EU RGPD, IoT, PrIvacy and DEBS: Integrating Usage Control in a distributed event-based system

TELECOM SudParis — INSTITUT Mines-Télécom — ASR 2018-2019

Euripides

Authors

Sirine BEN SLIMENE

Khouloud HIZAOUI

Mentors

Denis CONAN

Sophie CHABRIDON

Technologies

Java

muDEBS

WSO2 Balana

cassandra

git

Context and problematic

- By **2020**, the number of **connected devices** will exceed **25** billion [1].

- The main challenge for **IoT** is and will remain data **security** issues.

- **GDPR** requires the users **consent** for a well-motivated purpose to process their data.

- **DEBS** can manage the high amount of data generated by IoT devices but still not adapted to GDPR requirements.

Objectives
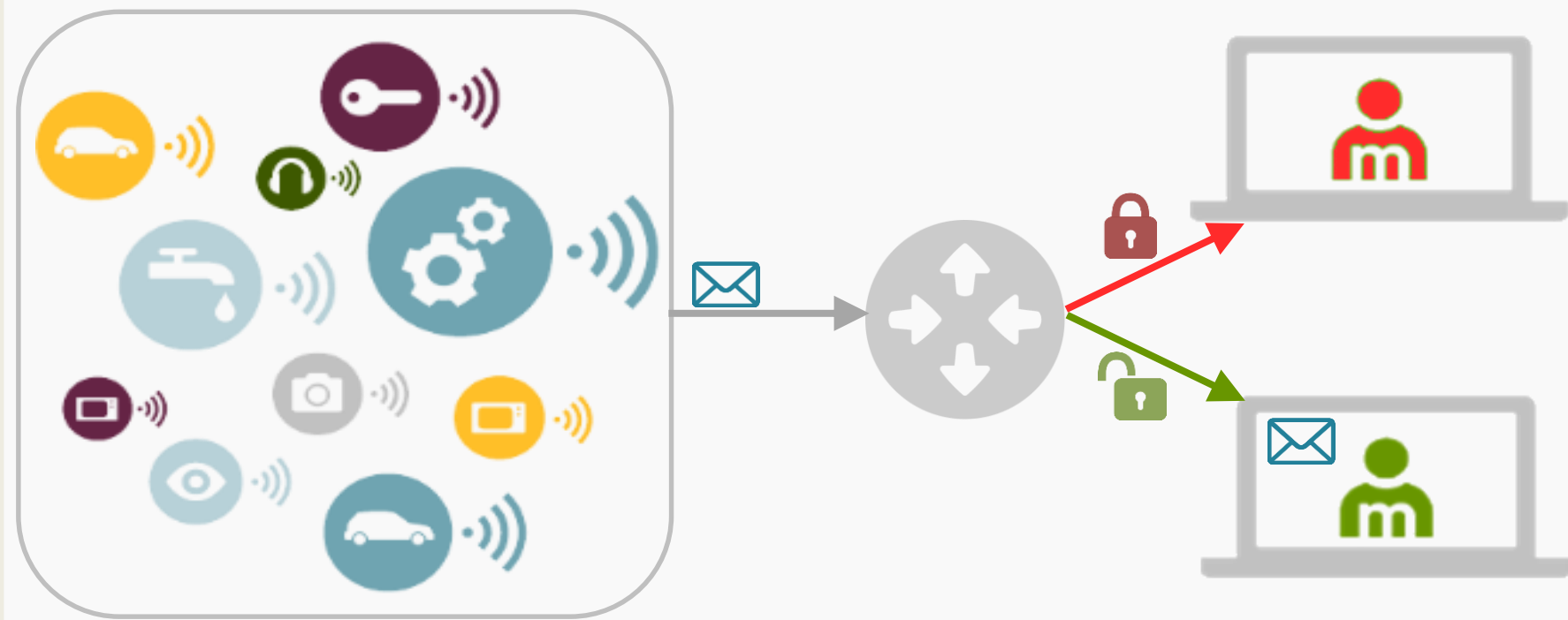
- Integrate a **usage control system** in the **muDEBS** [2] middleware tailored for the IoT and developed at Télécom SudParis.
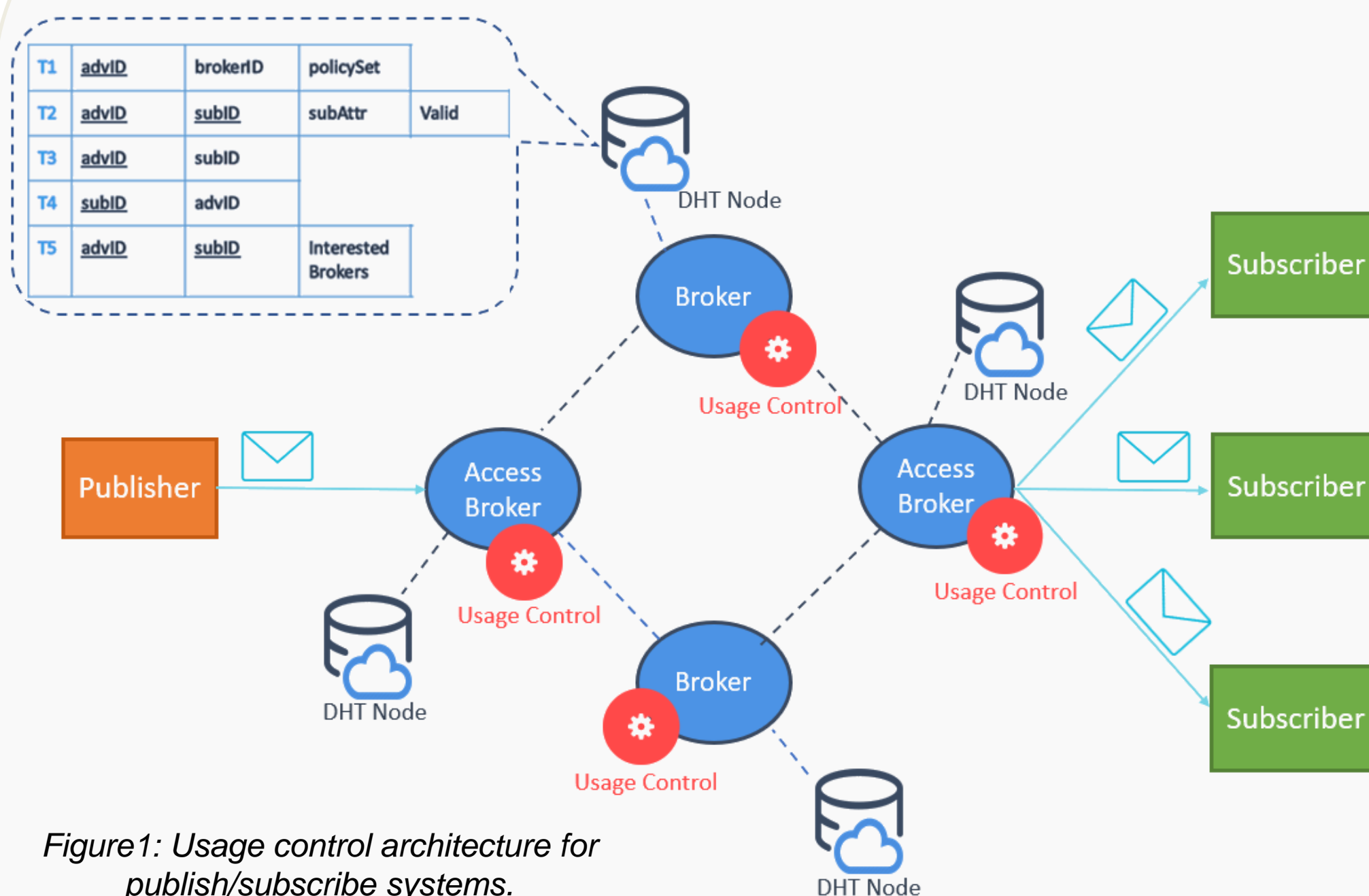
Approach

Figure1: Usage control architecture for publish/subscribe systems.

- **Publisher:** the sender/producer of the messages.

- **Subscriber:** the receiver/consumer of the messages.

- **DHT:** the Distributed Hash Table that stores the information for usage control system.

- **Broker:** the router of the messages.

- **Access Broker:** the broker that is directly connected to a publisher/subscriber.

- **Usage Control:** the system that decides about permission grant or denial for message processing.

- Sharing information in a DHT allows fault tolerance to possible brokers mistakes.

- Usage control system allows some uses once access is granted, and re-evaluates the authorizations on an ongoing basis to withdraw a at any time.

Solution

- Usage of Apache Cassandra to implement the DHT.

- Usage Control System integration by altering the following system functionalities:

  - **Advertise:** before publishing, the producer indicates the data it is willing to send and its privacy requirements.

  - **Publish:** when the publisher sends a message, the brokers determine the subscribers interested in this message by using the Usage Control System.

  - **Subscribe:** the consumer should subscribe to receive a message. It specifies the data it is willing to accept and its ABAC information, used by PDP to decide about its permissions.
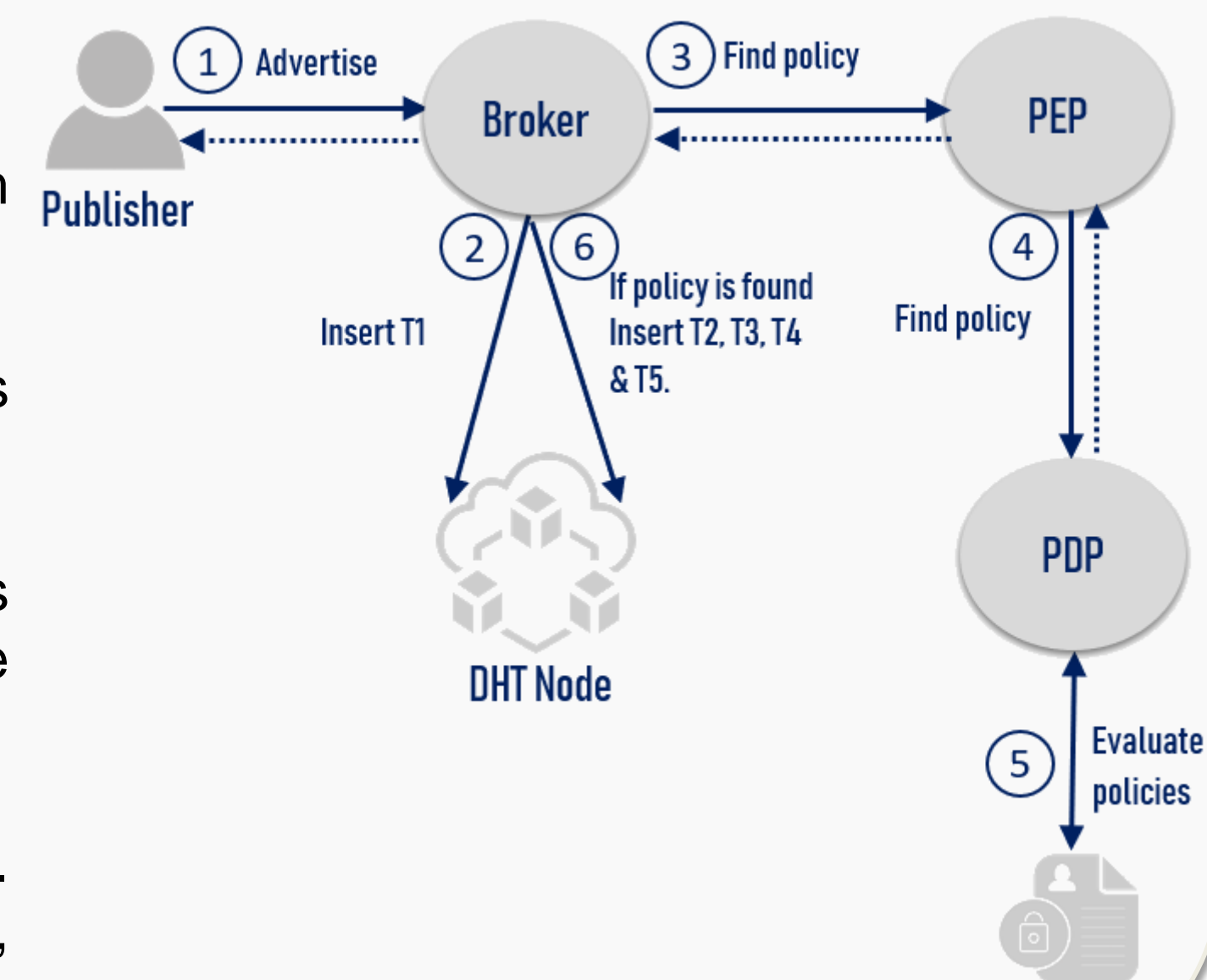

Figure2: "Advertise" process [3]

[1] www.europarl.europa.eu/RegData/etudes/BRIE/2015/557012/EPRS_BRI(2015)557012_EN.pdf.
[2] www.fusionforge.int-evry.fr/www/mudebs/
[3] S. Coroller, S. Chabridon, M. Laurent, D. Conan, J. Leneutre, Towards End-to-end Privacy for Publish/Subscribe Architectures in the Internet of Things. ACM M4IoT@Middleware 2018, pp. 35-40, Rennes, France.