


BOSCH SPAIN: USE CASES IN 5G-CLARITY





MIGUEL GRANDA; 2021.01.28

Bosch – Corporate presentation

A global network A global network


 Share of sales

 Associates

 Manufacturing sites

**Bosch Group
Figures 2019**


€ 77.7 billion euros
Sales revenue


 398,150
associates


 245
manufacturing sites


Europe




 52%

 242,506


 138


 8.400


 8

Asia Pacific¹




 29%


 111,717


 72

Americas



 19%

 43,927

 35

Four business sectors



Mobility Solutions



Industrial Technology



Energy & Building Technology



Consumer Goods

* As of 12.19
¹ Including other countries

Bosch – Corporate presentation

Technology to enhance quality of life



Bosch is one of the world's leading international providers of technology and services

126 engineering locations worldwide, in a single network

Over the past years, Bosch has invested several **billion euros** in research and development

Our objective:
To develop innovative, useful, and exciting products and solutions to enhance quality of life – technology that is **“Invented for life”**

Bosch – technology to enhance quality of life

Industrial Technology



The Business Sector Industrial Technology

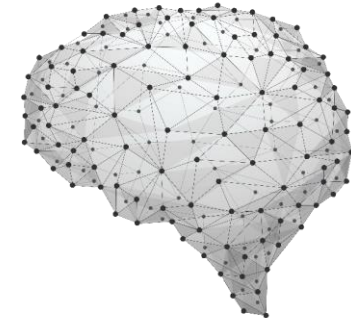
Drive and Control Technology division specializes in drive and control technologies for efficient, powerful, and safe movement in machines and systems including software and interfaces to the Internet of Things. Industrial Technology includes the Bosch Connected Industry business unit.

4

2020: All electronic **products connected**.
2019: **92%** of electronic product classes are connected



2025: All **products** either **possess AI**¹ or are created by **utilizing AI**¹



Bosch Group in Spain

Aranjuez plant, Madrid (Mobility Solutions)



The automotive sector plant Aranuez belongs to the division Powertrain Solutions and is dedicated to the production of **DNOX** components and modules (DNOX products are used for the treatment of exhaust gases, being systems capable of significantly reducing NOX emissions), **fuel filters**, **FRL** (fuel return line components), and other **thermoplastics and duroplastics** parts.

In 2018, the plant celebrated its 50 anniversary.

Portfolio

 <i>DNOX 2.2</i>	 <i>DNOX3.1</i>	 <i>DNOX 5.3 Heater</i>	 <i>Filter UREA DNOX 5.3</i>	 <i>OIL Filter</i>
 <i>Filter TEE</i>	 <i>Filter EMM</i>	 <i>FRL</i>	 <i>Electronic Part LIC-B</i>	 <i>Electronic Part PAS 5</i>

5GCLARITY

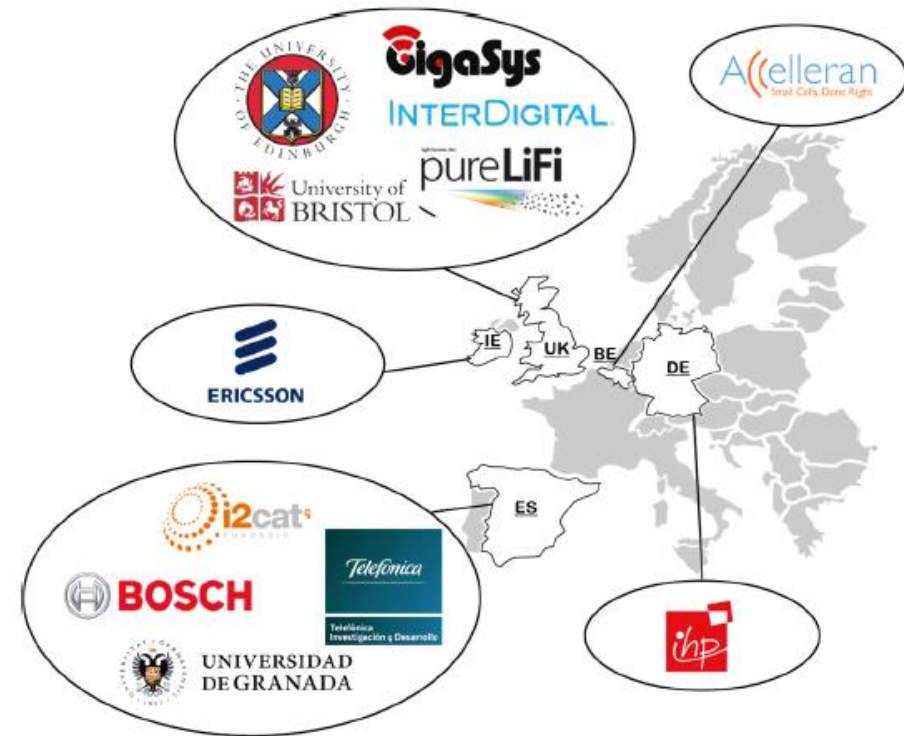
Title and Participants



- **5GCLARITY - Beyond 5G Multi-Tenant Private Networks Integrating Cellular, Wi-Fi, and LiFi, Powered by Artificial Intelligence and Intent Based Policy**

<https://www.5gclarity.com/>

No.	Participant Organisation Name	Short Name	Country
1	Innovations for High Performance microelectronics / <i>Leibniz-Institut für innovative Mikroelektronik</i>	IHP	Germany
2	Accelleran	ACC	Belgium
3	Bosch	BOSCH	Spain
4	Gigasys Solutions	GIGS	UK
5	<i>Fundació Privada i2CAT, Internet i Innovació Digital a Catalunya</i>	I2CAT	Spain
6	Interdigital	IDCC	UK
7	Ericsson LMI	LMI	Ireland
8	pureLiFi	PLF	UK
9	<i>Telefónica Investigación y Desarrollo</i>	TID	Spain
10	University of Edinburgh	UEDIN	UK
11	University of Granada	UGR	Spain
12	University of Bristol	UNIVBRIS	UK



5GCLARITY

Vision



5G-CLARITY will develop and demonstrate a beyond 5G system for private networks integrating 5G, Wi-Fi, and LiFi technologies, and managed through AI based autonomic networking.

5G-CLARITY brings forward the design of a system for beyond 5G private networks that addresses the challenges in spectrum flexibility, delivery of critical services, and autonomic network management.

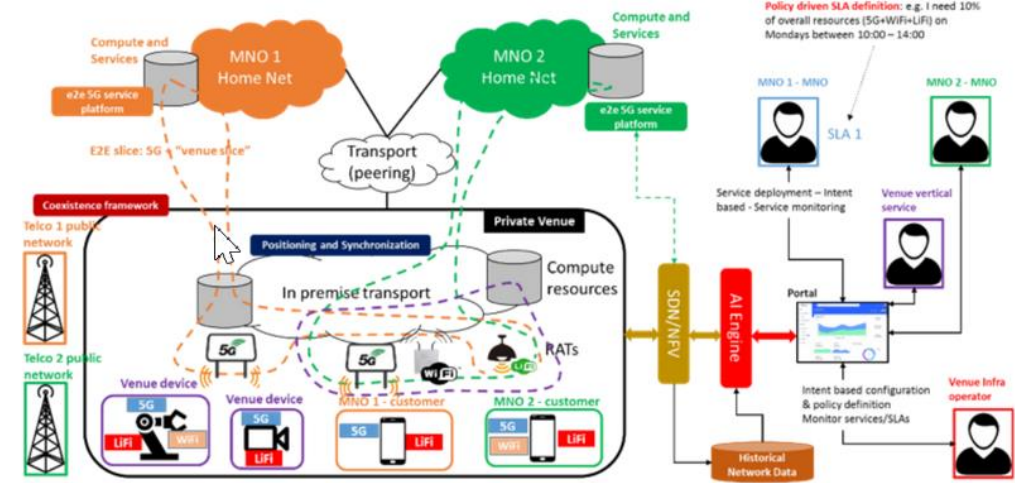
5GCLARITY Concept



5G-CLARITY envisioned system architecture will enable dynamic deployment of connectivity services.

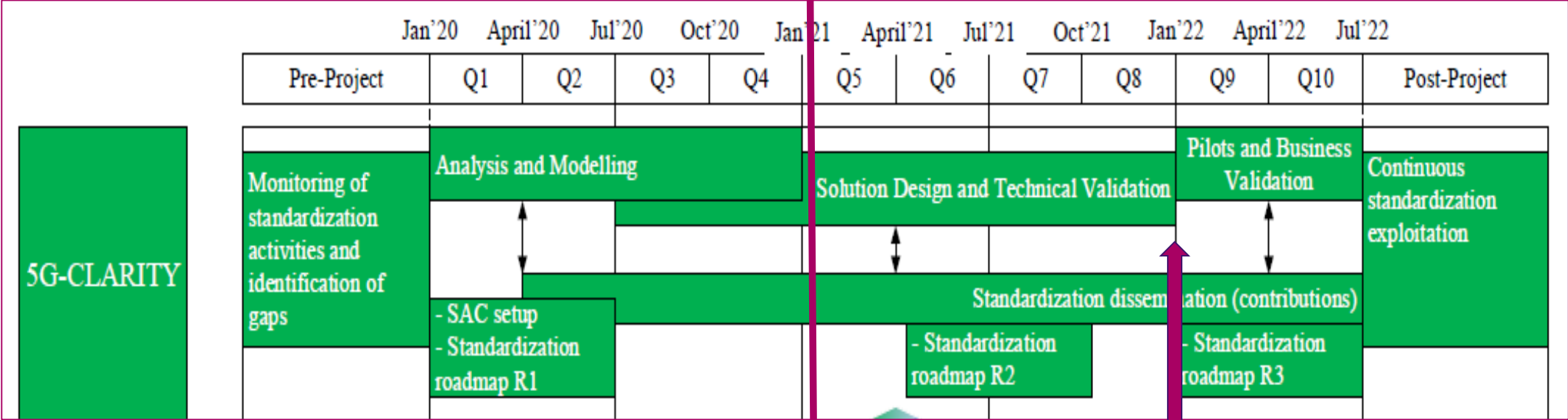
By supporting AI-driven management 5G-CLARITY will enable effective provision of slices, managing and optimizing their performance.

AI-driven management also drives network automation by greatly reducing the need for human intervention.



5GCLARITY

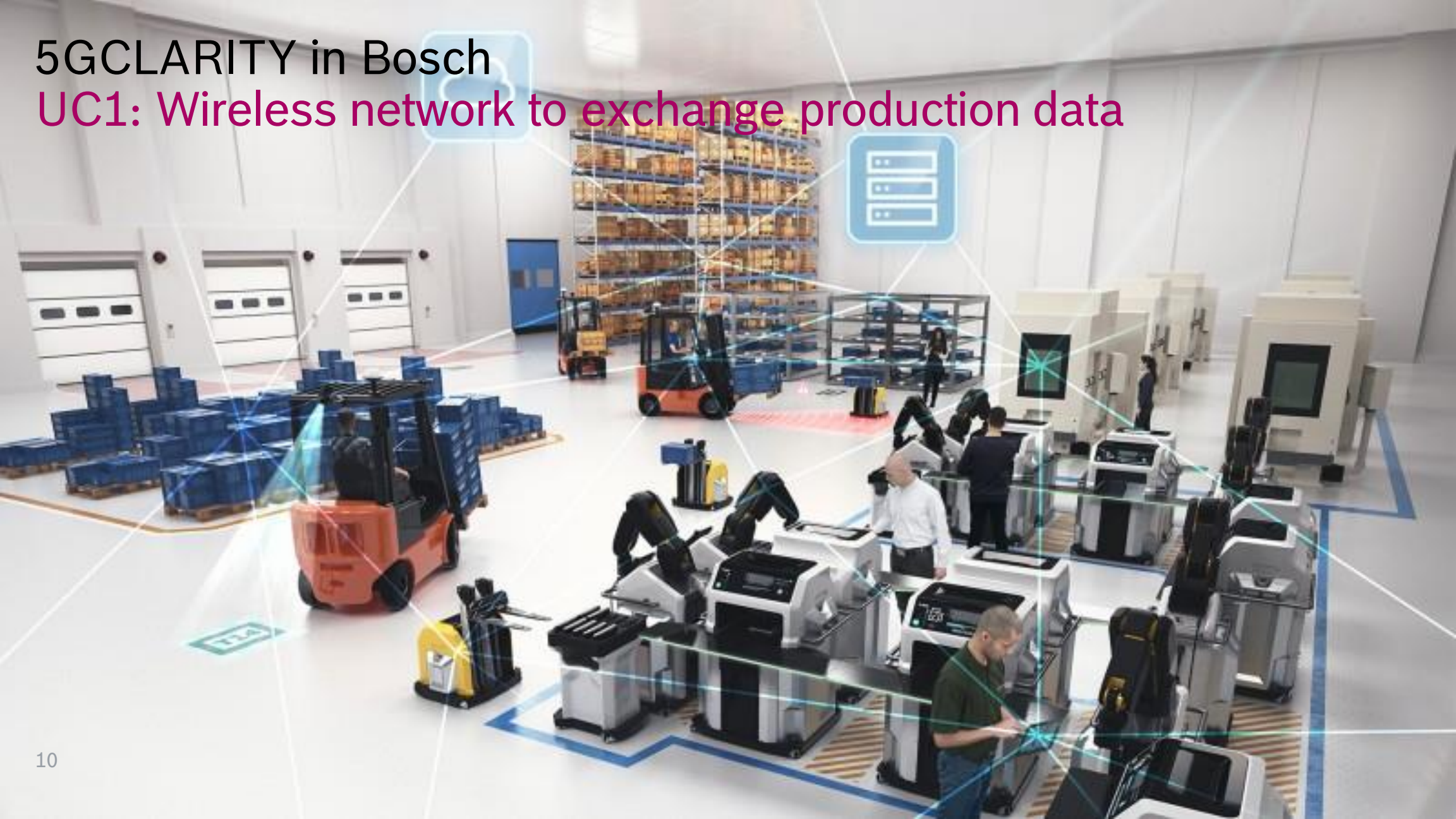
Project timetable



Jan 2022:
Demostrator

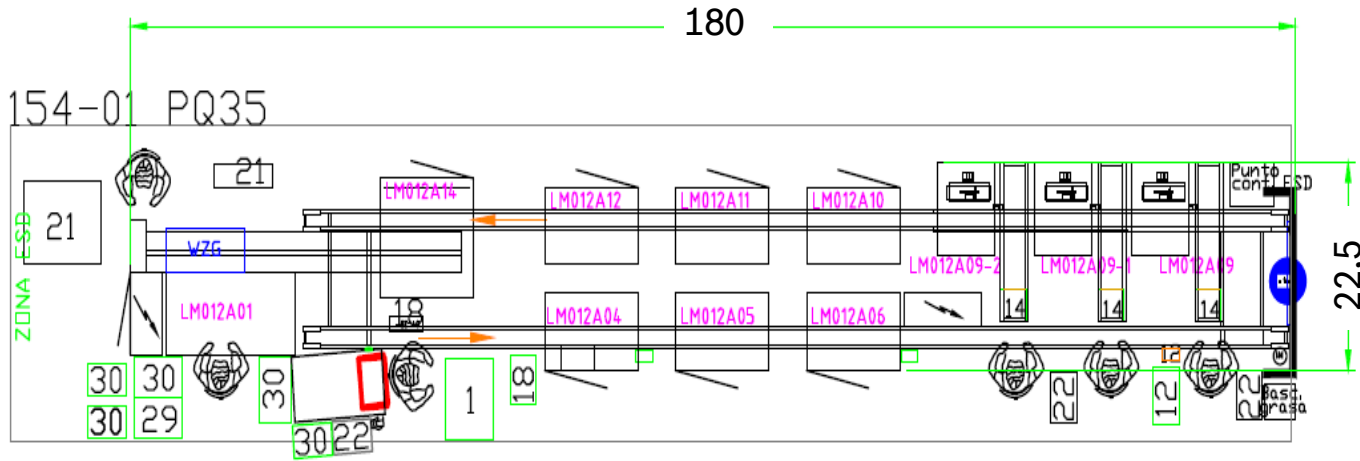
5GCLARITY in Bosch

UC1: Wireless network to exchange production data

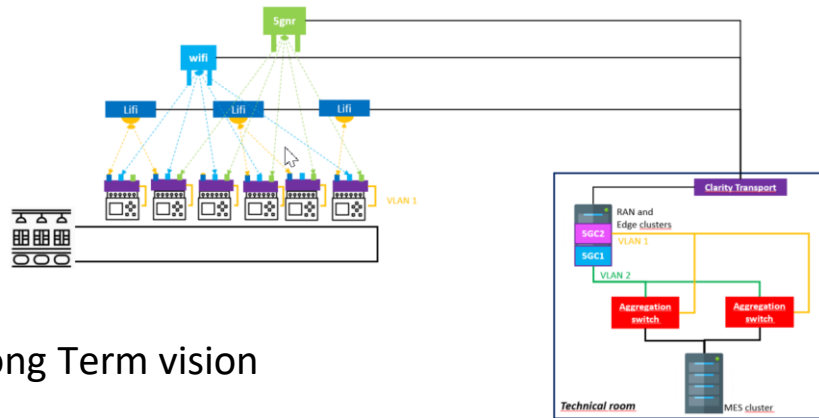


5GCLARITY in Bosch

UC1: Wireless network to exchange production data



Goal: Sending massive data in real time to a MES server which will check and send feedback to release the production process. The project will offer flexibility to reorganize the shop floor layout according to a changing market.



Long Term vision



5GCLARITY in Bosch

UC1: Wireless network to exchange production data



Objectives:

- Demonstrator of the 5G/Wi-Fi/LiFi in a pilot demo-site.
- Reliable data transmission system (without failures).
- Increase flexibility to adapt new factory layouts .
- Demonstration of a configurable wireless infrastructure to address multiple services:
 - Wi-Fi office (SAP, office automation, etc.).
 - MES.
 - Wireless guns.
 - Wi-Fi smartphones and laptops.
 - Wi-Fi ITM access to a Bosch Connected network LAN and production VLAN.

Current situation:

- The shop floor facilities in our production area have 4 SSID, regulated by VLAN.
- SAP has priority above all other services and stop any other service.
- Wire connectivity to give service to data production exchange.

Future situation:

- “One” configurable wireless infrastructure to address multiple services.
- A Private network with “layers” and parallel connectivity solutions to ensure the reliable data transmission in every moment.
- A new wireless service to support massive data exchange provided by new i4.0 data mining (MES).

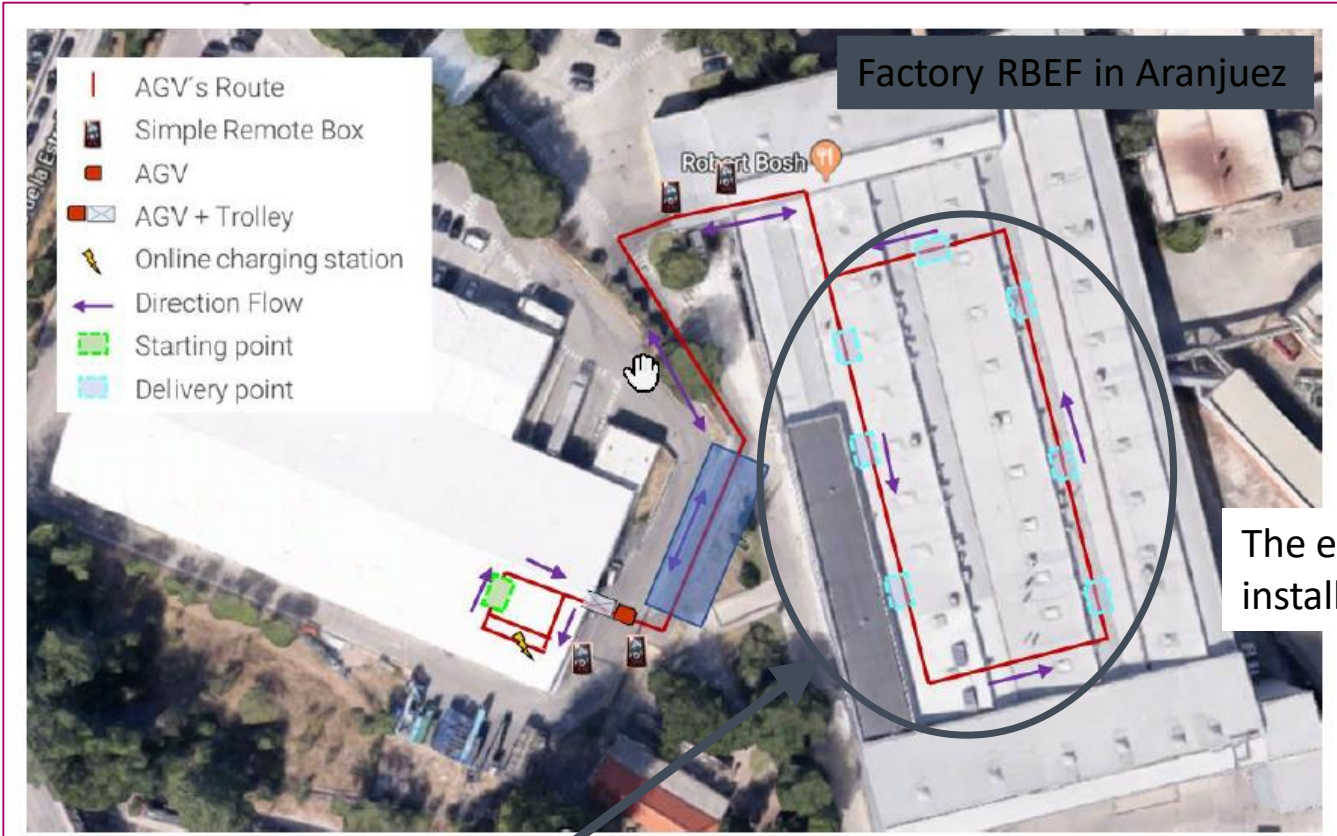
5GCLARITY in Bosch

UC2: AGV Precise position



5GCLARITY in Bosch

UC2: AGV Precise position



Goal: Collecting data with high accuracy and in real time to evaluate how many real incidents are produced during the routes, where they happen and how long it takes. The project will provide data that Bosch will convert in information used to introduce measures to increase the productivity of the AGV's

The equipment will be installed above the AGV



Simultaneous localization and mapping (SLAM) Navigation
 Safety Laser
 Radio
 Wi-Fi

We will focus only in this area – Wi-Fi only indoors

5GCLARITY in Bosch

UC2: AGV Precise position



Objectives:

- Develop and demonstrate an automatic process based in the positioning capabilities of 5GCLARITY.
- Evaluate the movement of AGV to identify disturbances in its route.
- Increase productivity: Allow the AGV to go faster (less cycle time) and reduce the width of the aisles gaining productive surface.
- Improve the safety in production areas
- Improvement of material flow transparency.

Current situation:

- The movement into the factory is based in traditional systems, such as forklift operated manually by professional drivers.
- A logistic operator has to prepare the container according to SAP Instructions and move it to the right assembly line.

Future situation:

- The Logistic operator leaves the container in the dispatch area.
- The system programmes the AGV to distribute it to the right point and return and stack the empty containers in the right place.
- New network to follow the AGV and the goods.
- Algorithms to define the right position of the AGV.
- Information system to follow any stop.

THANKS