



5TONIC: Open 5G Lab

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Jornadas de Movilidad RedIRIS

November 30th, 2017

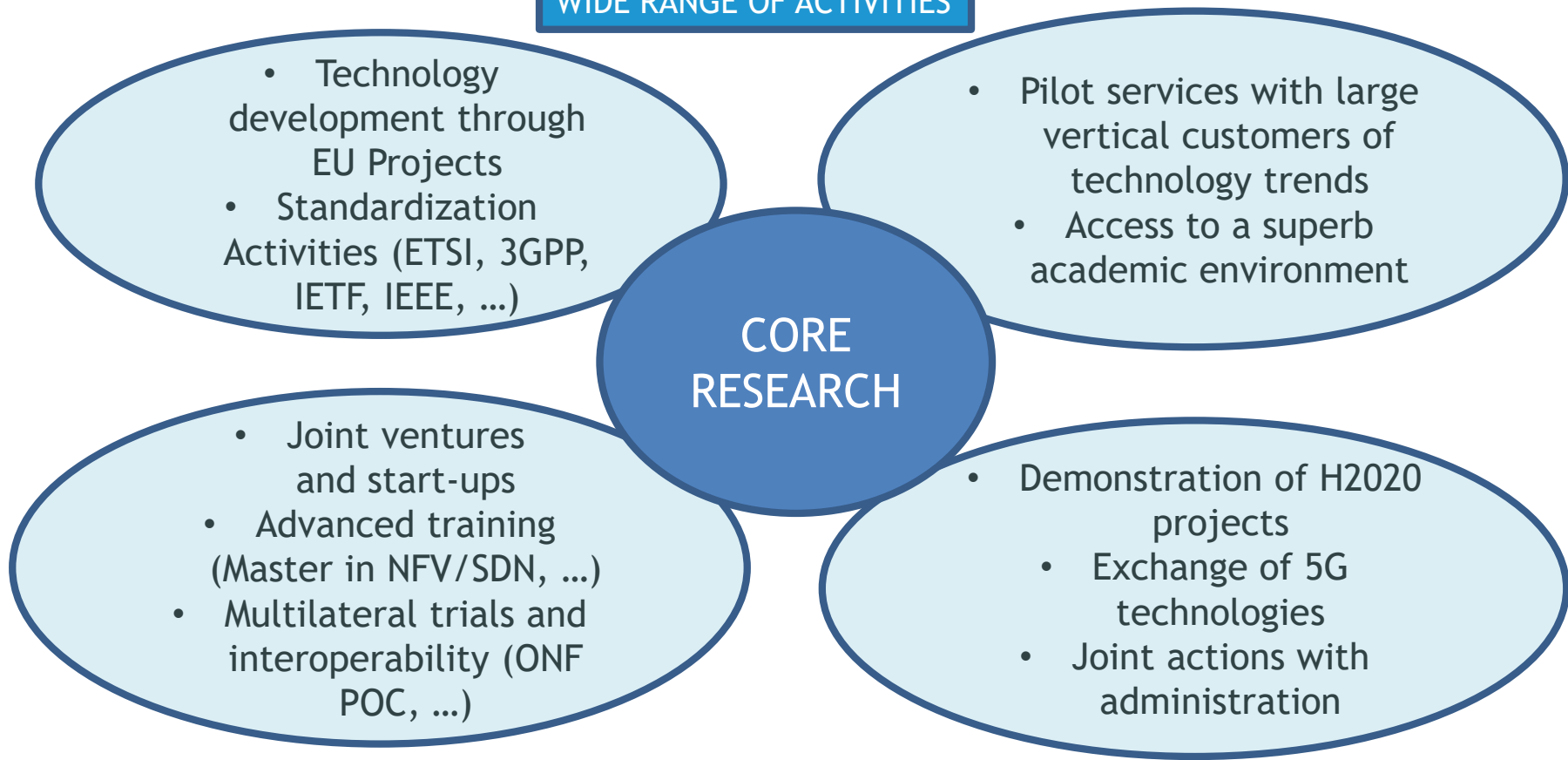


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5TONIC objectives

5TONIC is an open co-creation laboratory focusing in 5G technologies, founded by Telefónica and IMDEA Networks and based in Madrid

WIDE RANGE OF ACTIVITIES



5TONIC: a set of organizations that are reference in 5G R&D

Current 5TONIC members



Collaborators, for companies or institutions running specific trials and experiments, typically in vertical sectors

- IFEMA: trade fair of Madrid
- ASTI: self driven industrial vehicles
- SAMUR: emergency services
- Plus current conversations with:

Gaming		Finance	
Emergency		Education	
Manufacturing		Retail	
Tourism		Auto	
Smart Agro		Rail	
Energy			

5TONIC activities

Pioneer Master program in NFV/SDN for 5G

- In cooperation with UC3M, IMDEA Networks, Ericsson and Telefónica
- New edition in early 2018 focused on 5G

European Testbed for 5G-PPP projects:

- 5G-Crosshaul, 5G-NORMA, 5G-Ex, Flex5Gware, mmMagic, SUPERFLUIDITY, ...

Standardization

- ONF-POC event, ETSTI-OSM Plugtest, ...

Consortium set-up for both phase 2 and phase 3

- 5G-TRANSFORMER, 5GCORAL, 5G-MONARCH, ...
- (ICT-23 and ICT-25: June draft WP)

First 5G Start-up Competition

- Luz Wavelabs was selected

Expansion Prize to top 5 Industrial Innovation initiatives



5G PPP

The 5G Infrastructure Public Private Partnership

5G X Crosshaul

5Gex

5G NORMA

6 Flex5Gware

Flexible and efficient hardware/software platforms for 5G network elements and devices

mmMAGIC **SUPERFLUIDITY**

5TONIC Main Site: IMDEA Networks

- Standalone building sitting in its own plot of land
- Access both to open ground and rooftop, for the installation of antennas and radiating elements
- Equipment center, with space reserved for each member plus collaborators
- Nearby auditorium and facilities for conferences, public presentations and events
- Additional facilities available at Almagro Telefónica I+D offices
- Potential use of UC3M facilities both in Leganés and Madrid city center



Industry 4.0 use case

Industry 4.0 use case trial in 5TONIC will be carried out in cooperation with ASTI, a leading Spanish company in AGVs (Automated Guided Vehicles)

The initial objective of the trial is to assess the viability of centralizing in an application server deployed locally the software that allows the vehicles to move autonomously, thanks to a high reliability, low latency wireless connection

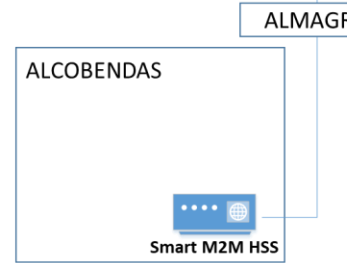
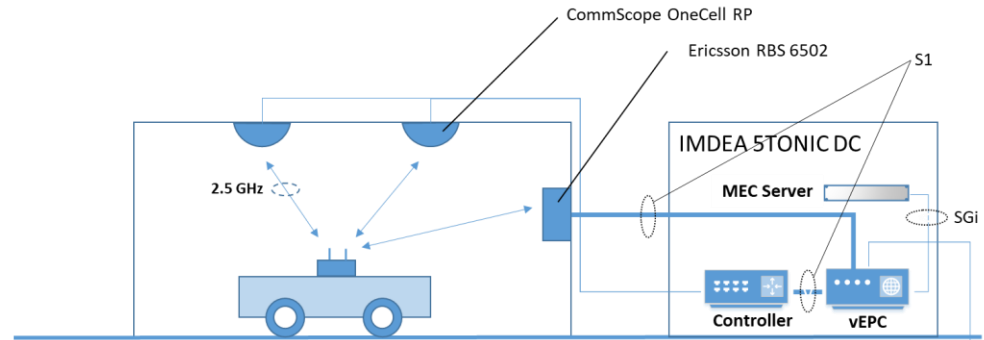
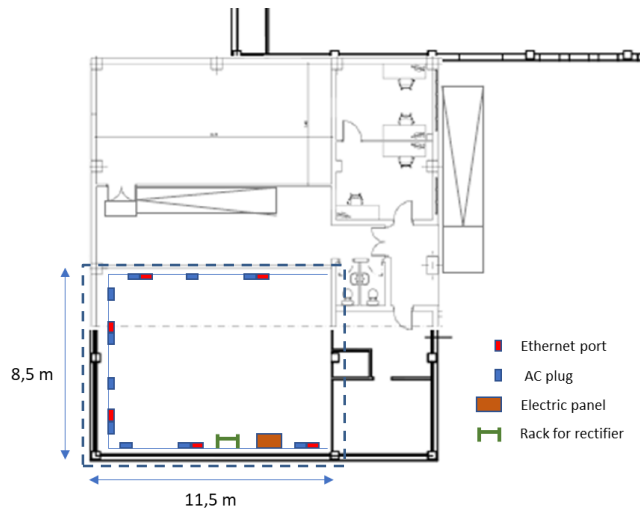
- The system should provide the same performance than the current system, where the control software runs on a PLC board installed in the vehicle
- If successful, in a second phase, the coordination of the vehicles will be pursued

As a secondary objective, the deployment of high resolution cameras on the vehicles and the wireless transmission of video and sensor data can also be considered

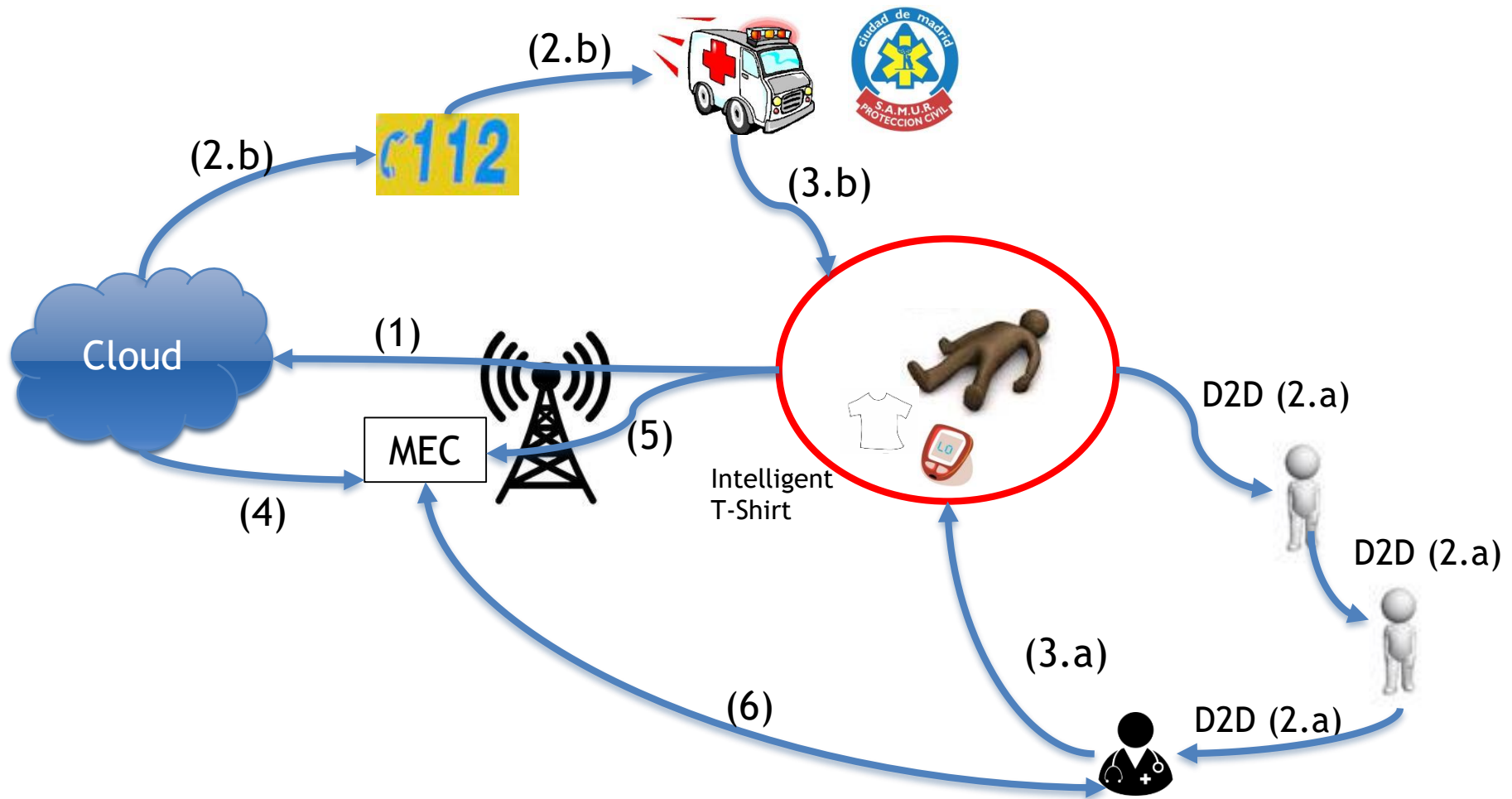
All these applications will be deployed as MEC applications running in a MEC server, initially connected through the SGi interface and, in a later phase, deployed in the S1 interface

For the implementation of the use case it has been necessary to prepare the area adjacent to the 5TONIC CPD where the AGVs will be deployed

Infrastructure for Industry 4.0

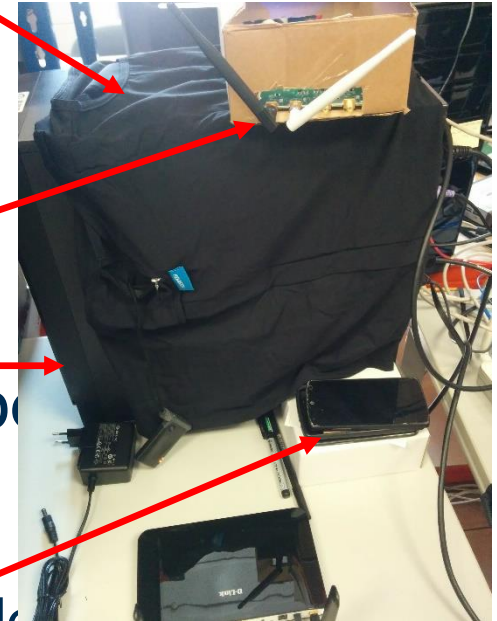


eHealth use case: emergency services



Status of Emergencies

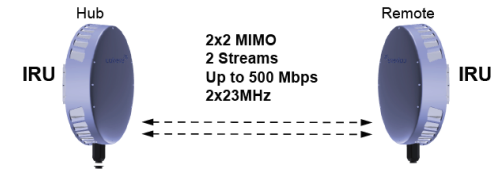
- Extracting information from a smart shirt
 - [Hexoskin](#)
 - Bluetooth connectivity
 - Open API
- Deploying an eNodeB and an EPC (Open LTE)
 - Not working yet
 - We plan to install the MEC solution provided by CAI
- Android smart phone as a gateway between the shirt and the server



Cohere OTFS Equipment demonstration

Cohere Connect equipment used characteristics:

- Size: 38.1 cm x 20.3 cm x 14 cm; weight: 5.44 kg
- Maximum power draw 70 W, AC
- Transmission power 1W/MHz
 - Maximum bandwidth: 2x23 MHz
- Antenna beamwidth
 - Vertical: 15°
 - Horizontal 30°
- Antenna gain: 15 dBi
- MIMO 2x2
- TDD operation 1:1 (same bandwidth in each direction)



Thanks for your attention!!

5G Key Characteristics (I)

- Edge computing service inside the network (MEC)
- Slicing capability for personalized services
- QoS assurance (guaranteed by SLA)
- 20 Gbps terminal peak data rate
- 100 Mbps terminal sustained data rate
- 10 Mbps/m² traffic density
- 1 ms latency

5G Key Characteristics (II)

- 10^{12} terminals (IoT, ...)
- 10^6 terminals/Km²
- 500 Km/hour mobile speed supported
- 99.999% reliability
- Service deployment of 90 minutes
- Ubiquitous 5G access, even low density areas
- 1m localization, network based, including indoors (under discussion)
- Low energy (down to 10% of current mJoule/bit)

5G deployment timeline

- Year 2018
 - 5G Pre-standard products available
 - 5G Pre-standard Wireless Fixed-Access service
 - 5G Pre-standard mobile coverage trial sites
- Year 2020
 - 5G phase I commercial services and products
 - Full 5G commercial coverage of at least one European city per member state
- Year 2022
 - 5G phase II commercial services and products