

Alliance for Internet of Things Innovation

IoTWeek 2022 Dublin • 22 June 2022

### AIOTI Testbeds Group Presentation of controlled experimentation facilities

**Charles Sturman, Huawei – Chair** 

Rute Sofia, Fortiss – Co-Chair

## Agenda

#### 13.45 - 14.15 Real-world testbeds activities – Charles Sturman, AIOTI IG Testbeds Chair, Huawei

- Introduction (15 min)
  - AIOTI Testbeds Methodology and Catalogue overview
  - Introduction to the testbeds on display at IoT Week
- Testbeds presentations (15 min)
  - Poznan Supercomputing and Networking Center FutureLabs (Marcin Plociennik)
  - Huawei Edge Computing over TSN (Konstantinos Alexandris)
  - Distributed Ledger Technologies testbeds (Tom De Block)

## 14:15 - 15:15h Roundtable: Next Generation IoT Testbeds Implementation and Usage Aspects - Moderator: Rute C. Sofia, AIOTI IG Testbeds Co-Chair, fortiss

- Discussion panel providing an overview on industrial impact, and the role of the AIOTI testbeds and the AIOTI testbed methodology in this context.
  - Ovidiu Vermesan, AIOTI WG Research and Partnerships Chair SINTEF
  - Georgios Karagiannis, AIOTI WG Standardisation Chair, Huawei
  - Ricardo Vitorino, AIOTI WG Urban Society Chair, Institute for Future of Living
  - Natalie Samovich, AIOTI WG Energy Chair, Enercoutim
  - François Fischer, AIOTI WG Mobility and Logistics Chair, FSCOM

# **AIOTI Testbeds Group**

A Testbed is defined as: 'A platform (hardware and / or software) implemented on a trial basis in order to explore and evaluate a set of technologies as a solution to a set of use cases, business challenges and / or domain-specific needs. '

### Scope:

- Promote the advantages of IoT and edge computing in various vertical domains using testbeds
- Facilitate AIOTI members in finding testbeds to validate new developments for specific use cases
- Create network of federated AIOTI testbeds

### **Deliverables:**

AIOTI Testbeds Methodology



AIOTI Testbeds Published Catalogue



#### **AIOTI Testbeds Portfolio**

Catalogue of IoT Solutions focused on IoT Testbeds

#### Browse the solutions provided by AIOTI members in the table below

If you need to return to the main page, just follow this link.

#### AIOTI IG Testbeds Catalogue

Name	Provider	Domains	Use-cases	Access	Testbed stage
CCC, Climate Coalition Change	,Ottawa, Canada	Cross-domain, climate action	Energy, Agriculture, Land use, Industry, Finance, Building, Transportation	not available, local and remote, based on a specific agreement	use-case

Description: The CCC Testbed series are set to demonstrate practical use cases from the Climate Chain Coalition, a global multi-stakeholder membership of over 270 organizations in over 50 countries (CCC Members). CCC Members use a variety of DIS (e.g., Ethereum, Hyperledger, Algorand, Chia, Tezos, Stellar, IOTA, Bitcoin) in combination with other digital technologies. The DLT-enabled digital solutions are deployed for a variety of use case applications (e.g., carbon markets with tokenization and transactions, emissions accounting and MRV, supply chains and product carbon footprints, adaptation to climate impacts, innovative climate finance). Demonstrations and reports with insights into the technical layers allow observers to properly understand how DLT is applied in combination with the IOT and IT stack.

	Concept:	Technology: Convergence of IoT, DLT, AI, Digital Twins, and legacy IT components	
	Hardware On-Premises, Edge and Cloud combined	<b>Software</b> Legacy IT and IoT platforms combined with different DLT protocols.	

#### Online at: aiotieu.github.io/testbeds/

# **AIOTI Testbed Methodology**

Agreed methodology to support the collation, categorization, management and dissemination of information on AIOTI member testbeds

### Key components:

- Collate and categorise member testbeds against defined criteria
- Identify key rationale for testbed deployment; e.g. technology proof, use cases and business improvements and interoperability requirements;
- Identify emerging technologies and market verticals where testbeds are strategically necessary;
- Capture important learnings and results from each of these testbeds;
- Report on and document testbed performance, best practice and gaps



Based on concepts drawn from existing testbed activities such as the EU Living Labs initiative, the IEEE Future Networks Testbeds Working Group, the EU Fed4Fire initiative and the Industrial Internet Consortium (IIC).



# **AIOTI Testbed Catalogue**

### Key criteria:

- Partner organisation names, Testbed URL, Target domains and Use-cases Contact details, Partner collaboration potential
- Testbed stage e.g. Use-case; Proof-of-concept; Deployed
- Testbed summary identifying key technologies and system components

### First version published Q4 2021:

- 40 collected testbeds: 4 in use-case stage; 8 in Proof-of-Concept stage; 28 are deployed testbeds
- 'Live' version now online at: <u>aiotieu.github.io/testbeds/</u>



# **AIOTI Testbeds Group – What Next ?**

- Published catalogue updates 6 monthly
- Identification of strategic use cases and application areas mapped to AIOTI key directions
  - In collaboration with standards group (specifics) and research group (vision)
- Completion of methodology flow to collated testbeds
  - Gap analysis testbed opportunities and proposals
- Showcase and promotion of testbeds at industry events
  - IoT Week and AIOTI Signature Event and more tbd
- For more information Please visit: aioti.eu/about-us/our-groups/testbeds/
- For deliverables Please visit: aioti.eu/resources/testbeds-resources/

## **AIOTI Testbeds @ IoTWeek**



Huawei Edge Computing over TSN

 Time Sensitive Networking (TSN) for Smart Manufacturing



Poznan Supercomputing and Networking Center FutureLabs

 IoT and edge for education, eHealth & Smart City



AIOTI Distributed Ledger Technologies

 Air quality, Climate change, Protocol performance



### **Huawei TSN Testbed & Research Cooperation**



## **Time Sensitive Networking (TSN) for Smart Manufacturing**

Industry 4.0 needs a reliable time-sensitive communications backbone

Features

#### **TSN converged network**

• High bandwidth, multiple services and on-demand latency guarantee.

#### **Brownfield device compatibility**

• PROFINET, EtherNet/IP, EtherCAT, POWERLINK, Modbus-TCP devices.

#### **IP/Ethernet based connection**

- · Connecting field devices with intelligent gateways.
- Data travels up and intelligence travels down.

#### Application and networking decoupling

- Automatic and dynamic network configuration.
- Application unawareness and user intent-driven.

#### **Key Networking Technologies**

#### TSN NCap (Network Calculus analysis platform)

• Integrates TSN scheduling and network calculus algorithms to guarantee delay, bandwidth, and reliability for different types of traffic.

#### **TSN middleware solution**

• Identifies traffic intent and reports specifications to the network controller to coordinate TSN device with the network.





### Industry Leading TSN Testbed

Unified TSN network configuration and implementation, vendor independent application over TSN network, visualization app in edge computing platform.





### **ECC:** The Biggest Edge Computing Initiative In China

- Founders: Huawei SIA CAICT Intel ARM iSoftStone
- Wide Coverage: Telecom Operator, Enterprise & IoT, Manufacturing, Industrial Internet

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Research Manufacturing Smart City Energy/Power	ст	ІСТ	
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### **Invitation to Participate in Huawei TSN Testbed**

### Testbed Membership, Business opportunities, Potential synergies

We welcome all industry partners to join us to support TSN innovation and cooperation.

#### How can I get involved ?

- 1. Participate in Testbed meetings and access the Testbed workspace (Germany and/or China).
- 2. Participate in Plugfests and PoC activities.
- 3. Joint go to market activities.

Please Contact: Lingbo Kong (konglingbo@ecconsortium.net)





# **Poznan Supercomputing and Networking Center**

- Leading operator of Polish e-Infrastructure
  - National Research and Education Network – PIONIER Research Metropolitan Area Network -POZMAN
  - HPC Center: upgrade to 15 PFlops
  - 2 Data Centers: over 80 PB under upgrade → NDS











# PIONIER LAB SMART CAMPUS TESTBED













NATIONAL PLATFORM FOR INTEGRATION OF RESEARCH INFRASTRUCTURES FOR INNOVATION ECOSYSTEM

POIR.04.02.00-30-A005/16 The project is co-financed by the European Regional Development Fund under Measure 4.2 of the Smart Growth Operational Program 2014-2020 (Priority IV: Increasing the Scientific and Research Potential, Measure 4.2; Development of Modern Research Infrastructure for the Science Sector)

# PIONIER LAB SMART CAMPUS OFFER

- Use infrastructure and environment for developing and testing your own applications and services
- Borrow a Smart Campus infrastructure development kit to conduct research in your own environment, using a part of the infrastructure with a programming API in the form of a living lab
- Use collected data (sensors measuring various physical quantities, use of infrastructure, anonymized data on the movement of space users) in order to conduct advanced analysis

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# eDWIN – infrastructure for agriculture

The primary outcome is to rationalize the use of pesticides in agriculture

System integrates approx. 200 existing stations from project partners and installs additional 300 units. creating a regular network throughout the country

e-services:

- virtual farm, tracking of the food origin, agrometeo services
- Decision support systems (deployment of 20 models for integrated plant protection) and pest signaling 100 demonstration farms

A set of 20 dedicated phenology observation stations

Possibility to access the data and propose the services extending the Virtual Farm e-Service

ΑΙῶΤΙ



Rzeczpospolita Polska



in Wielkopolska

Unia Europejska Europejski Fundusz Rozwoju Regionalnego







## **AIOTI Signature Event, 27 Sep, Brussels**

Please register at: aioti.eu/aioti-signature-event-2022/



