5G INDUCE

Open cooperative 5G experimentation platforms for the industrial sector NetApps

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"Research Projects for creating the Future and Innovative Telecoms Market"

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ML Tools and AR Applications Implementation in a 5G Environment for Predictive Maintenance

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Whirlpool EMEA / WIND-TRE /CNIT

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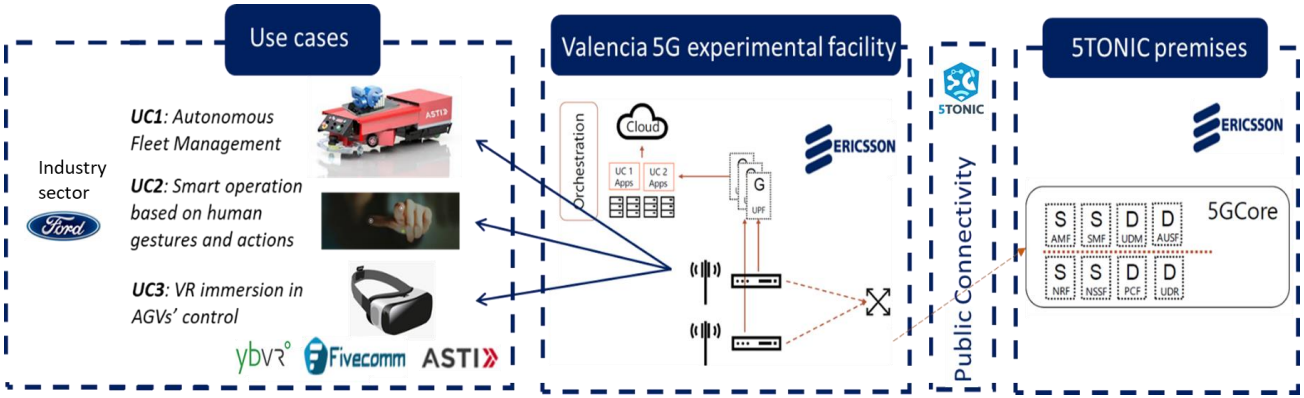
Current deployment status

- Infrastructure deployment status
- Use Cases deployment status
- Next steps and DEMO’s detailed plan

Experimentation Facilities

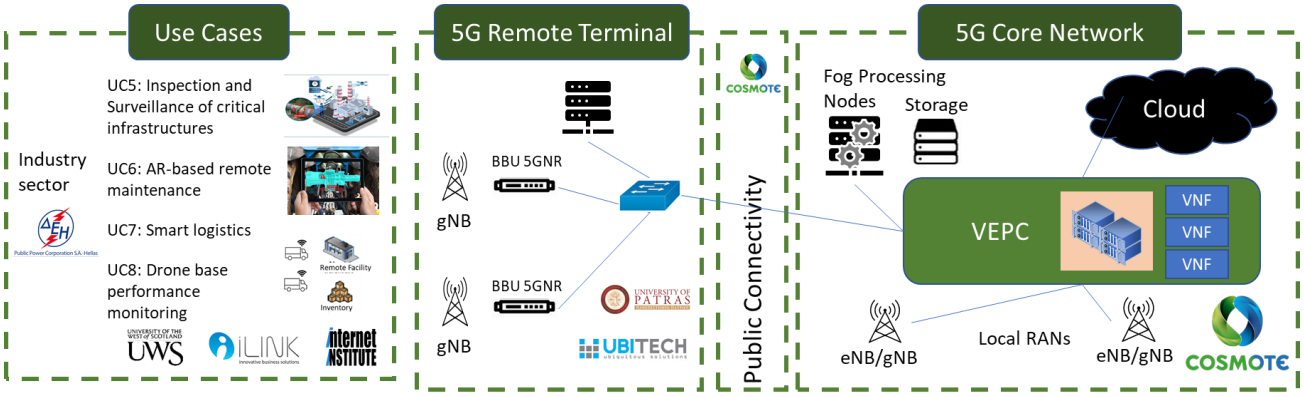
ExFa - Spain



- Industry:
FORD, Valencia

- 5G connectivity
Ericsson remote node
5TONIC, 5G-EVE

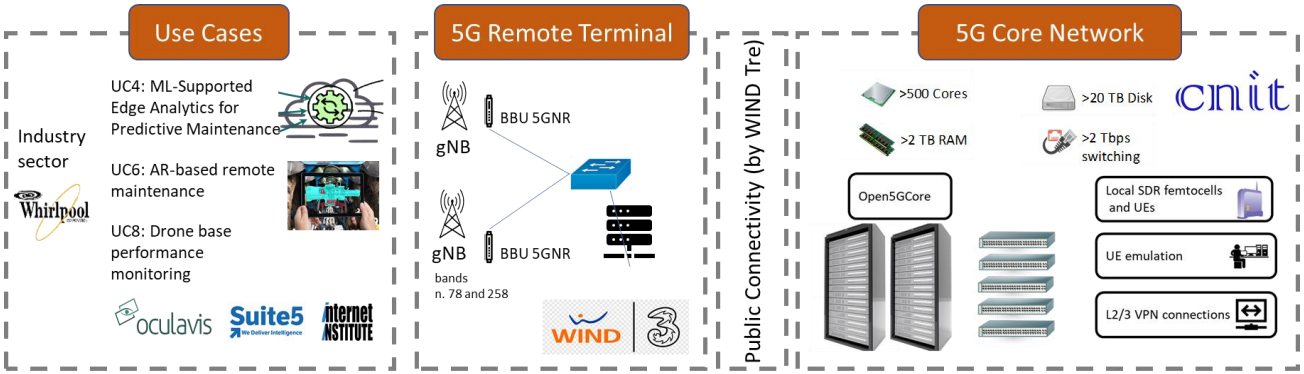
ExFa - Greece



- Industry:
PPC, Lavrio Athens

- 5G connectivity
COSMOTE 5G core and RAN enviroment
Remote node

ExFa - Italy



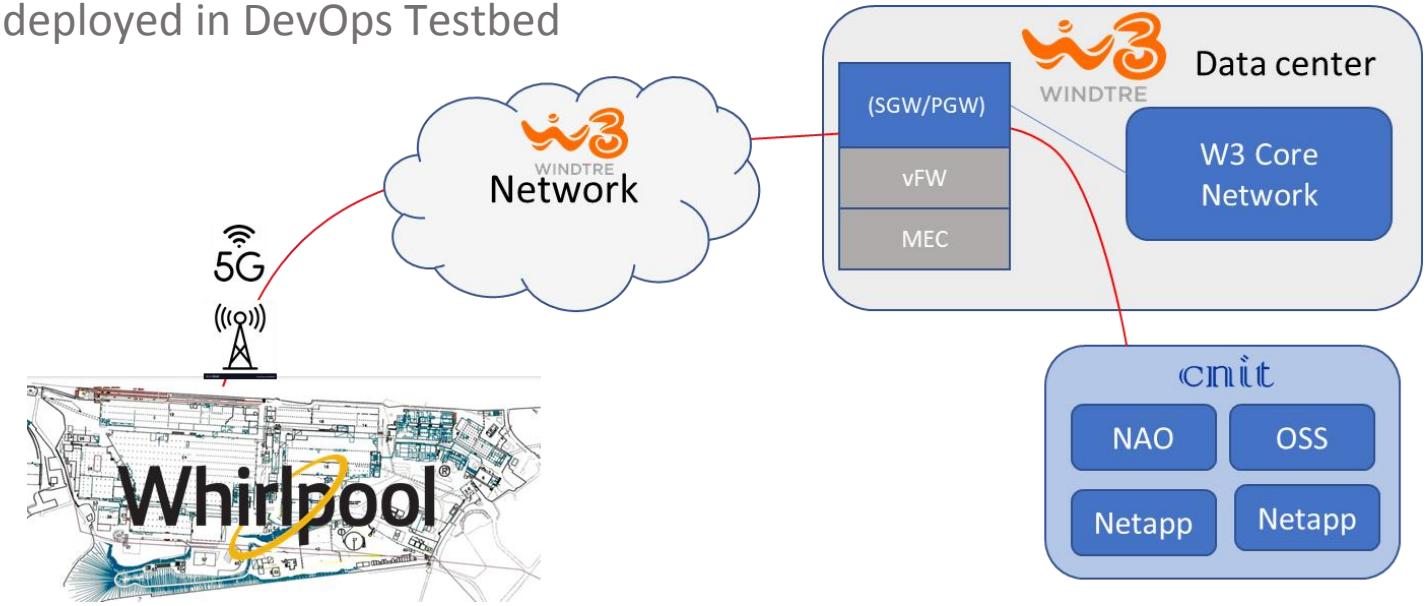
- Industry:
Whirlpool,

- 5G connectivity
Wind3, CNIT
DevOps test bed (core + RAN)

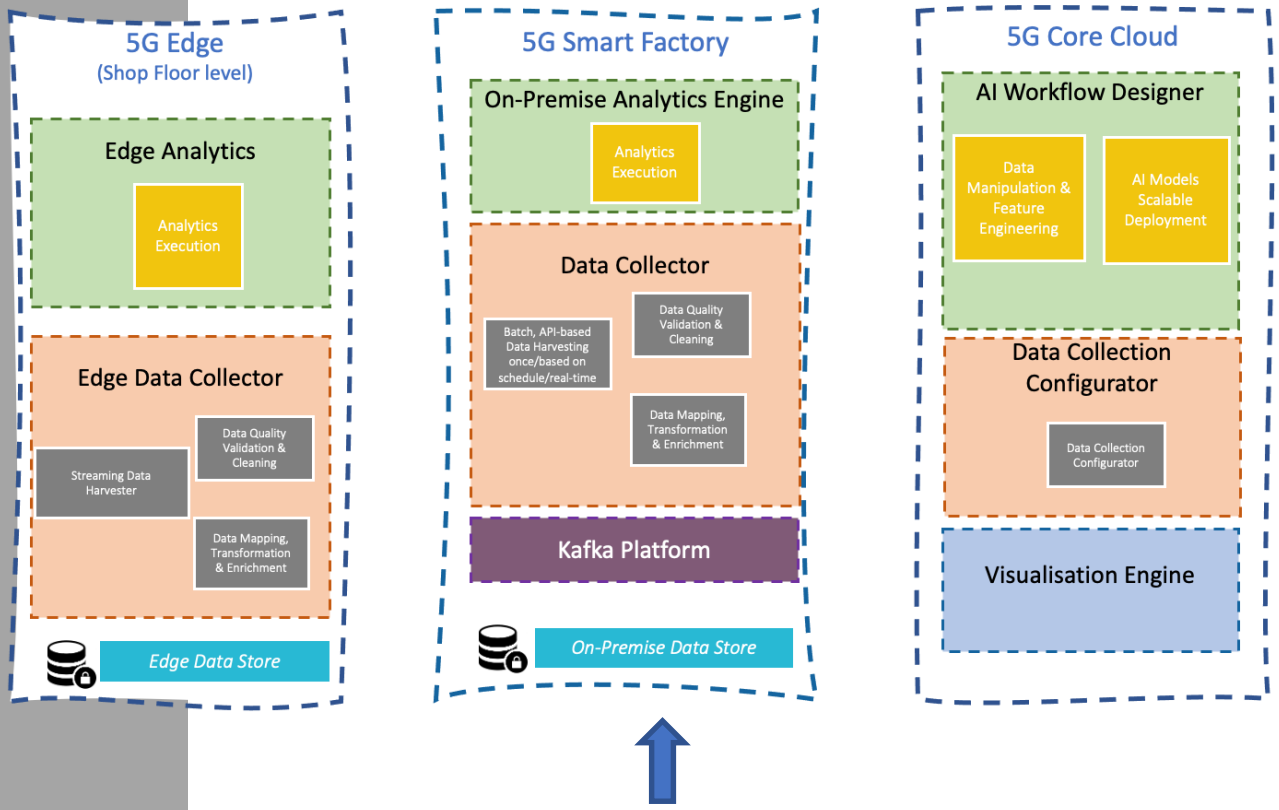
Current deployment status – Italian ExFa

Infrastructure deployment status

- Hardware MEC available in WindTre data center
- MEC installation completed – configuration in progress
- 5G SIMs available @Whirlpool, tested and configured for both private and public APN
- 5G-INDUCE platform and non time-critical Network Application components deployed in DevOps Testbed



Edge Analytics for Predictive Maintenance (UC#4)



The On-Prem Analytics is running on a Kubernetes cluster, in order to allow the breakdown of operations into different jobs and their ability to scale. Spark and TensorFlow are used for executing the analytics.

UC#4 is related to the execution of data-driven analytics for predictive maintenance within a factory setting.

The Network Application that will be developed in the context of this use case, will offer data collection, analytics and visualisation functionalities bundled in separate VNFs, that serve the different needs of the shop floor and factory levels, while taking into consideration the respective technical capabilities and any applied limitations.

Current deployment status: UC#4

Use Cases deployment status

UC#4

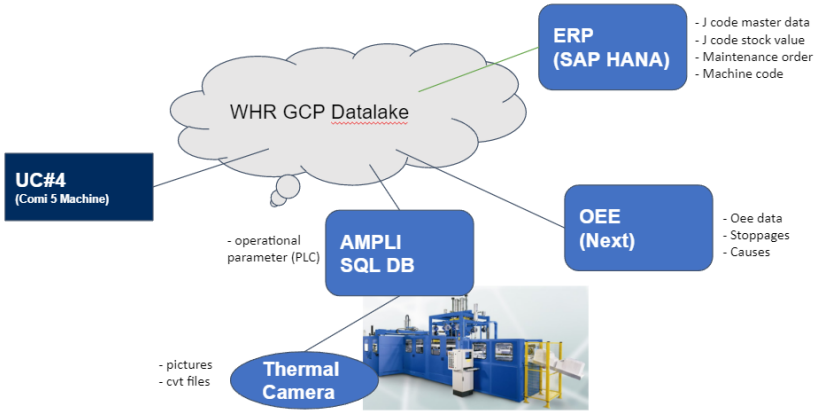
NetApp: Predictive maintenance for Thermoforming machine

Main objective:
Test bandwidth and latency on real time data flow for machine connectivity (PLC data and thermal camera images) via 5G
Secondary objective:
Evaluate netApp

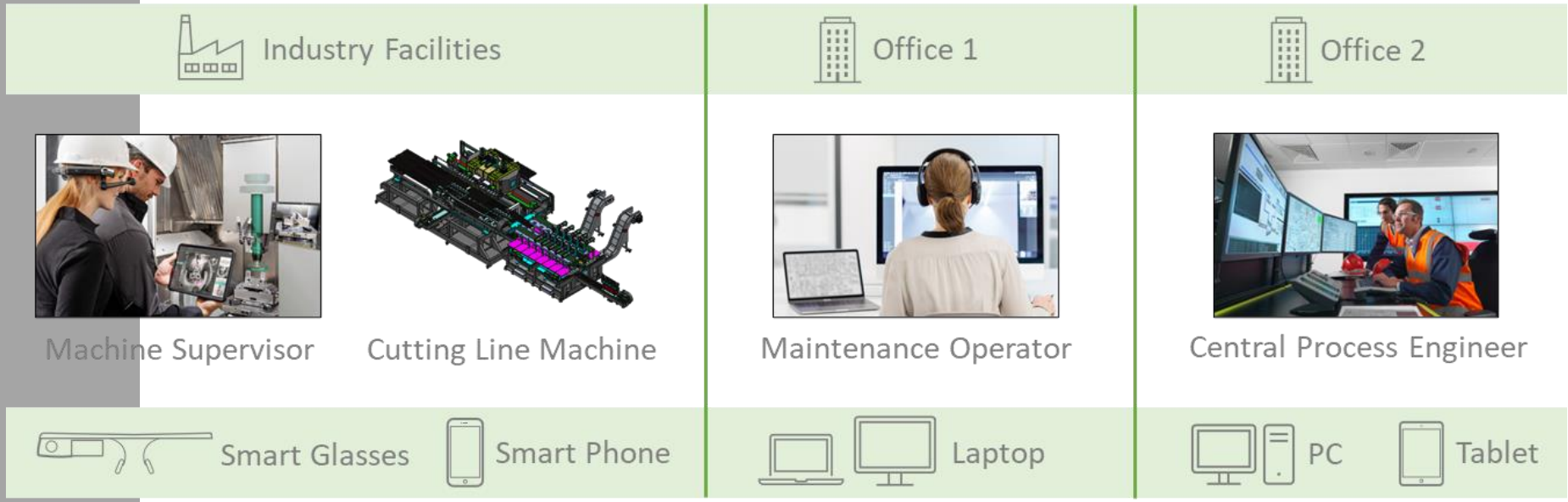
Business requirements

- Signal quality
  - Signal strength >-76dBm on covered area
  - Signal stability within covered area +/-5%
- Latency
  - Transport layer: Communication latency (end-to-end) <100ms - currently from 4-5ms for the same site and 40-50ms for different sites
  - Application layer: Processing Latency (including transport)
    - <200 ms for control purpose as today
    - <500ms for monitoring purpose as today
- Bandwidth
  - video/images/data uploading >10 Mb/s for single user point
- Availability (at system level) 99,99%
- Health and Safety: Compliance DPCM 8.7.2003 (GU 199 29.08.2003)

- Data availability in private Whirlpool cloud (GCP) in progress: completion by dec'22 (machine PLC data, Thermal camera)
- System integration architecture defined
- Mobile devices available. 5G SIM available and tested
- Stakeholders engaged for demo validation phase
- Readiness for Demo session in Jan

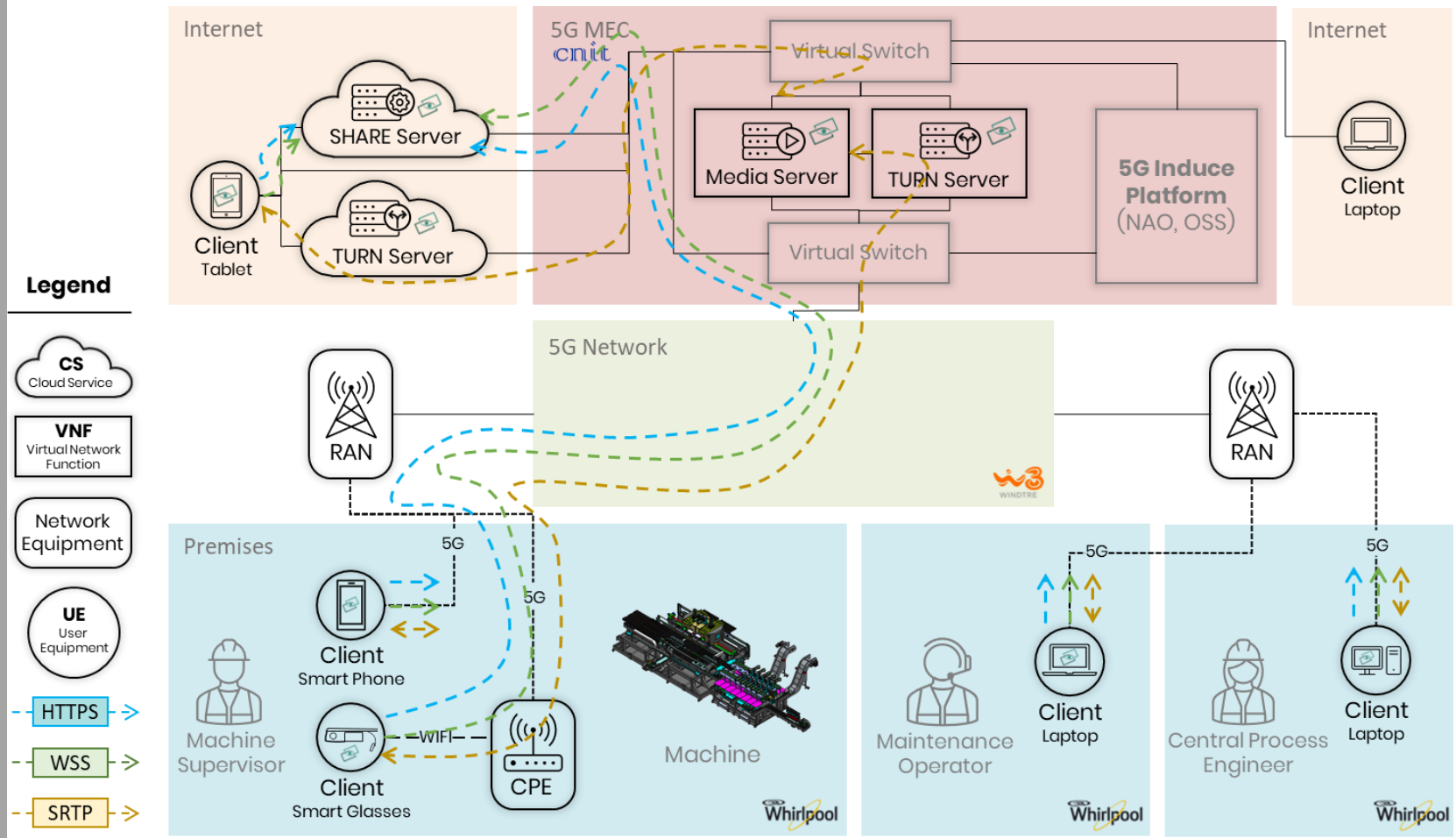


Remote Inspection, Maintenance and Repair (UC#6)



Here, the **Remote Support module of Oculavis SHARE** provides a broad and high-quality remote support call through the combination of high-quality video and audio streams, collaborative working tools such as diverse AR annotation and documentation tools and linking of respective data.
The application enables the execution of maintenance, inspection and repair tasks remotely, so that travel time and costs of service technicians can be reduced, and the machine availability increased.

UC#6 Network Application graph



The Network Application graph is used to deploy the NetApp via the Network Application Orchestrator (NAO) of the 5G-Induce platform.

Current deployment status: UC#6

Use Cases deployment status

UC#6

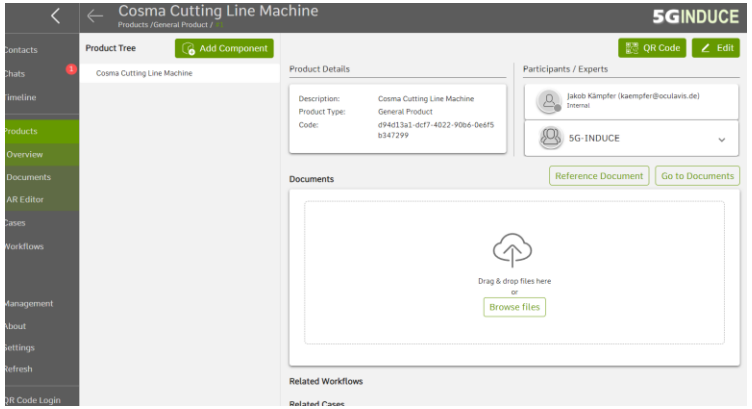
NetApp: AR assistance for maintenance

Main objective:
Test bandwidth and latency on real time data flow for worker assistance and documents/ pictures/ video management via 5G
Secondary objective:
Evaluate netApp

Business requirements

- Signal quality
  - Signal strength >-76dBm on covered area
  - Signal stability within covered area +/-5%
- Latency
  - Transport layer: Communication latency (end-to-end) <100ms - currently from 4-5ms for the same site and 40-50ms for different sites
  - Application layer: Processing Latency (including transport)
    - <200 ms for control purpose as today
    - <500ms for monitoring purpose as today
- Bandwidth
  - video/images/data uploading >10 Mb/s for single user point
- Availability (at system level) 99,99%
- Health and Safety: Compliance DPCM 8.7.2003 (GU 199 29.08.2003)

- Data availability in Oculavis SHARE platform repository and NetApp platform configuration in progress.
- User training session to be planned in dec
- Mobile devices available. 5G SIM available and tested
- AR Glasses configuration in progress
- Stakeholders engaged for demo validation phase
- Readiness for Demo session in Jan



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THANK YOU!

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