IoT-NGIN

Next Generation IoT as part of Next Generation Internet

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Jonathan Klimt, M.Sc.

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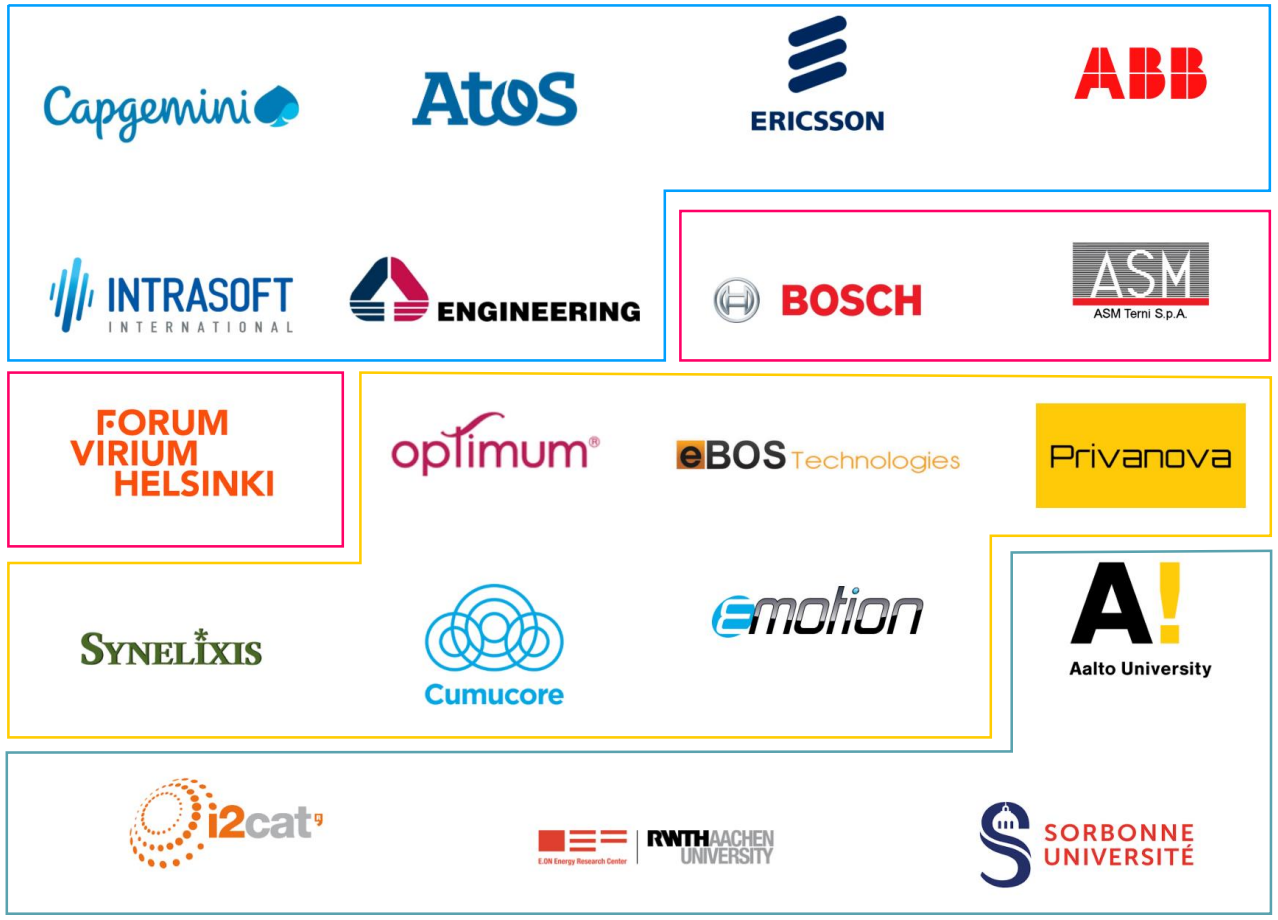
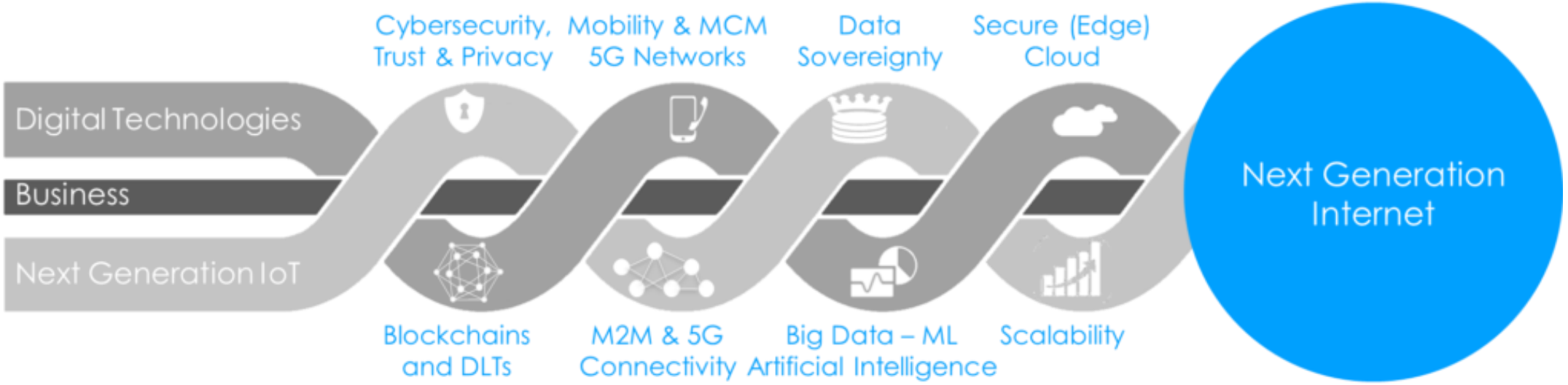
IoT-NGIN



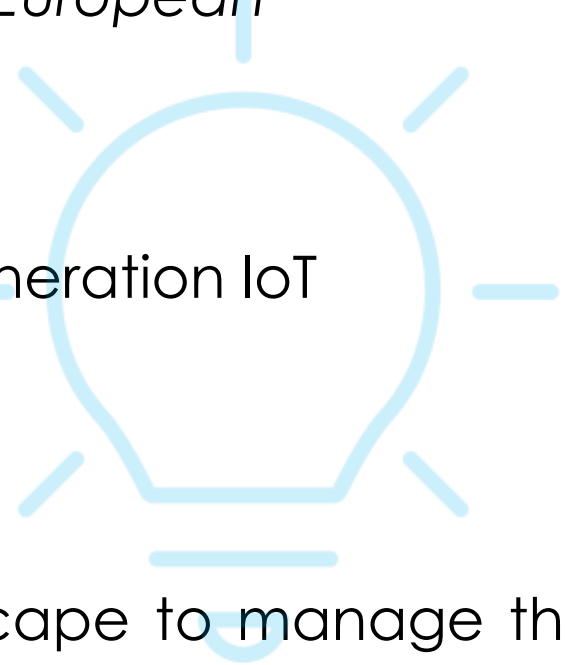
- Title: Next Generation IoT as part of Next Generation Internet
- GA ID: 957246 - H2020 Call: H2020-EU.2.1.1.
- Funding Instrument: RIA
- Duration: 36 months
- Starting Date: 1st October 2020

IoT-NGIN building blocks



IoT-NGIN in one slide

- Our goal:
  - *Bringing the IoT and modern technologies (5G, AI, DLT…) together in an optimal way, towards a sustainable ecosystem of European Technology and System providers*



- Our way:
  - Offer new tools and ecosystem to enable next-generation IoT
    - New services to existing platforms
    - New platform opportunities
    - New collaboration paradigms
    - New business potential
  - Prepare the technology & standardization landscape to manage the demands posed by large-scale IoT deployments

IoT-NGIN core technical objectives

- Patterns-based meta-architecture
  - Architectural design language for IoT platforms and services
  - targeting mostly next-generation IoT architectures
    - Compatible with existing, legacy IoT architectures

- IoT-NGIN federation approach
  - Machine Learning as a Service – Distributed AI
  - Inter-DLT technologies for secure and trusted interactions
  - Zero knowledge proof techniques for security, privacy and trust by design
  - Meta-level semantic twins and Ontology-based operations to ensure interoperability

IoT-NGIN core technical objectives

- Optimize IoT/M2M and 5G/MCM communications
  - Task offloading onto a secure edge cloud
  - 5G slicing
  - Time Sensitive Networking
  - Research over a 5G network exposure API
  - Device to Device communications for extending 5G coverage
- Enable user and self-aware, autonomous IoT systems
  - privacy-preserving federated ML & relevant attacks detection
  - ambient intelligence, with AR support towards tactile internet
- Research towards distributed IoT cybersecurity and trust
  - Self-Sovereign Identities
  - Interconnected DLTs
  - ML-based cybersecurity auditing and active protection

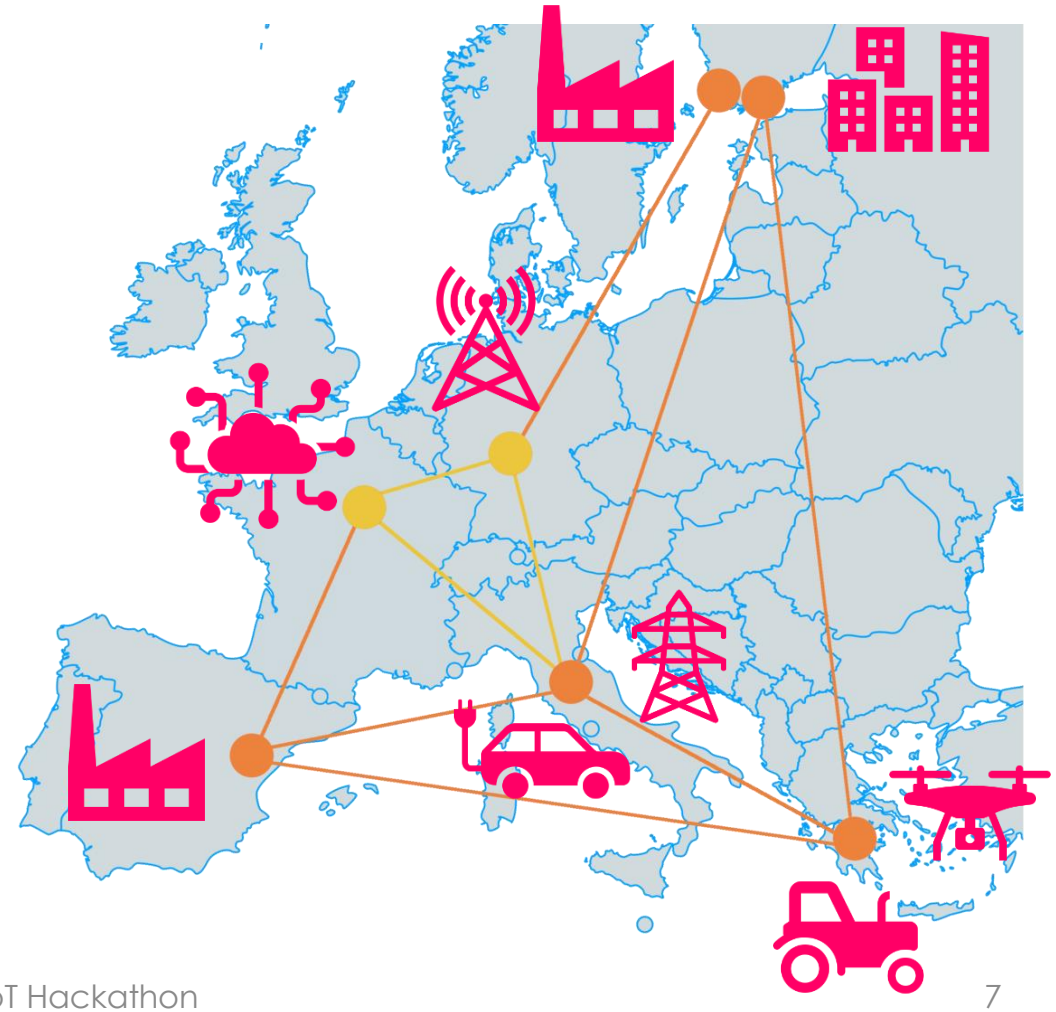
Validation

7
COUNTRIES

7 LLs and
Lab Tests

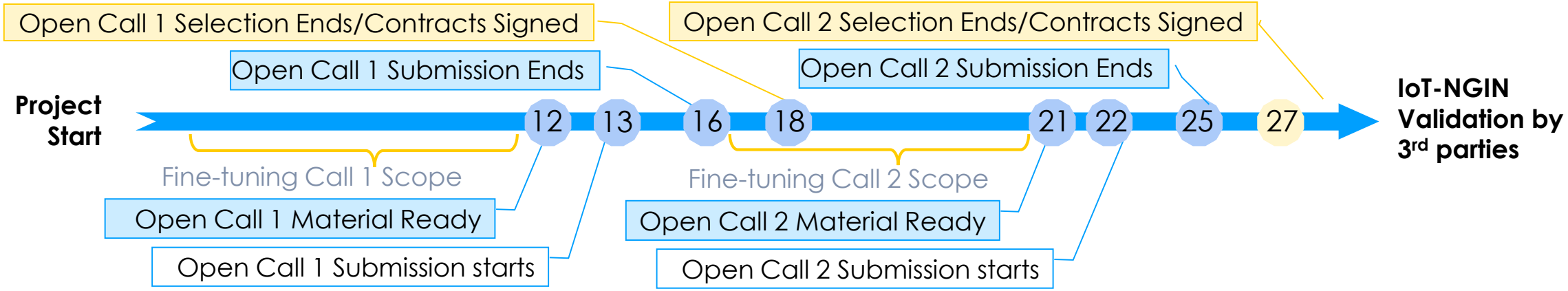
12
PARTNERS

>10 USE
CASES



Open Calls

- Increase the IoT-NGIN community via 2 open calls
- 1st Open call closed, 2nd will be live in a few days



IoT-NGIN

Thank you for your attention

Jonathan Klimt, M.Sc.

https://iot-ngin.eu

@IotNgin
#iotngin

company/iot-ngin/
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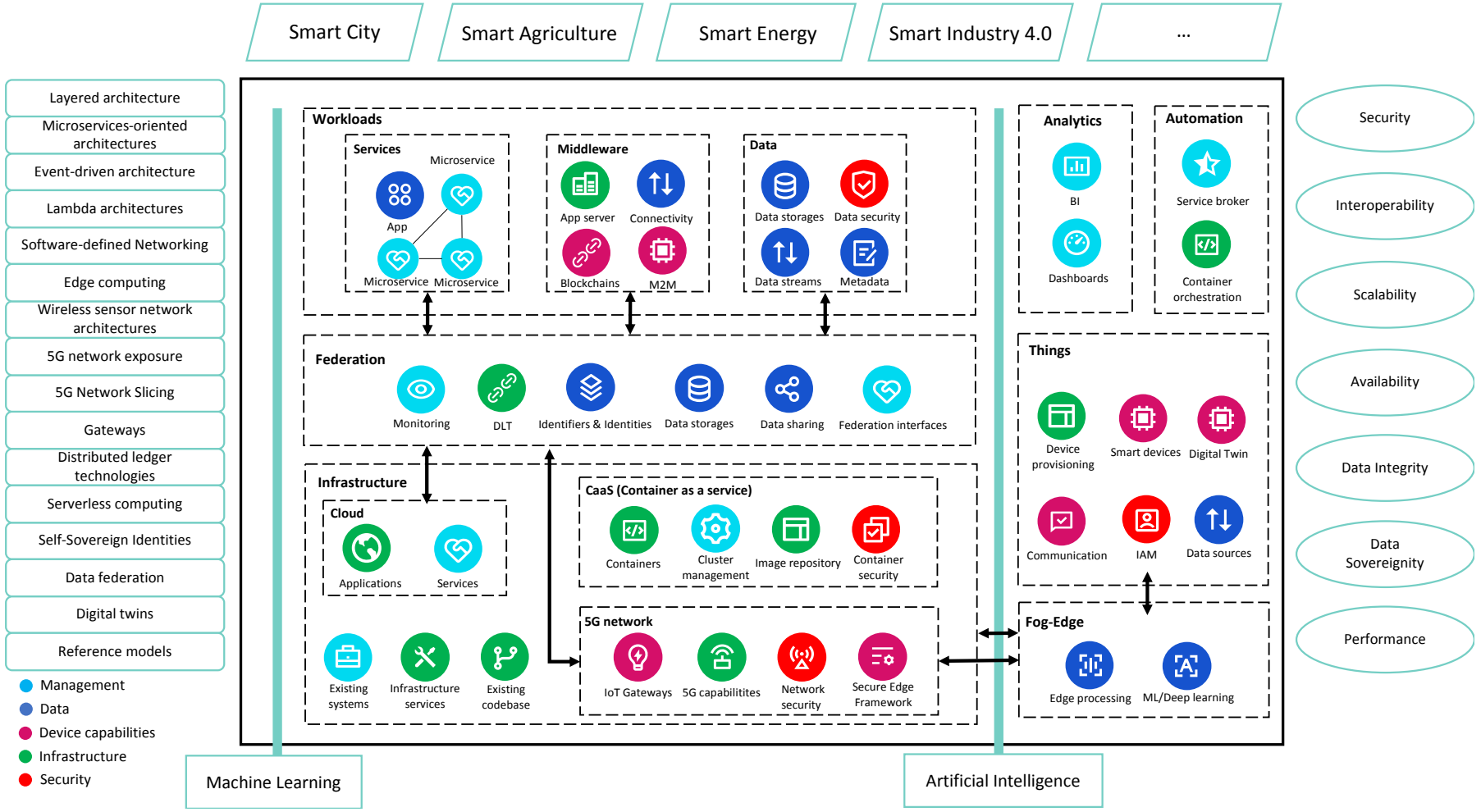
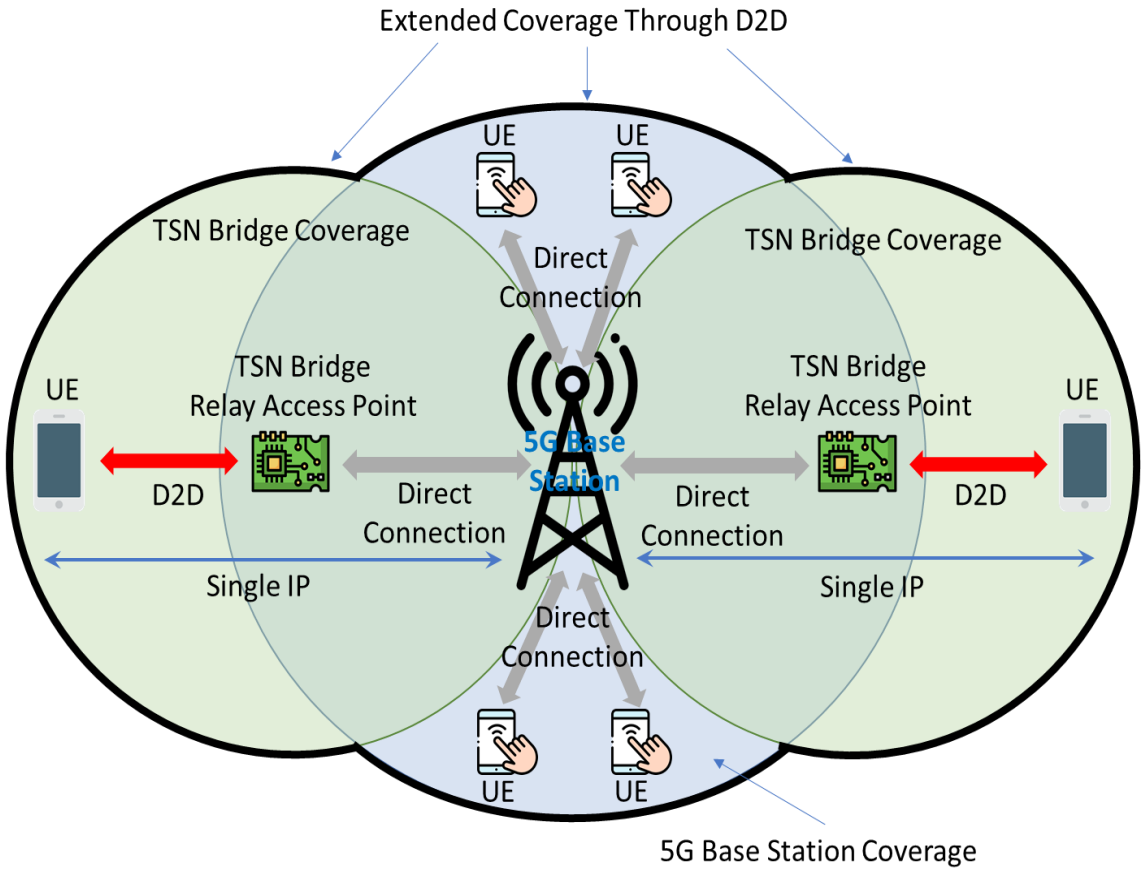
Backup slides

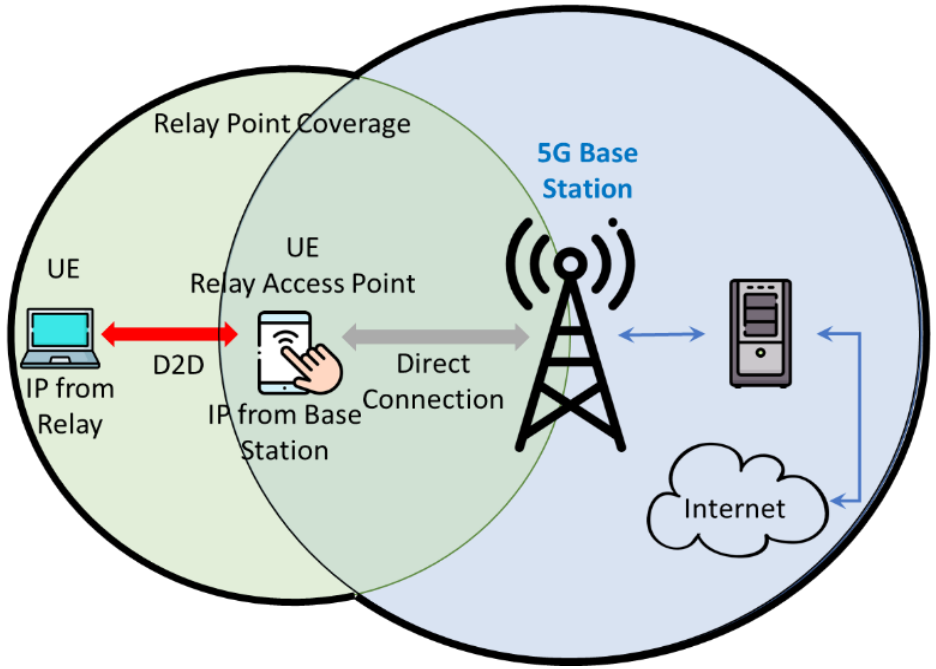
IoT-NGIN integrating IoT Architectures

IoT-NGIN Meta-Architecture

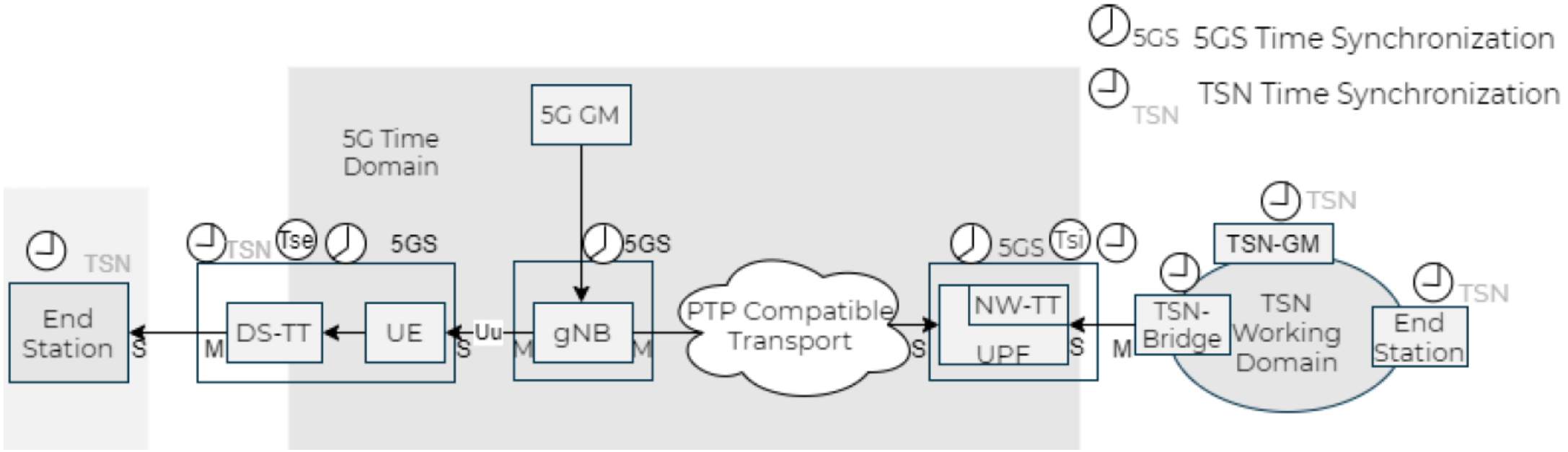


5G coverage extension

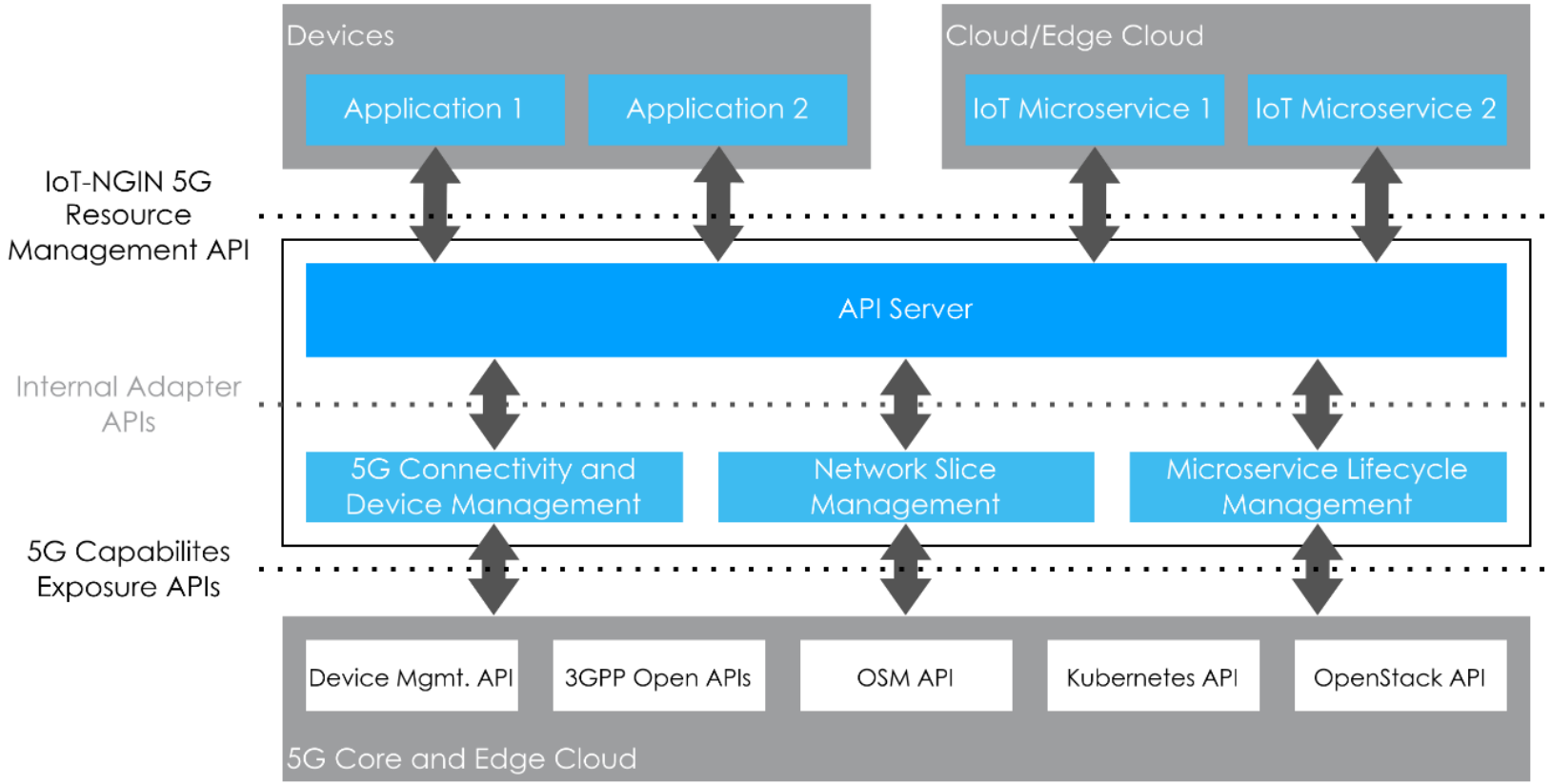




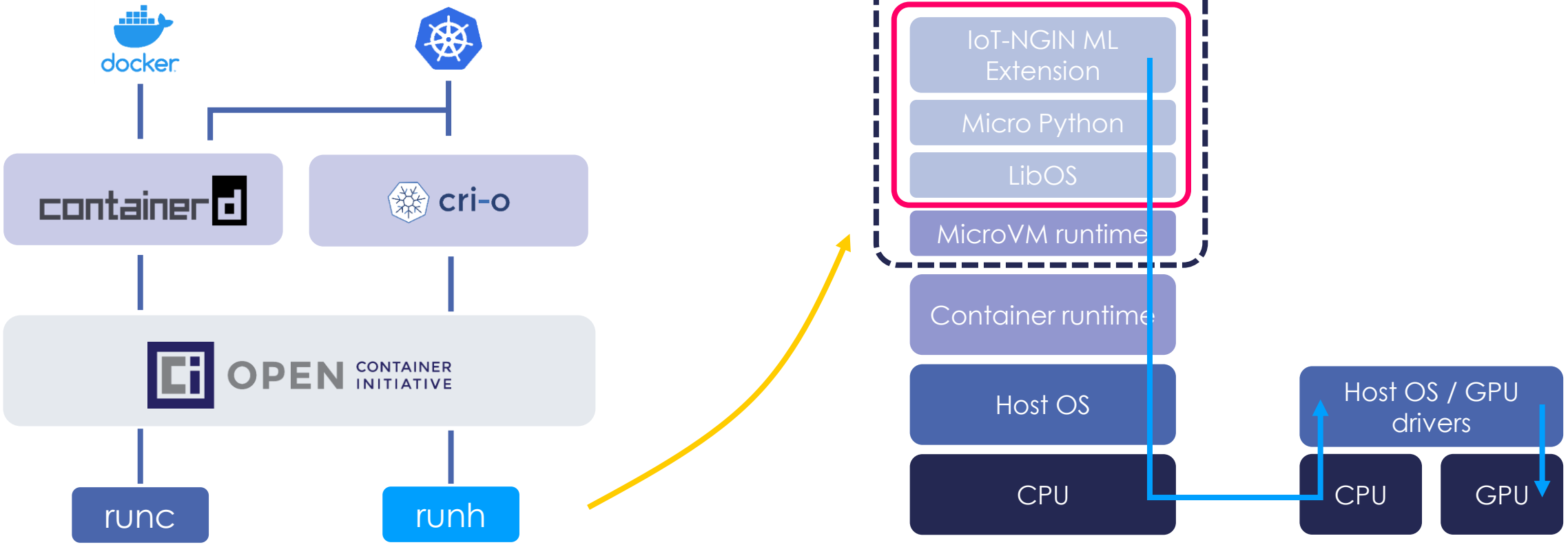
Time Sensitive Networking (IEEE 802.1AS)



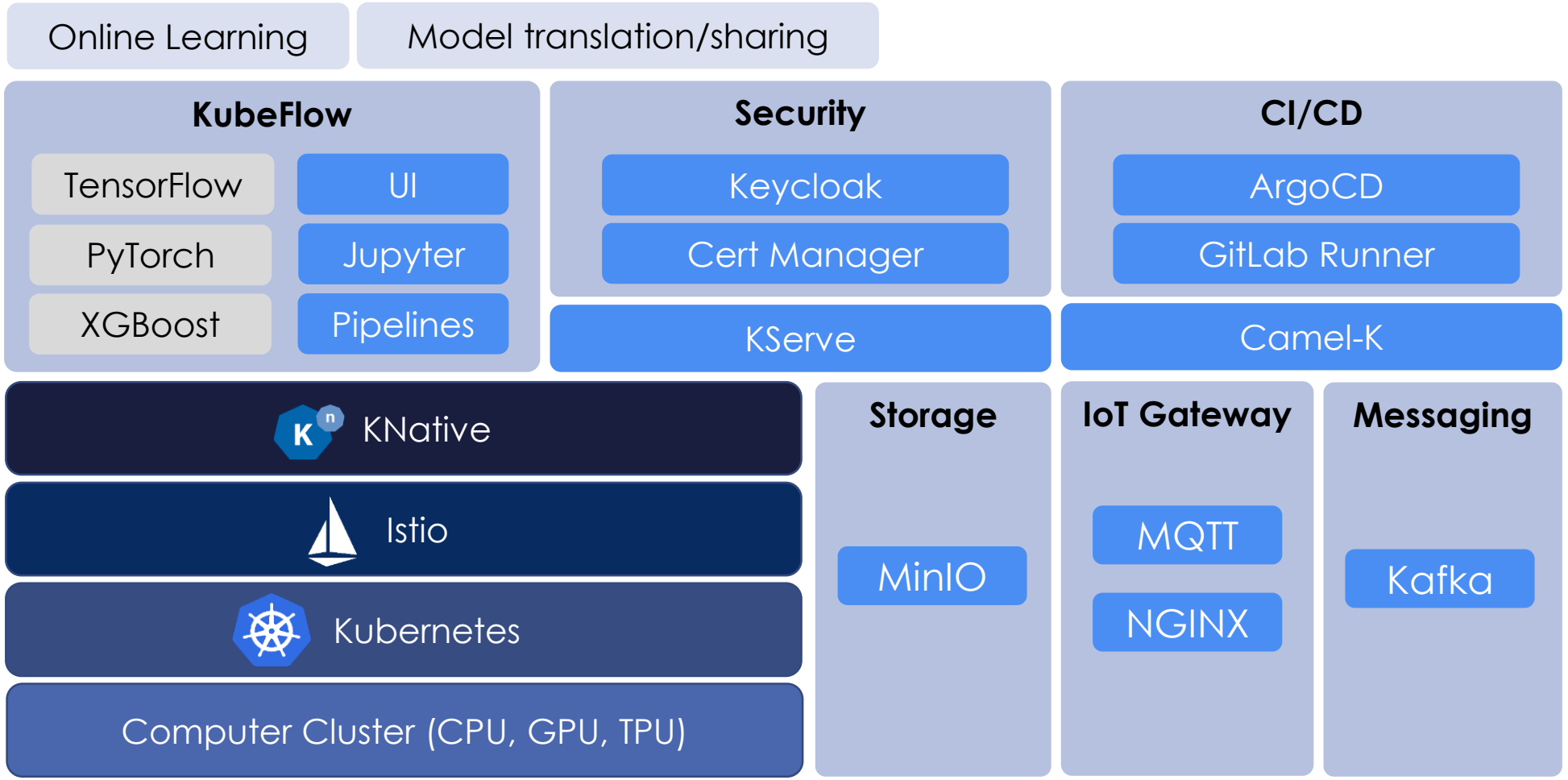
IoT-centric dynamic management of 5G Resources



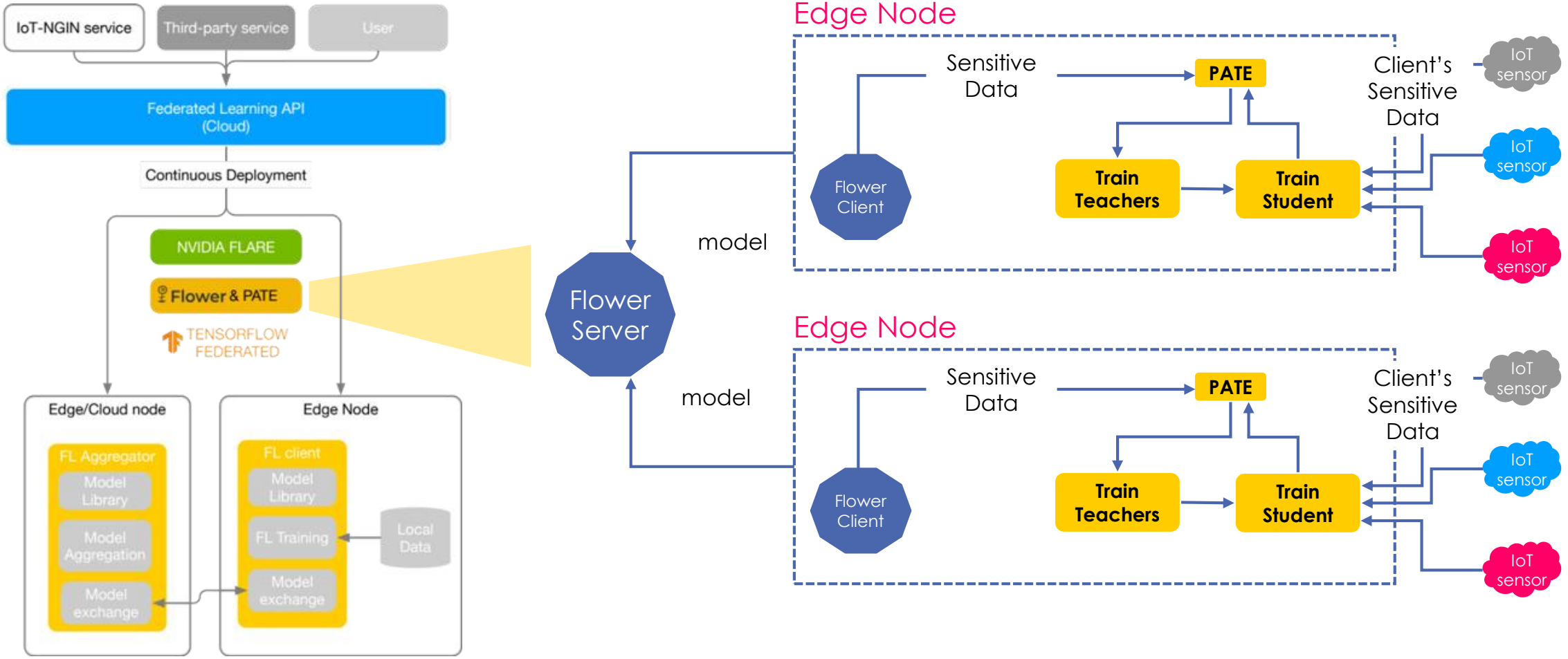
Secure Edge Cloud framework for IoT micro-services



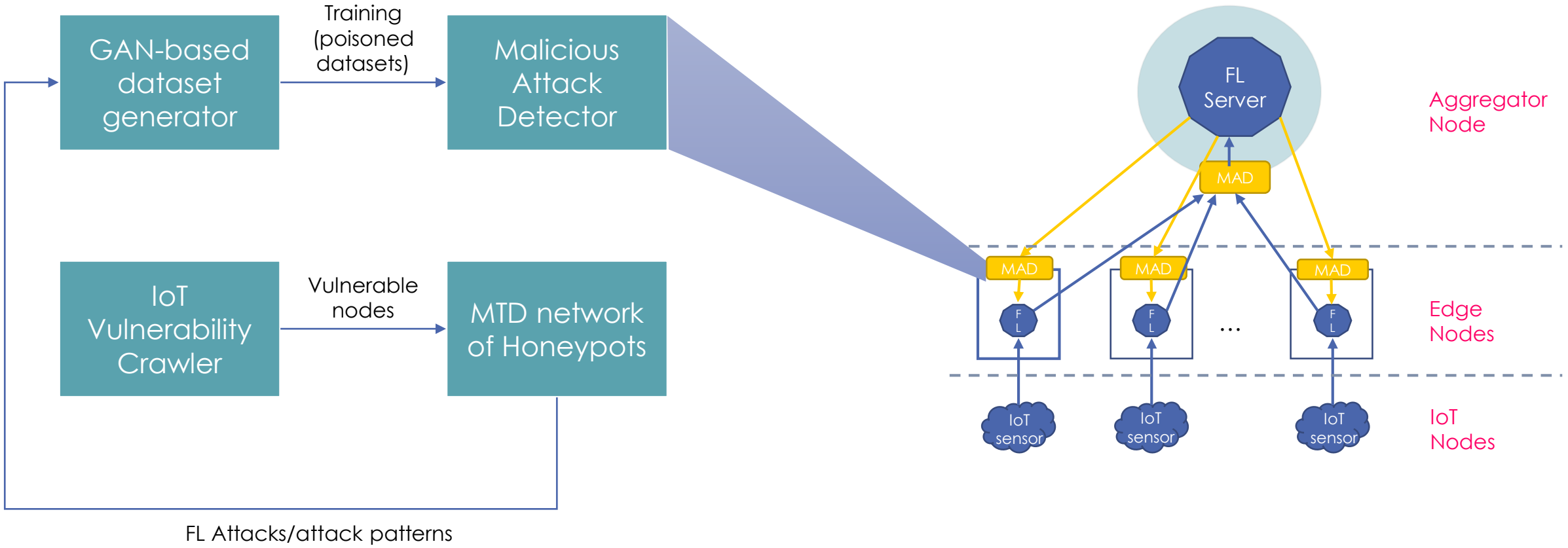
Machine Learning as a Service



Privacy-preserving Federated Learning

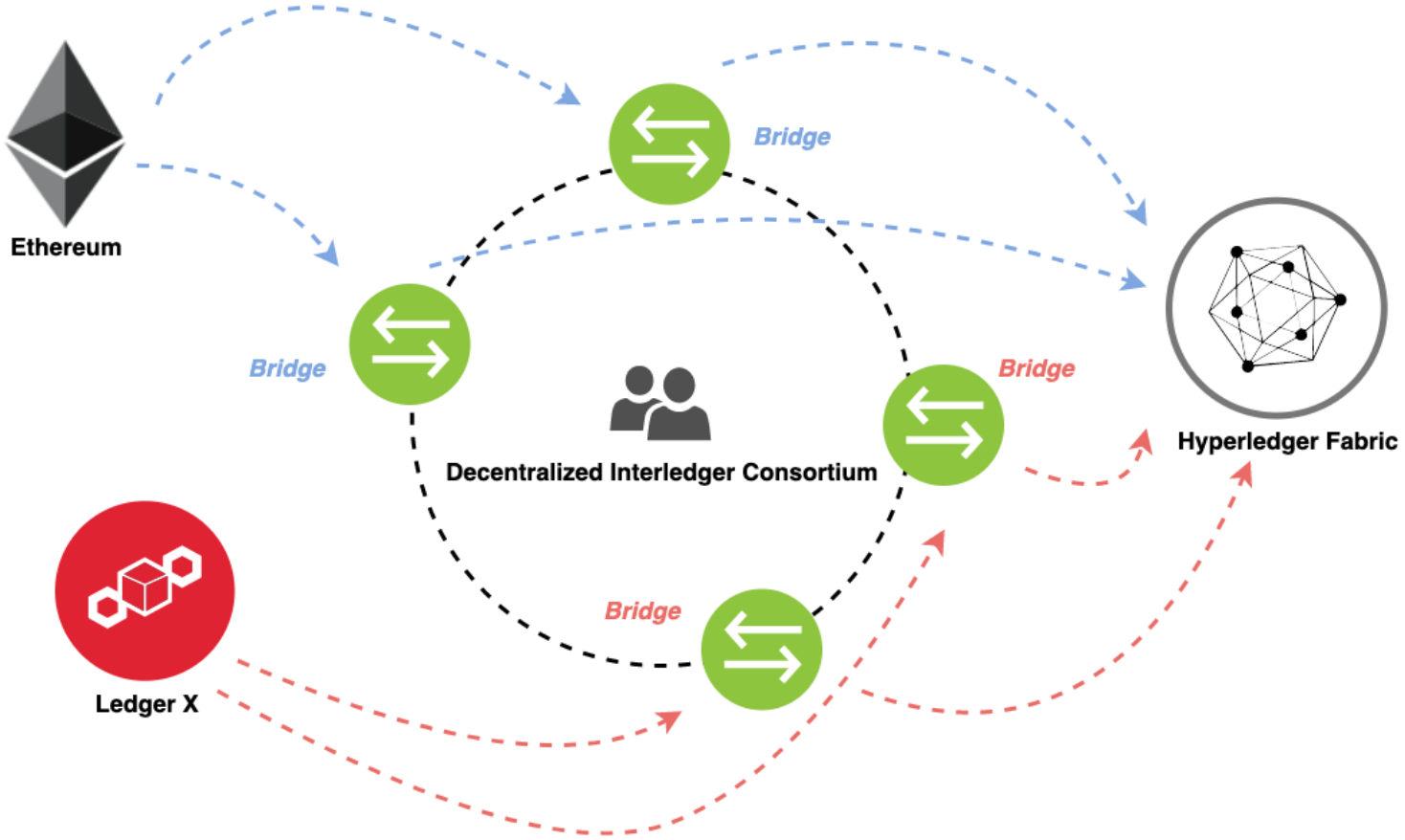


IoT Cybersecurity



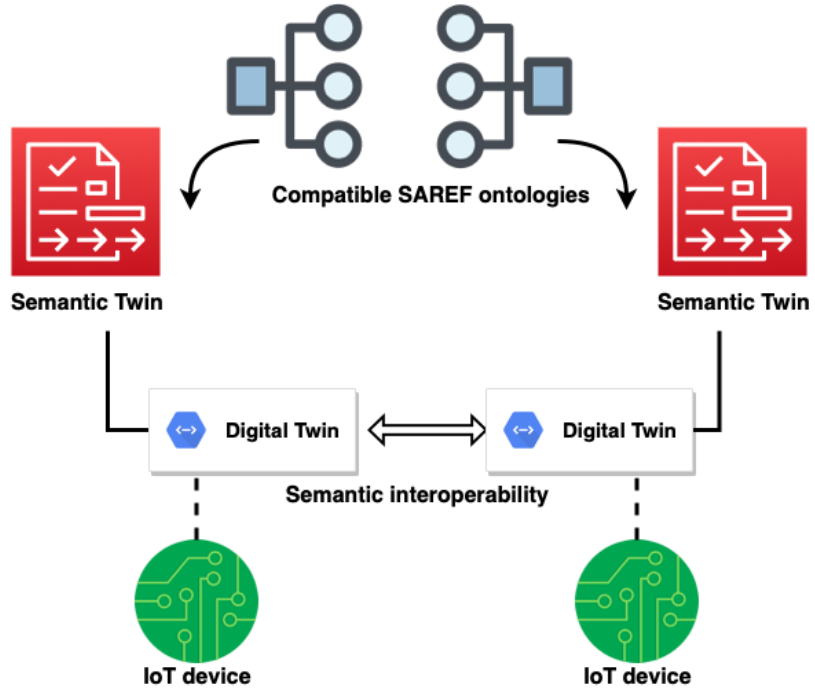
Enhancing IoT data privacy & Trust

Decentralized Interledger Bridge



Enhancing IoT data privacy & Trust

Self-Sovereign Identities



Semantic Twins

TRIAL #1
IoT-NGIN Integration Infrastructure Technology Lab

FIT
FUTURE INTERNET TESTING FACILITY

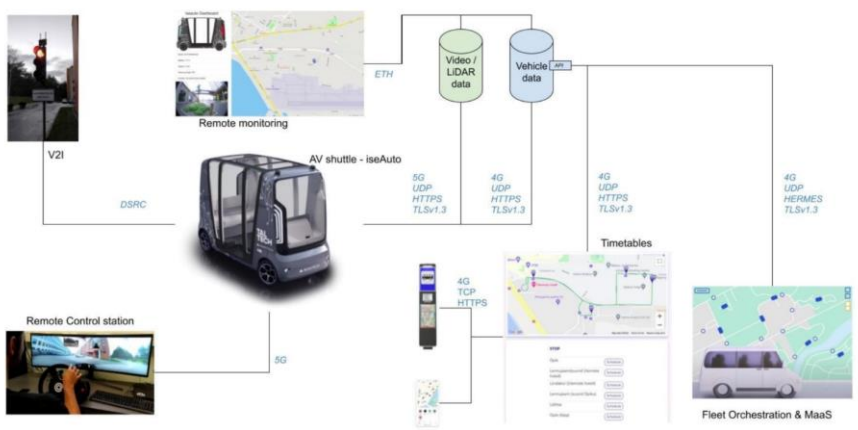
6 sites
Different topologies and boards
Mobility by robots

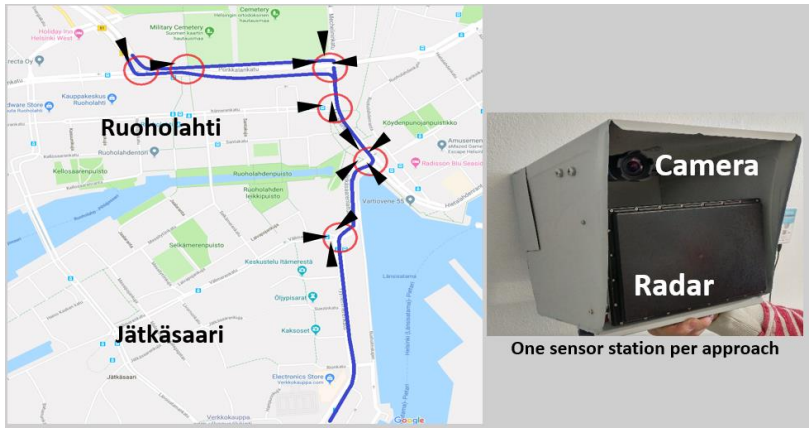
Users
Internet
NITOS Server
wimaxrf
LTEnet EPC
OpenFlow Switch
USRP Device
WiMAX BS
WiMAX to WiFi
WiMAX Smartphones
USRP Device
LTE AP
LTE AP
LTE Smartphones
OutDoor Testbed
camera
Outdoor node
Outdoor node
WiMAX Interface
WiMAX Dongle
LTE Interface
LTE Interface
LTE Interface
camera
ICARUS
ICARUS
ICARUS
ICARUS
Directional Antennas
Mobile Node
InDoor Testbed
ICARUS
ICARUS
ICARUS
ICARUS
ACM Cards - Power Monitoring

NITOS > Future Internet Facility Lab

TRIAL #2
Human-Centred Twin Smart Cities Living Lab

- **UC#1:** Traffic flow prediction & parking prediction
- **UC#2:** Crowd management
- **UC#3:** Co-commuting solutions based on social networks





AV shuttles

Traffic sensors (radar + camera)

data

data

data

data

Sensors

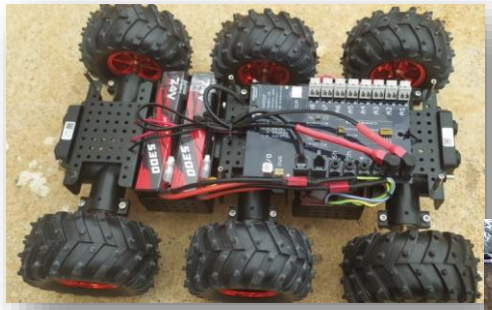
Tallinn port

Helsinki port (Jätkäsaari)

Weather, AQ & other sensors

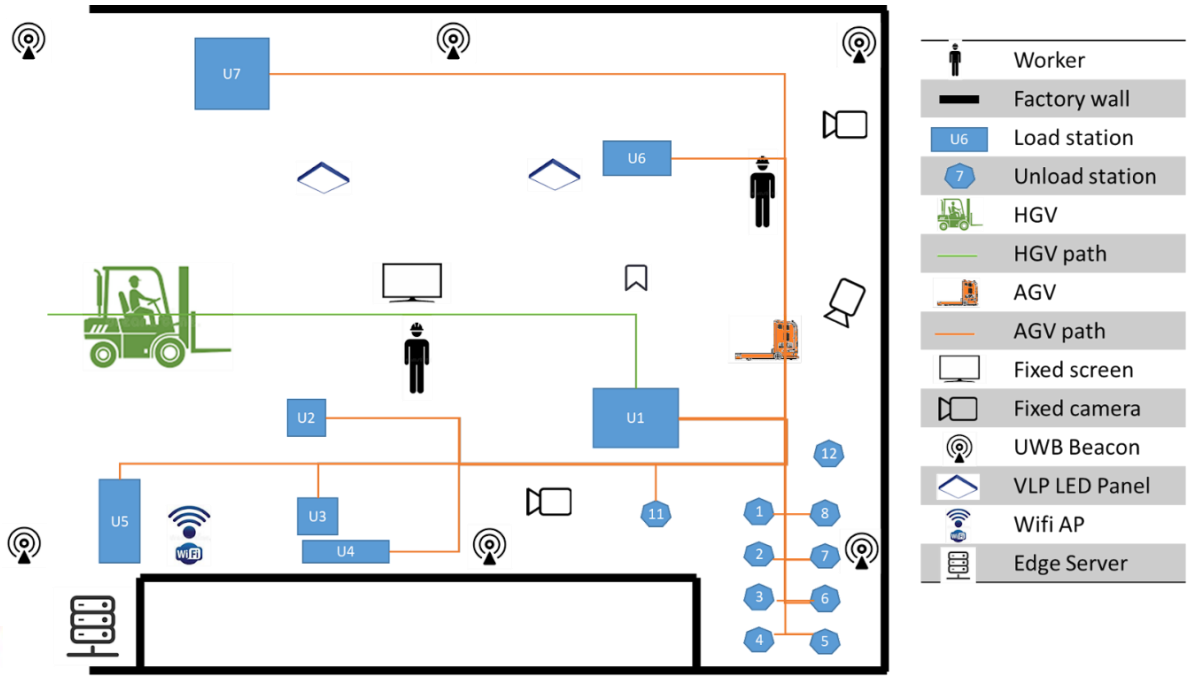
TRIAL #3
Smart Agriculture IoT Living Lab

- **UC#4:** Crop diseases prediction, Smart irrigation and precision aerial spraying
  - Optimization of the crop harvesting process
  - Operational costs' reduction
  - Improvement of quality of services related to harvesting and loading
- **UC#5:** Sensor aided crop harvesting
  - Improvement of the prediction of crop disease
  - Optimization of precision aerial spraying



TRIAL #4
Industry 4.0 Use Cases & Living Lab #1

- **UC#6**: Human-centred safety in a self-aware indoor factory environment
  - AGV – Human collisions prevention
  - AR human assistance

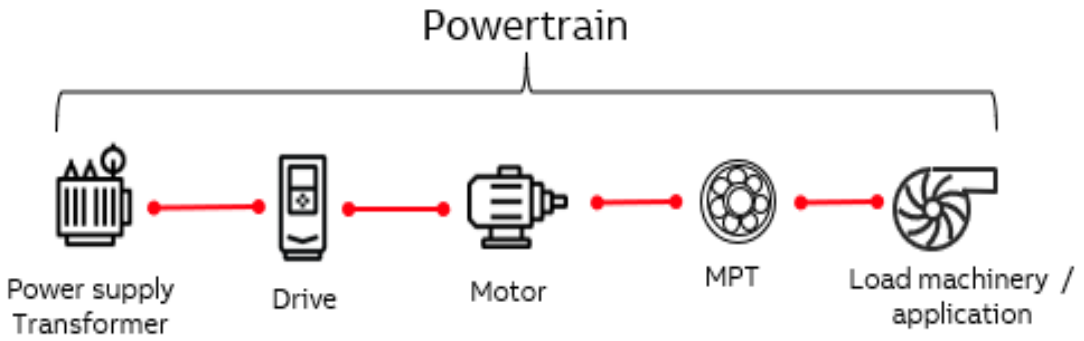


BOSCH

TRIAL #5
Industry 4.0 Use Cases & Living Lab #2

- **UC#7**: Human-centred Augmented Reality assisted build-to-order assembly
- **UC#8**: Digital powertrain and condition monitoring

ABB



TRIAL #6

Smart Energy Grid Active Monitoring/Control Living Lab

UC#9: Move from reacting to acting in smart grid monitoring and control

UC#10: Driver-friendly dispatchable EV charging

Trial #7
IoT-NGIN Technology and Living Labs Federation

- Federation of OneLab and RWTH/EDD EuroLab with IoT-NGIN instances in 5 living Labs

- Further extended via the Open Calls