW	Smart IoT Gateway
5ST	5G-specialized Satellite Terminal
	WWAN transmitter/receiver
	Small electronic antenna array
	GEO Satellite
5SG	5G-specialized Satellite Gateway

Why NB-IoT?

3GPP indicated to ITU-R that NB-IoT would be proposed to ITU-R as meeting the IMT-2020 requirements for the massive IoT scenario [1] [2].



NB-IoT is in continuous evolution through 3GPP releases for meeting massive IoT needs.

5G ITALY
The Global Meeting in Rome

«NB-IoT via satellite is gaining momentum and could be included within the Release 17»

[1] 3GPP, "3GPP submission towards IMT-2020", available at http://www.3gpp.org/ftp/TSG_RAN/TSG_RAN/TSGR_77/Docs/RP-172098.zip.

[2] Mwakwata, C. B. Malik, H.; Alam, M. M.; Le Moullec, Y.; Pärand, S.; Mumtaz, S. (2019). Narrowband Internet of Things (NB-IoT): From Physical (PHY) and Media Access Control (MAC) Layers Perspectives. Sensors, 19 (11).

COREALIS EU H2020 Project

Capacity with a p**O**sitive envi**R**onm**E**ntal and societ**AL** footprInt: port**S** in the future era.

5 Living Labs

Antwerp, HaminaKotka, **Livorno,**

Piraeus, Valencia

Objectives

- Embrace circular economy
- Reduce environmental footprint
- Improve operational efficiency
- Enable the port to become an innovation hub

https://www.corealis.eu/
https://twitter.com/corealis_eu
https://www.linkedin.com/company/corealis-eu/
https://www.youtube.com/channel/UCSijCB6-jDaxOqdyt3sEw_g?view_as=subscriber

Problem Statement

A large port typically has multiple terminals that together can handle many cargo types; however, individual terminals are usually designed to move a single cargo type. Different cargo types require different vessels, terminal configurations, and handling equipment.

Container Terminal

Containers

Commercial solutions for the optimization of the management and handling operations.

General Cargo

Non standard dimensions, inefficient/hard handling, human mistakes, low automation.

Others

Other management systems.

RTPORT: 5G-based General Cargo Management System

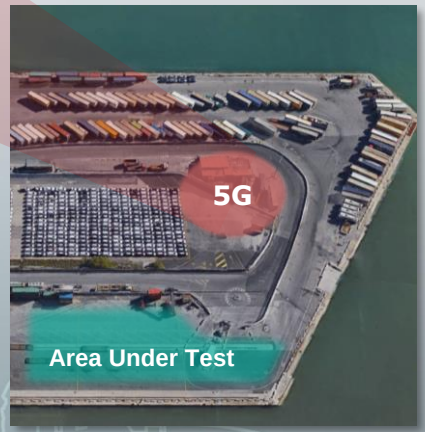
IoT devices

COREALIS
THE PORT OF THE FUTURE

Innovative Services for the Final Users

Machine-to-Machine Standard (ETSI) Platform

- Coverage: **250x50 m²**
- Frequency: **3.7GHz**
- E2E Latency: **< 10ms**
- Reability: **> 99%**
- Availability: **99.999%**



RTPORT aims to instantiate a **pervasive 5G network** demonstrating how the interconnection of IoT devices, through machine-to-machine standards, is in line with the ITU IMT-2020 technical requirements (**mMTC**).

KPIs-driven Technical Assessment

IoT Devices

1

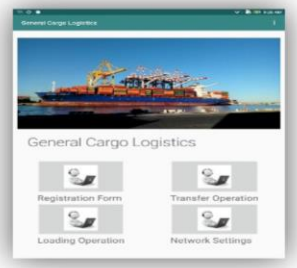
Cargo

2

LIDAR

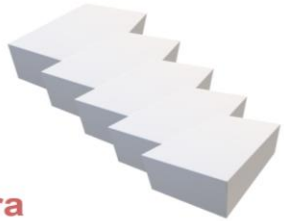
Control System

5G Equipment



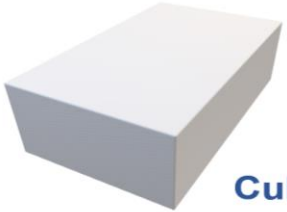
4

WDR Camera



Storage Area

3



Cuboid

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THANK YOU FOR YOUR ATTENTION

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