

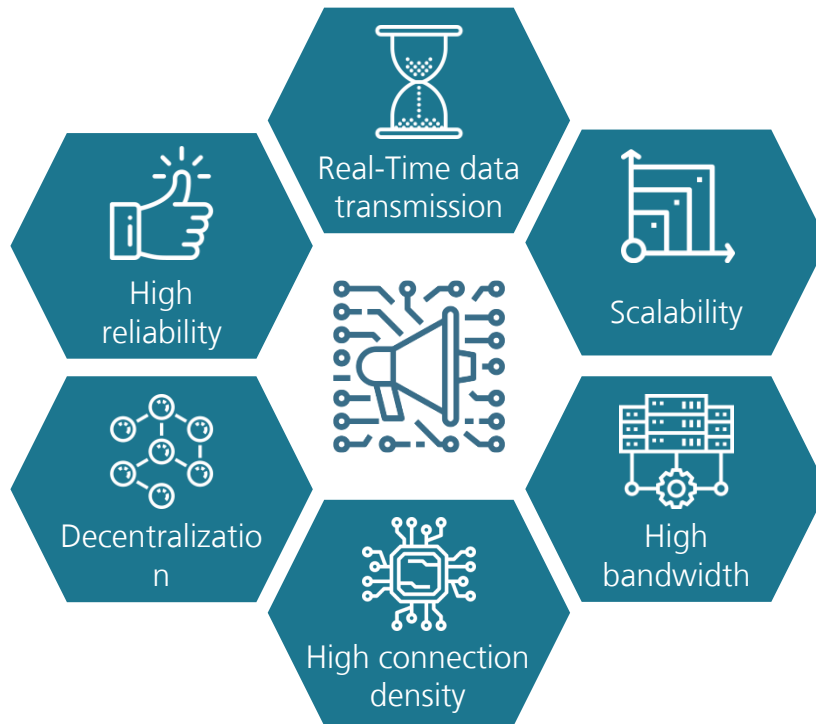
## 5G Portfolio – Your customized path to 5G

Coaching, sensor development, demonstrations, opportunity assessment, strategy formation and implementation

# 5G creates new opportunities in industrial applications

## Data infrastructure as the foundation for the factory of tomorrow

Flexible and interconnected industrial applications have specific requirements:



## 5G as the future of communication in manufacturing



Enhanced mobile  
broadband

20 Gb/s  
Peak downlink rate

10 Gb/s  
Peak uplink rate

10 Tbps pro km<sup>2</sup>  
Capacity

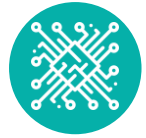


Ultra-reliable and low  
latency  
communication

<1ms  
Latency

< 99,999%  
Reliability

500 km/h  
Mobility



Massive machine type  
communication

100x  
more connected  
devices

~ 15 Jahre  
Battery life

1.000.000/km<sup>2</sup>  
Device density

5G-technologies enable a wealth of new applications in  
manufacturing

**We help you to discover the potential of 5G and to use it for YOUR own production!**



# 5G INDUSTRY CAMPUS EUROPE



WZL FIR  
Fraunhofer IPT

5G-Industry Campus Europe is the largest industrial 5G testbed

- Since 2019
- 5G indoor networks on 4 different shopfloors fully equipped with machines and robots
- 5G outdoor network of 1 km<sup>2</sup> at the RWTH Aachen Campus
- 5G-NSA and 5G-SA running on industry spectrum @3.7 – 3.8 GHz
- Simultaneous 4G network running @2.3 GHz as anchor band
- 5G-URLLC Testbed @26-28 GHz

Supported by:



Federal Ministry  
of Transport and  
Digital Infrastructure

on the basis of a decision  
by the German Bundestag

5G network supplier:



ERICSSON



IT Center

RWTHAACHEN  
UNIVERSITY



Fraunhofer  
IPT



RWTHAACHEN  
UNIVERSITY

**fir**  
an der  
RWTH Aachen

# 5G Portfolio – Your path to 5G

Our range of services

## OUR RANGE OF SERVICES FOR YOU



### 5G Portfolio – First steps for your 5G application

- Customized consulting on the implementation of 5G in your company
- Modular design
- Coaching, opportunity assessment, strategy formation and implementation from one source
- Extensive testing ground on site at the 5G-Industry Campus Europe
- Experience with the setup of private IT-infrastructure
- Covering the whole edge-cloud spectrum, from sensors to datacenters
- Extensive domain knowledge in manufacturing processes
- Collaborative approach

## YOUR BENEFITS

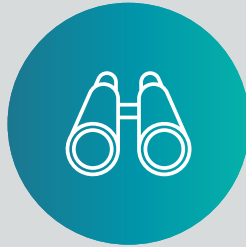
- Facilitate technological expertise 
- Discover opportunities and recognize challenges 
- Objective assessment of your current situation 
- New Ideas for increasing performance 
- Support of internal resources 

# 5G Portfolio overview

5G Start, 5G Expert, 5G Professional

OUR **OFFER**: CREATE YOUR CUSTOMIZED PORTFOLIO FROM OUR MODULAR RANGE OF PRODUCTS

## 5G Start



5G  
Experience  
day

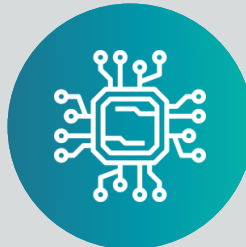


5G  
Use case  
identification



5G  
Opportunity  
assessment

## 5G Expert



5G  
Sensor  
development

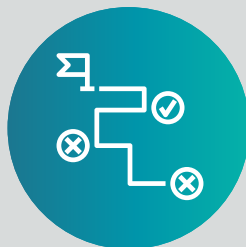


5G  
Use case  
implementation



5G  
Hands-On  
Training

## 5G Professional



5G  
Ecosystem  
manager



5G  
Performance  
testing

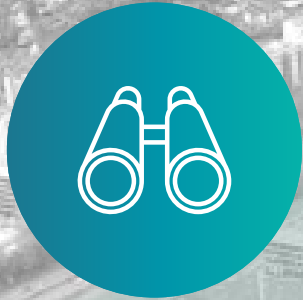


5G  
Mobile testing  
system



# 5G Start

Get a first impression of 5G technologies with our starter set. With your input, we identify possible applications of 5G technologies for your company and assess their economic profitability.



## 5G EXPERIENCE DAY IN AACHEN



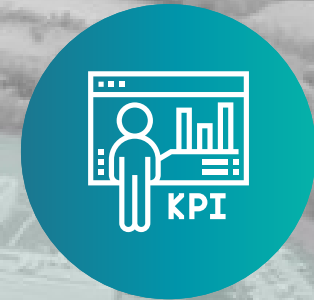
Get to know 5G  
use cases already  
deployed at the  
*5G-Industry  
Campus Europe*



## 5G USE CASE IDENTIFICATION



Identify possible  
5G use cases in  
your company



## 5G POTENTIAL ANALYSIS



Asses the  
economic  
profitability of  
your 5G use cases

# 5G Experience day in AACHEN

5G Start



## OUR RANGE OF SERVICES

### 5G Experience day – 5G Hands on

#### Expert presentations

- Coaching on 5G industrial applications
- Expert presentations e.g., Introduction of 5G-technology and the 5G ICE, applications of 5G in manufacturing, deployment strategies, economic assessment of 5G

#### Guided tour of the 5G campus

- Tour of the infrastructure of the 5G-industry campus europe
- Demonstrations of various 5G-use cases in industrial applications

#### Workshop

- Interactive workshop with all participants
- Discover 5G for your company and your individual processes
- Hands on/ World Café



1 day

## YOUR BENEFITS

- Extensive background information on 5G-technologies from our experts
- Experience different 5G architectures in application
- Multiple 5G use cases serve as an inspiration for your company (robotics, logistics, industrial process control)
- Discuss your experiences and questions with us and other participants and transfer this to your company

# 5G Use case identification

5G Start



## OUR RANGE OF SERVICES

## YOUR BENEFITS

### **5G Use case identification – Identify your companies individual 5G use cases**

- Guided tour at the Fraunhofer IPT with multiple 5G use cases
- On-site shopfloor inspection
- Collaborative workshop identifying and developing you companies 5G use cases.
- Bilateral consultation
- Design of your identified use cases

- On site methodical development of 5G use cases
- Apply our extensive experience in 5G industrial applications
- Identify your personal 5G Use cases
- Develop the firsts steps for your 5G application



1-3 months



# 5G Potential Analysis

5G Start



## OUR RANGE OF SERVICES

## YOUR BENEFITS

### 5G Potential Analysis – are your 5G use cases economically viable?

- Flesh out the details of your 5G use case
- Independent economical analysis of your 5G use case (Return Of Invest - Tool)

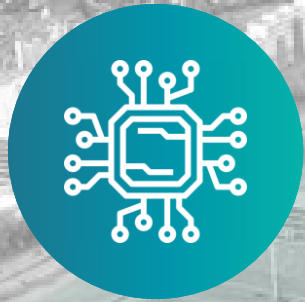
- Methodical analysis of the economic viability of your 5G use Cases
- Apply our extensive experience in 5G industrial applications



1-3 months

# 5G Expert

You want to evaluate 5G in real life scenarios? We develop customer and process specific 5G sensor systems. We implement initial blueprints with you, beginning with requirements analysis to implementation and validation. Or have your own personnel trained as 5G experts with our 5G Hands-On Training.



## 5G SENSOR DEVELOPMENT



Customer centric development of 5G sensor systems



## 5G USE CASE IMPLEMENTATION



Implementation of initial 5G blueprints



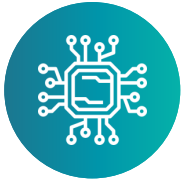
## 5G HANDS-ON TRAINING



5G training with interactive hands-on part

# 5G SENSOR DEVELOPMENT

5G Expert



## OUR RANGE OF SERVICES

### **My 5G Sensor – your customized 5G IoT sensor!**

- Requirement analysis (Battery runtime, sensor type, MCU, IP rating, communication protocols etc.)
- Design of sensor platform
- Hardware development
- Prototype application (embedded software)
- Test and validation
- Data visualization

## YOUR BENEFITS

- Sensor platform tailored to your application
- 5G capable modular, expendable and adaptable sensor platform
- Industrial ready wireless sensor platform for data logging right at the source



6-9 months



# 5G Use Case implementation

5G Expert



## OUR RANGE OF SERVICES

### 5G Use Case implementation – your initial 5G blueprints!

- Requirement analysis
- Design phase: **Architecture development**
- Development phase: 5G sensors, connectivity, etc.
- Implementation phase: On site at your company, or at Fraunhofer IPT
- Validation phase: Test the performance on predefined criteria

## YOUR BENEFITS

- Identify challenges and opportunities of 5G technologies for your individual use case
- We design you 5G case – for and with you



3-9 months

# 5G Hands-On Training

5G-Expert



## OUR RANGE OF SERVICES

### 5G Hands-On Training – 5G in Use

- Two-day training (at 5G Industry Campus Europe or on-site at your facility).
- Topics:
  - End-Device Handling (Log-in, AT-Commands, Configurations, Troubleshooting,...)
  - Network testing (iperf3, ping, twamp, professional equipment,...)
  - Network management (infrastructure setup, configuration options e.g. VLANs, SIM card provisioning,...)

## YOUR BENEFITS

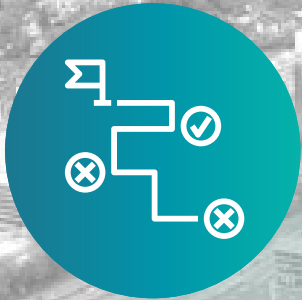
- Apply 5G yourself in a real industrial environment
- Interactive training and exciting insights
- Benefit from our extensive experience as a 5G testbed for several years



2 Days

# 5G Professional

You want to create your personal 5G network? We accompany you during your whole customized 5G roadmap. With „5G Testing“ we offer an independent evaluation of your 5G networks performance. Or test your setup with our mobile 5G testing system on your own site.



## 5G ECOSYSTEM MANAGER



Support  
implementing  
your personal  
5G infrastructure



## 5G TESTING



Evaluation of Network  
performance,  
coverage, your 5G-  
end devices and your  
5G-application on site



## 5G MOBILE TESTING SYSTEM

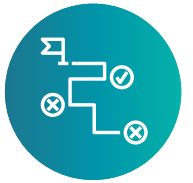


Create a temporary  
5G Network on site



# 5G Ecosystem manager

5G Professional



## OUR RANGE OF SERVICES

### 5G Ecosystem Manager – Support until first contact

- Development of your customized 5G roadmap/strategy
- Implementation of a partner network (connect to MNOs, Federal Network Agency, IT, infrastructure providers...)
- Management of the 5G deployment (network planning, IT integration, ... )
- 5G Hands-On coaching for employees

## YOUR BENEFITS

- Customized consultation on the 5G implementation for your company
- Profit from our combined domain knowledge in manufacturing and industrial 5G
- A personal 5G network with minimal overhead



1 year



### OUR RANGE OF SERVICES

### YOUR BENEFITS

## 5G Testing – What is the real-life performance of your network?

- Test of prototypes of 5G end devices (routers, custom electronic, etc.) at our private Fraunhofer IPT campus network (Stand Alone, Non-Stand Alone) or on site
- Evaluation of your network performance (QoS, throughput, signal strength, QoE etc.)
- Evaluation of 5G capable application on site (preexisting 5G network)
- Walk tests -> Mapping of performance criteria
- Scan of all available network bands

- Independent performance evaluation
- Targeted testing of your use cases and devices
- The necessary infrastructure can be provided (Network and use cases for device testing, network and devices for use case testing ...)
- Support with academic exploitation



1-2 Months

# 5G mobile testing system

5G Expert



## OUR RANGE OF SERVICES

### 5G mobile testing system – 5G on site!

- Application for 5G Frequency bands
- Transport and setup of the mobile testing system on site
- Initial launch and short introduction
- Support for the integration of 5G use cases or devices
- Remote support while the system is in use

## YOUR BENEFITS

- 5G infrastructure and our experience at your doorstep
- No effort setting up the infrastructure
- Temporary 5G network for transitional periods or initial tests
- Test before invest
- Experience 5G inside of your companies manufacturing process



3 months – 1 year



# 5G

INDUSTRY  
CAMPUS  
EUROPE



# Fraunhofer

IPT

5G as the key for connected and  
adaptive manufacturing of  
tomorrow



**VISION**



**MISSION**

We support you, to discover and  
implement the **opportunities** of  
5G in **your personal**  
manufacturing process!

# Contact



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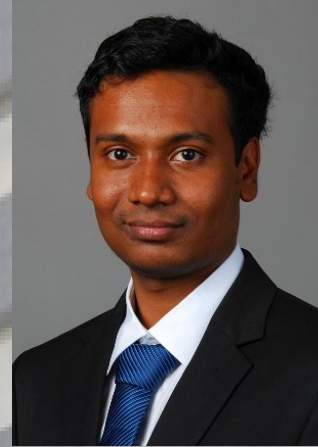
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