



ROMARS

ROME
APPLICATIONS
RESEARCH
SYSTEMS

ROMARS: Research and Products

Over 20 years of technological expertise

RomARS is a university spin-off made up of highly qualified staff specialising in telecommunications and software development.

Mission: To design, develop and validate innovative network technologies.

Acquired expertise:

3GPP and 5G mobile networks

Network protocols

Virtualised network architectures

Satellite systems

Software development (C, Go, Java, C++, Python...)



2003

Founders start to cooperate in research group at University of Rome Tor Vergata

2005

Founders join Nitel Consortium and broaden Their R&D activities

2015

Starts the development of commercial products and applications for 3rd party customers

2020

Foundation of RomARS Innovative Start Up with a background of > 35 research projects

2024

Creation of commercial and product development business unit.

2025

For the second year 1M€ revenues (R&D + commercial) ~ 60 total research projects

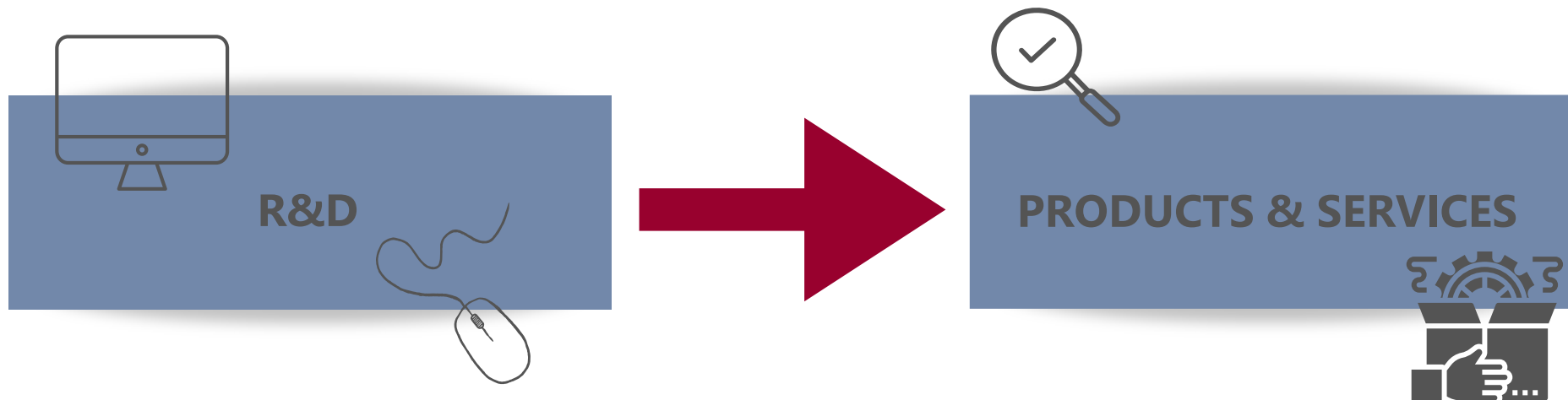


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From research to products

TECHNOLOGY TRANSFER





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INDUSTRIAL PRIVATE NETWORKS

WiFi-5G Convergence



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Logistics revolution

New robots and new applications



New autonomous robots with new on-board capabilities

Connectivity

**AI and on-board
computing power**

**HD CAMERA for image
recognition**

WHY A 5G-WiFi NETWORK

**Need for service continuity and guaranteed Quality of Service
Downtime of robots, AGVs/AMRs or automated warehouses due to
coverage gaps or unstable WiFi or 4G/5G links**

Cost of one hour of downtime

Lost margin

+

Downtime and
restart

+

Penalties and
delays

=

TRUE COST OF DOWNTIME

**ROMARS SOLUTION: A HYBRID, INTEGRATED 5G + WIFI NETWORK
USES EXISTING WIFI AND COMPLETES COVERAGE WITH A 5G SIGNAL.
RESULT: REDUNDANCY, MAXIMUM RELIABILITY AND PERFORMANCE,
AT EVEN LOWER COST THAN A WIFI-ONLY NETWORK.**



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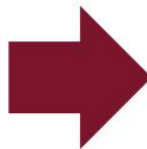
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Use cases: Expansion with mixed coverage

WiFi only



Local
Server



5G+WiFi



Local
Server



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Integration with 5G-WiFi coverage

- **Coverage integration**
 - WiFi where 5G is weak and vice versa
- **Increased network capacity**
 - High-speed Wi-Fi hotspots for AR/VR applications and video
 - Local decongestion
 - Higher terminal/device density
- **Performance improvements**
 - Unified QoS
 - Uniform network slicing over both networks and segregation of different traffic types
 - Managed and optimised handover between the two networks
- **Different device types on the same network**
 - 5G: AMRs and high-density IoT
 - WiFi: tablets and staff
 - Dual-mode 5G+WiFi modems for innovative equipment (mobile video, robots, AMRs, cobots, etc.)



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5G + WiFi

When to choose private 5G+WiFi

- ✓ Large or highly automated warehouses
- ✓ **Fleets and/or large numbers of AMRs/AGVs**
- ✓ Real-time and mission-critical processes
- ✓ Challenging environments:
 - Metal shelving
 - RF interference
 - Wide-area coverage
 - Indoor/outdoor coverage
- ✓ Requirements for:
 - Seamless roaming
 - Traffic prioritisation
 - Industrial-grade security

Today's best option: a hybrid architecture

- ✓ **Wi-Fi**
 - Human operators
 - Terminals
 - Non-critical applications
- ✓ **Private 5G**
 - AMRs / AGVs
 - Machine vision
 - Real-time systems
- ✓ **5G+WiFi**
 - Seamless roaming
 - Single security management
 - Consistent policies across networks

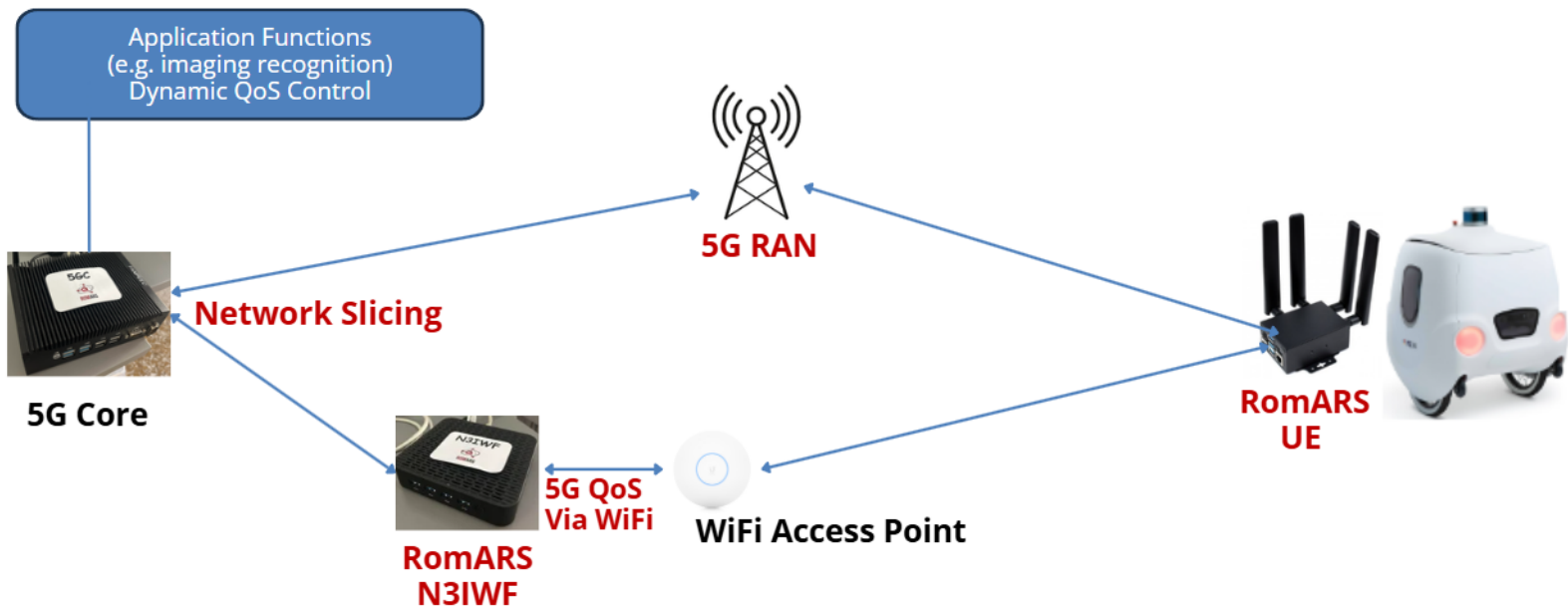
→ **The most robust and future-proof choice.**



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The RomARS solution



Network Slicing, QoS, Traffic segregation: 1) per application; 2) both on 5G and Wi-Fi



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Certified product



RAPPORTO DI PROVA



Campagna Nr.

L26003/1

Codice Documento.

CTTETLL2607203400

Nr. di pagine (Totali)

10

Oggetto

Certificazione Sistema N3IWF ROMARS/Reply



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MULTI-LINK SOLUTIONS

Multipath + QUIC



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Two combined technologies

1) Multipath

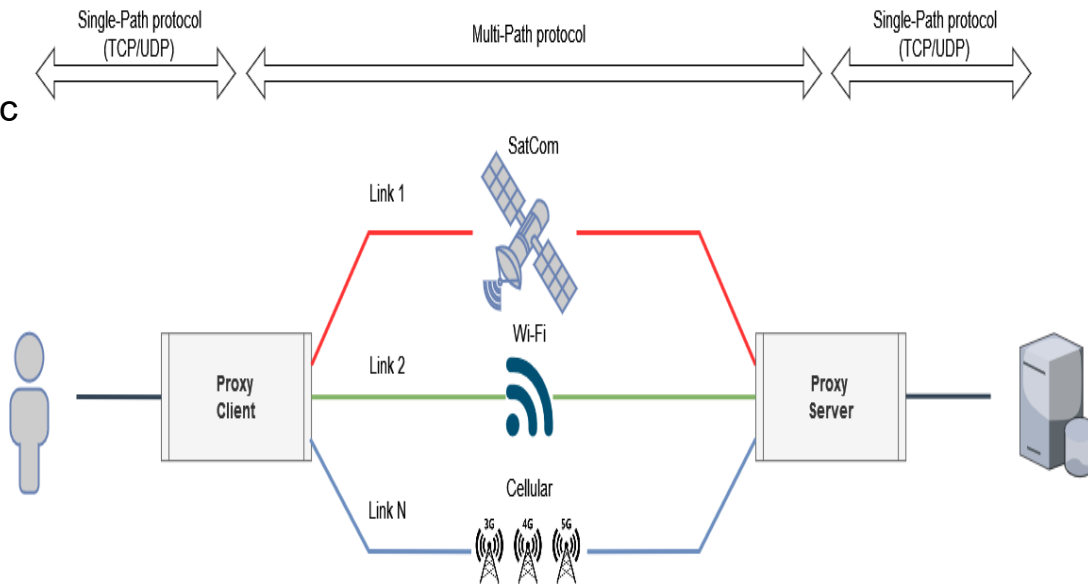
Simultaneous use of two or more connections, even with different characteristics: GEO, LEO, terrestrial. The aim is to improve performance, capacity, redundancy and reliability at the same time.

2) Opportunistic use of QUIC or TCP

Today QUIC is used for most of Internet traffic

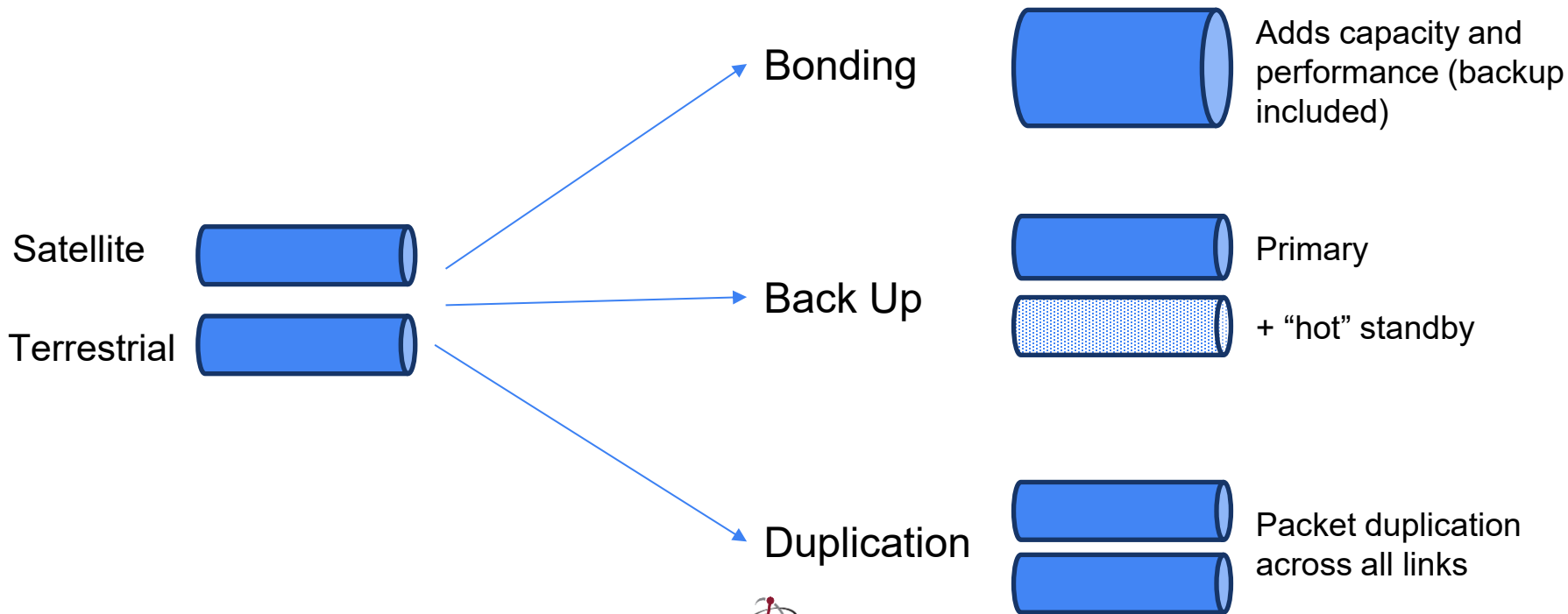
Some advantages:

- Reduced latency/connection set-up
- Multiple independent streams
- Stream prioritisation and scheduler
- Congestion control algorithm



Services Offered

The starting point is the availability of two or more physical links, satellite or terrestrial (4G/5G)

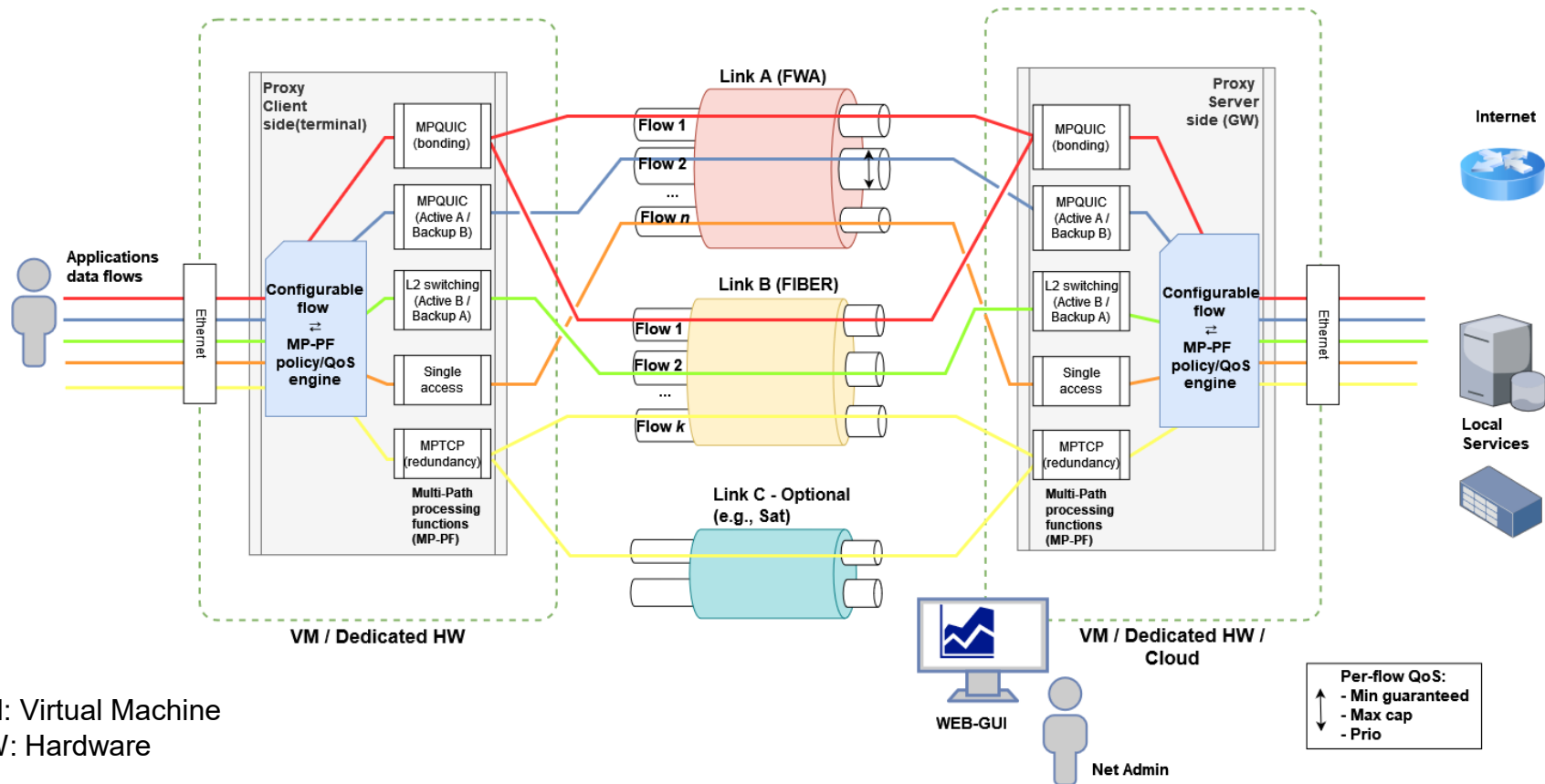




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In Detail



VM: Virtual Machine
HW: Hardware

Applications



Maritime Mobile Communications single antenna



- Ability to optimise satellite connection performance.
- Traffic segmentation with different priorities for different user categories
- End-to-end communication security



Maritime Mobile Communications dual antenna



- Ability to optimise satellite connection performance.
- Traffic segmentation with different priorities for different user categories
- End-to-end communication security
- Increased bandwidth by aggregating connections
- Increased reliability with backup and failover between connections



Fixed Communications single terrestrial connection

- Traffic segmentation with different priorities for different user categories
- End-to-end communication security



Fixed Communications dual terrestrial connection

- Traffic segmentation with different priorities for user different categories
- End-to-end communication security
- Increased bandwidth by aggregating connections
- Increased reliability with backup and failover between connections
- Single public IP address to support business applications



Land Mobile Communications with dual antenna for critical applications

- Always-on connectivity in both urban street-level and rural environments.
- High capacity by aggregating connections.



Land Mobile Communications with dual antenna for high capacity and continuity

- Ability to optimise wireless connection performance.
- Traffic segmentation with different priorities for different user categories
- End-to-end communication security
- Increased bandwidth by aggregating connections
- Increased reliability with backup and failover between connections



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MULTI ACCESS GATEWAY



5G as a global standard

5G networks consist of a 5G CORE and a 5G radio access.

The 5G CORE is today the most advanced and powerful system for managing a telecommunications network.

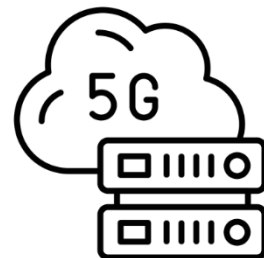
The benefits of using the 5G CORE for PRIVATE NETWORKS are:

- Security
- Flexibility
- Lower capex
- Lower operating costs
- Quality and performance control
- Rapid deployment



**5G RADIO
ACCESS**

+



5G CORE

WiFi as an alternative access

For private networks, 5G radio access is not the only one allowed.

3GPP has defined a gateway called N3IWF to enable Wi-Fi access instead of the 5G RAN.

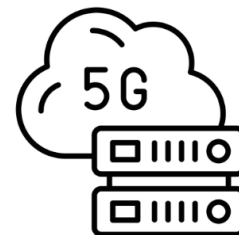
The benefits of using Wi-Fi for PRIVATE NETWORKS are:

- No licence costs
- Lower radio equipment costs
- Lower capex for Wi-Fi coverage
- Lower operating costs
- Quick and simple deployment
- Many Wi-Fi-compliant IoT devices



5G RADIO ACCESS

+



5G CORE

+



WI-FI RADIO ACCESS

Extension to different access types

With the RomARS solution, the concept of Wi-Fi access to the 5G Core can be extended to provide access through many different access technologies.

The benefits of using the MULTI ACCESS GATEWAY are:

- Multiple types of IoT sensors can be used
- Different radio coverage types can be leveraged

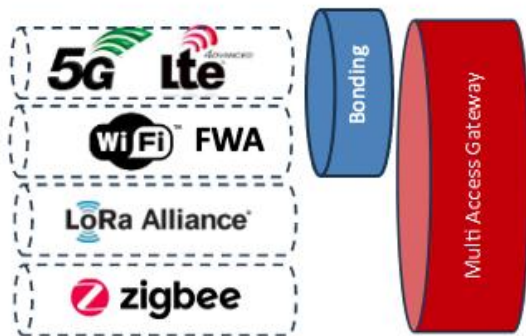
The RomARS solution also provides:

- Centralised core and centralised management for all the different technologies
- Centralised data collection

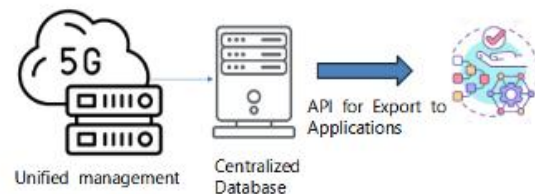
Manage different IoT devices
or drones



With different access technologies



With CENTRALIZED AND UNIFIED
Control System, Authentication, QoS

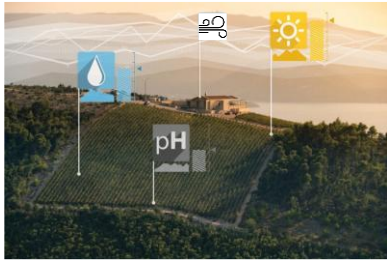




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Agritech Example



Various sensors for moisture, pH, salinity, etc.

Capability to create a “digital twin” of the crops.



Ground or aerial drones for soil and crop monitoring.

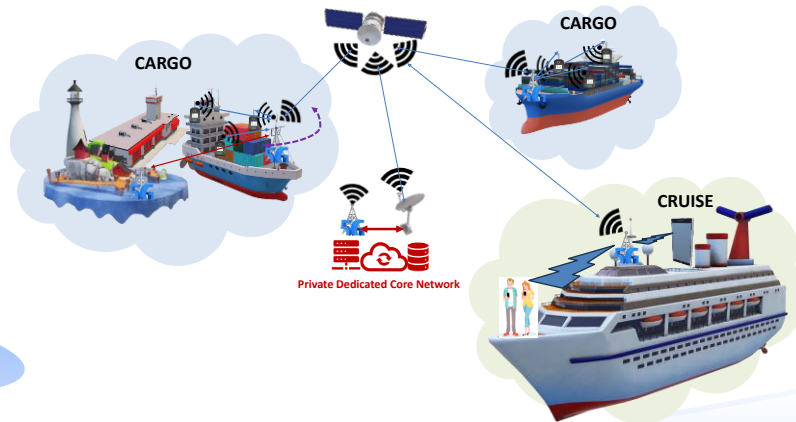


Harvesting drones

Maritime Industrial Example

CARGO Applications

- Multi-standard sensor network
- Remote monitoring of structures and cargo
- Smart mooring
- Telemedicine for crew
- Virtual Ship Inspection
- Private network for sensitive data
- Ship "Digital Twin" for improved maintenance



Private Maritime Network

- Private Core Network to manage devices and connectivity Designed to 3GPP 5G standards for Private Core Networks
- Centralised, unified management of all services and connections available on board
- Reuse of all satellite connections already available
- Advanced on-board connectivity with access to 5G services via WiFi (no need for 5G spectrum or antennas)

CRUISE Services

- Internet connectivity
- Private network for on-board staff
- Entertainment and multimedia
- Videoconferencing
- International telephony via "Voice over WiFi"



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Thank you!

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