IoT Week 2022

MEC IoT Service: an Overview

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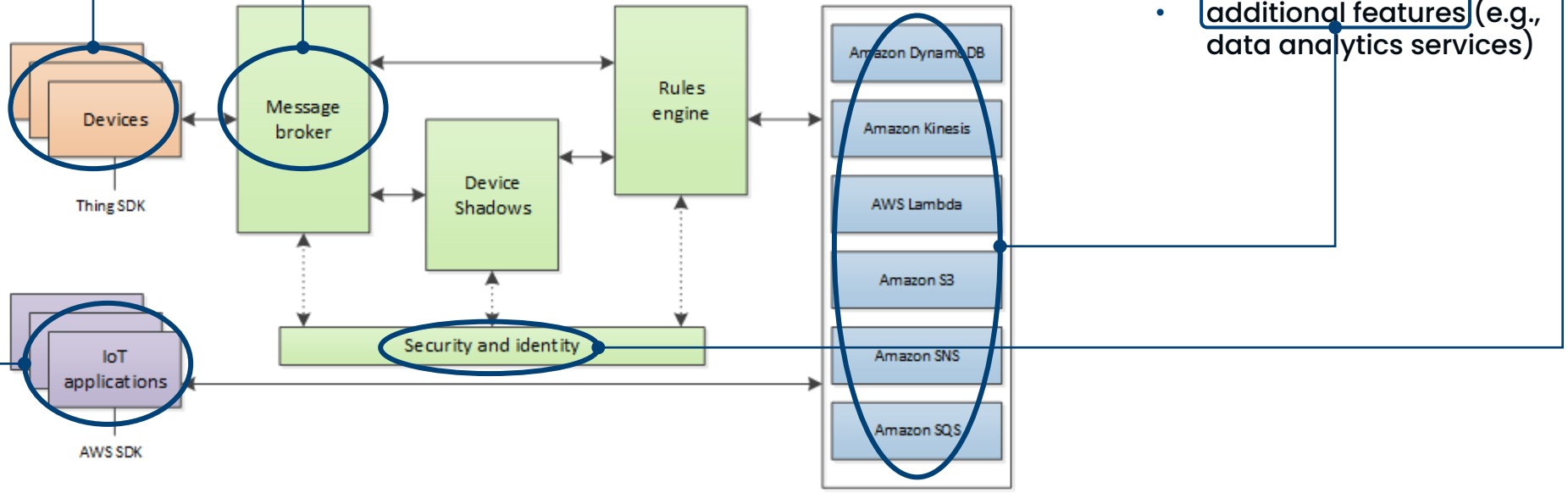
State of the art – IoT platforms

- An Internet of Things (IoT) system makes 2 types of entities communicate:
  - the *IoT Devices* publishing data to a topic-based message bus
  - the *IoT Applications* subscribing to topics and/or publishing data to the same message bus

The channel is secured thanks to a TLS tunnel. The devices and IoT applications are authenticated thanks to the certificate they own



https://docs.aws.amazon.com/iot/latest/developerguide/aws-iot-how-it-works.html

- Popular, commercial-off-the-shelf IoT platforms (e.g., AWS and MS) offer:
  - the message bus
  - the security framework
  - additional features (e.g., data analytics services)

- **An IoT system administrator aims at:**
  - requesting an instance of the IoT platform
  - using the provided SDK to provision IoT devices and IoT applications in order to connect them to the IoT platform instance

Problems and opportunities for ETSI MEC

The IoT system administrator assumes that:

1. the IoT device can
   a) resolve the URI of the message bus, and
   b) establish and maintain a TLS session using the provided certificate
2. an IP network exists to enable the exchange of packets between the IoT devices and the message bus

… **however**, in many relevant use cases the IoT device may have *limited capabilities* (e.g., lack of a DNS client, or a whole TCP/IP stack)

Edge computing is deemed a key added value for an IoT deployment…

… **however**, the architecture of an IoT system, despite being arbitrarily complex, may not consider *ETSI MEC-related aspects*:

- A MEC host may limit visibility over the IoT system components such as, e.g., IoT platforms, and may not be configured to route traffic properly, thus preventing the enforcement of the desired network behavior

Envisioned role for a MEC system in IoT deployments:

1. For unconstrained devices → route the packets to/from the desired message bus
2. For constrained devices → act on the message bus *on behalf of* the IoT devices

Description of the MEC IoT Service

What is the MEC IoT Service?

The MEC IoT Service (MEC IOTS) aims at fostering the integration between a MEC system and IoT platforms

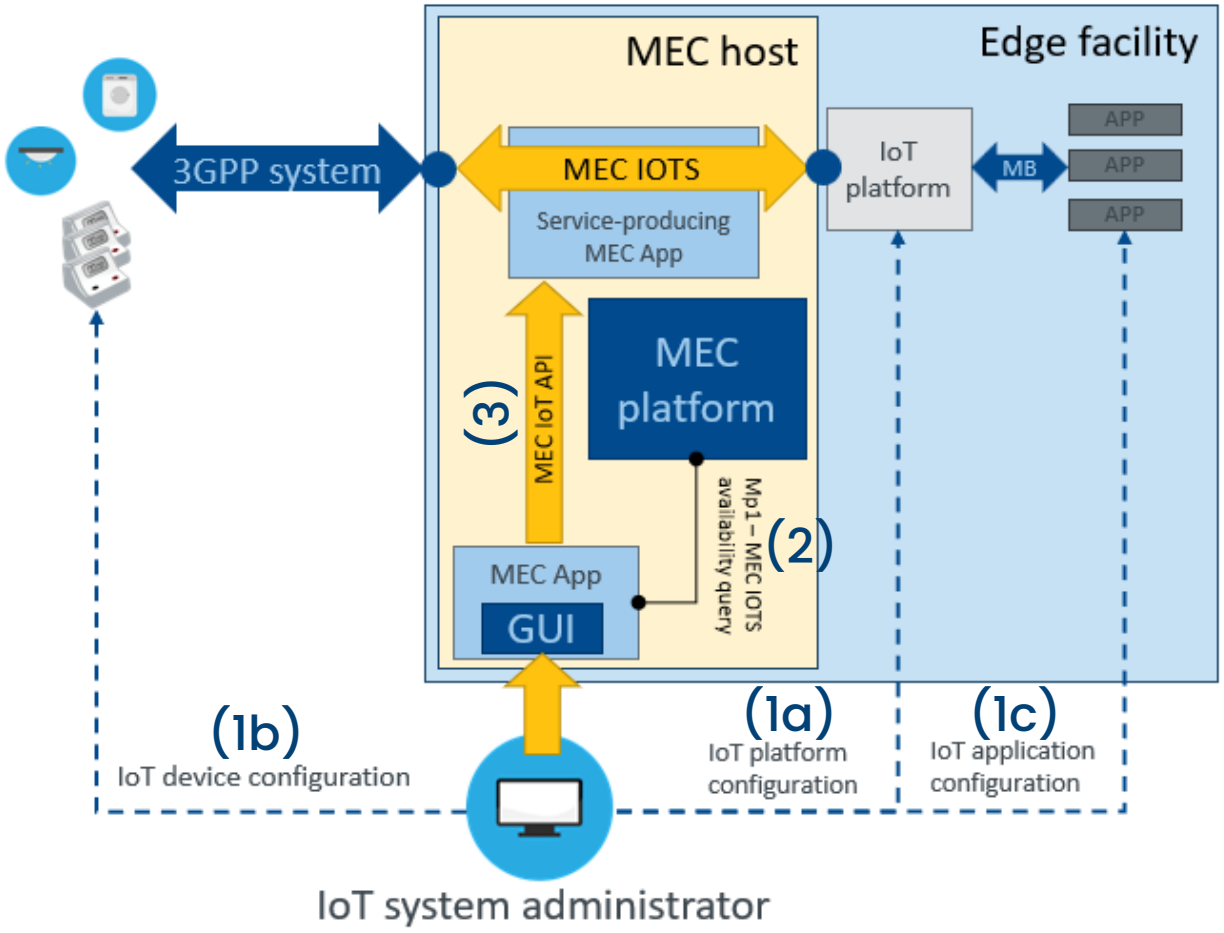
- The MEC IOTS provides means to incorporate heterogeneous IoT platforms in the MEC system and exposes IoT API (specified in ETSI GS MEC 033, under preparation) to enable the configuration of the various components of the overall IoT system
- Specifically, the IoT API allows for:
  1. the discovery of IoT platforms
  2. the provisioning of IoT devices into the MEC system
  3. the routing of communications between the devices and the requested IoT platform
  4. the enablement of discovery and usability of the IoT platform's native APIs

MEC IoT Service – Use case example (1)

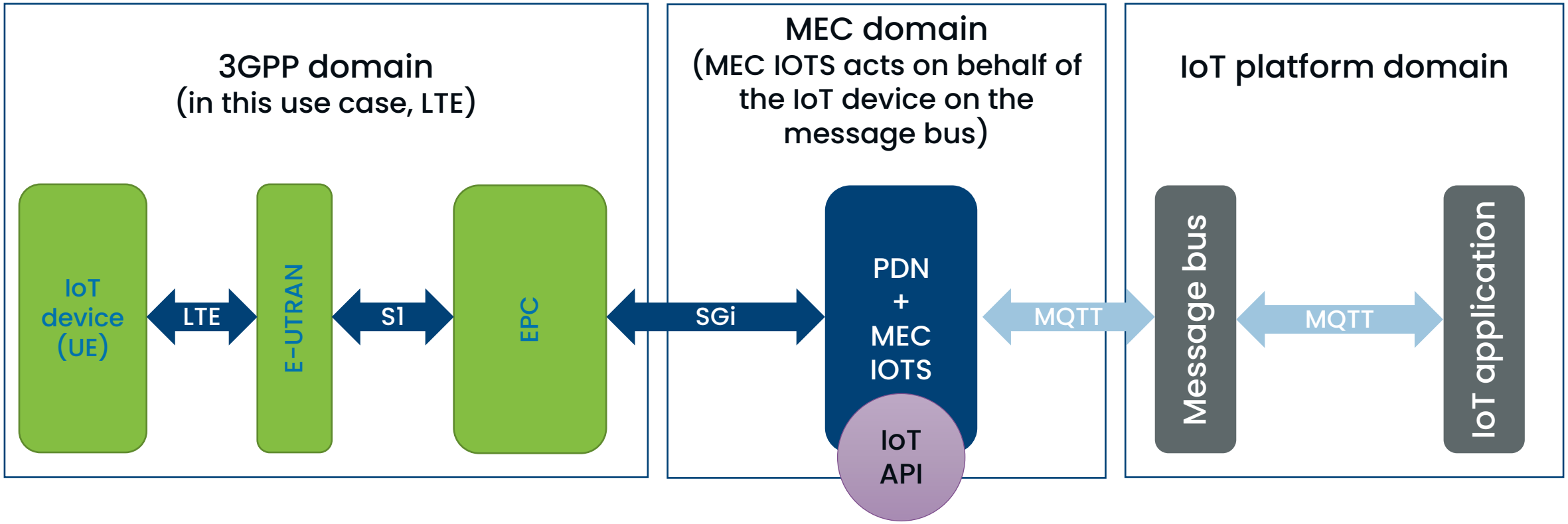
- Involved entities
  - IoT devices
    - Smart meters of a utility company
    - Each smart meter is equipped with a mobile network (4G/5G) transceiver and a USIM
    - Each smart meter is difficult to reach after initial deployment and is constrained in terms of networking and computational capabilities
  - MEC host
    - Served by a data plane provided by a 4G network, that is, part of a PDN
    - A MEC IOTS is registered on the MEC platform's Service Registry, thus discoverable over Mp1
  - IoT platform
    - Part of an edge facility co-located with the MEC host
    - Offers a topic-based message bus (i.e., a user transport not provided by the MEC platform)
  - IoT API consumer
    - The IoT system administrator, who leverages the IoT API to integrate the IoT platform with the MEC host, allowing the MEC IOTS to act on the message bus of the IoT platform on behalf of the smart meters
    - The MEC's mobile-oriented trait is leveraged to facilitate the usage of cellular-agnostic IoT services on top of 3GPP networks

MEC IoT Service – Use case example (2)

- Procedure
  1. The IoT system administrator configures the IoT platform (1a), the IoT devices (1b), and the IoT applications (1c)
  2. The IoT system administrator discovers the MEC IOTS via Mp1
  3. The IoT system administrator consumes the IoT API to perform IoT platform discovery, IoT device provisioning, and user transport configuration
- Based on the IoT device's capabilities, the MEC IOTS bridges the IoT devices and the IoT platform
  - Since we assumed that the smart meters are constrained, the MEC IOTS acts on behalf of them on a given message bus provided by the IoT platform, publishing data generated by the devices on the correct topic
  - If smart meters were unconstrained, the MEC IOTS would manage the association of each one to a particular traffic rule, be it a MEC traffic rule or the message bus offered by the IoT platform



MEC IoT Service – Use case example (3)



A proof of concept of this use case was presented at the '**Demonstration of MEC IoT API**' on Tuesday, Oct. 11!

Thanks!

Q&A