



Welcome to the World of Standards



SPECIALIST TASK FORCE 505 IOT STANDARDS LANDSCAPING & IOT LSP GAP ANALYSIS

IoT Platforms

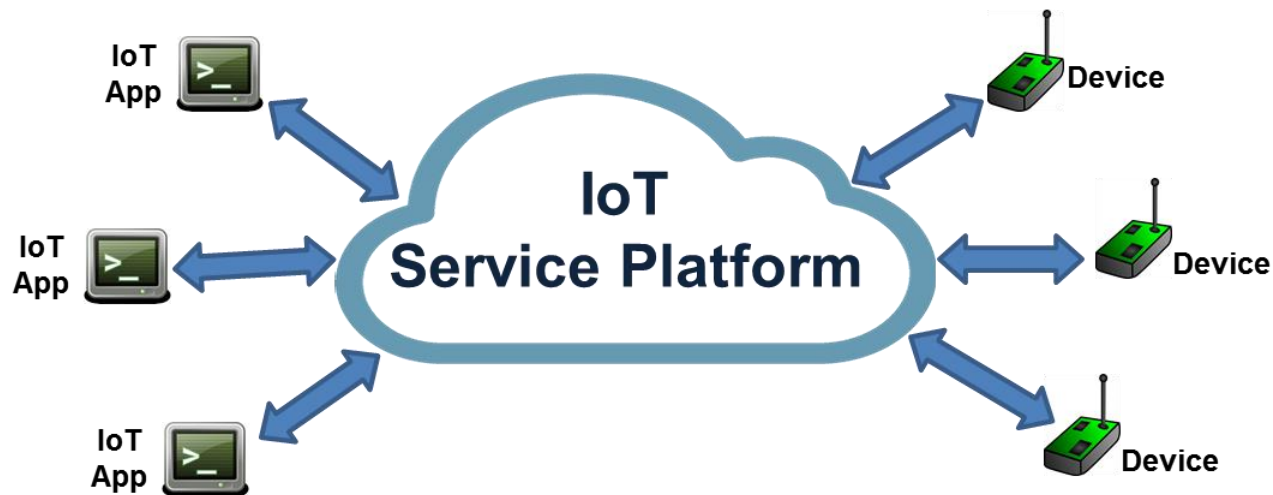
Final STF 505 Presentation Workshop

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- 🌐 IoT service platform
- 🌐 IoT service platform features
- 🌐 Standardized IoT service platforms
- 🌐 Open Source implementations
- 🌐 Gap analysis and conclusions

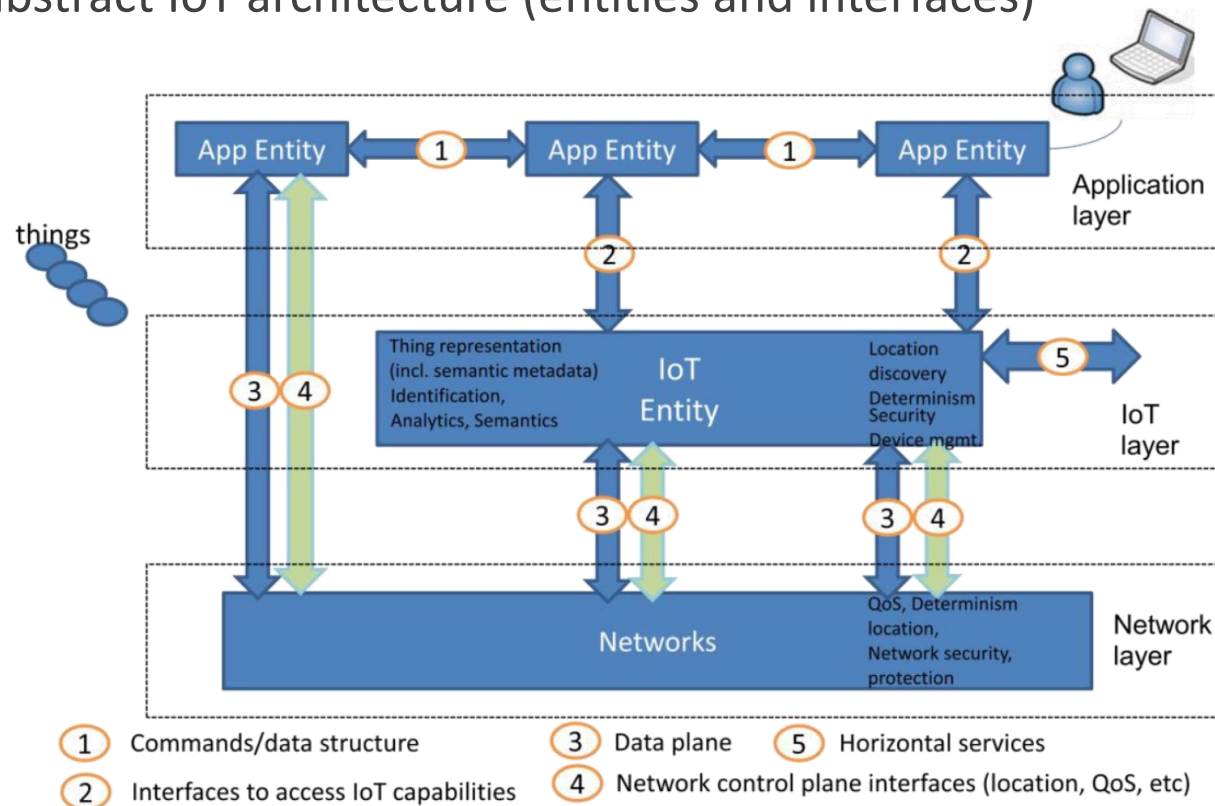
IoT service platform overview



- Intelligent layer between applications, networks and devices
- Coherent set of standardized functionalities
- Enabler for communication and data interoperability.

IoT service platform vs IoT Architecture

- The IoT service platform is the actual implementation/deployment of an abstract IoT architecture (entities and interfaces)



Why do we need an IoT service platform ?

- **Device management**
 - Device provisioning
 - Connectivity monitoring
 - Devices supervision
- **Messages and data management**
 - Message routing
 - Data collection
 - Data storage and data history management
 - Notification management
 - Access right management
- **Application management**
 - Tooling, SDKs, APIs
 - Rapid application development (RAD)

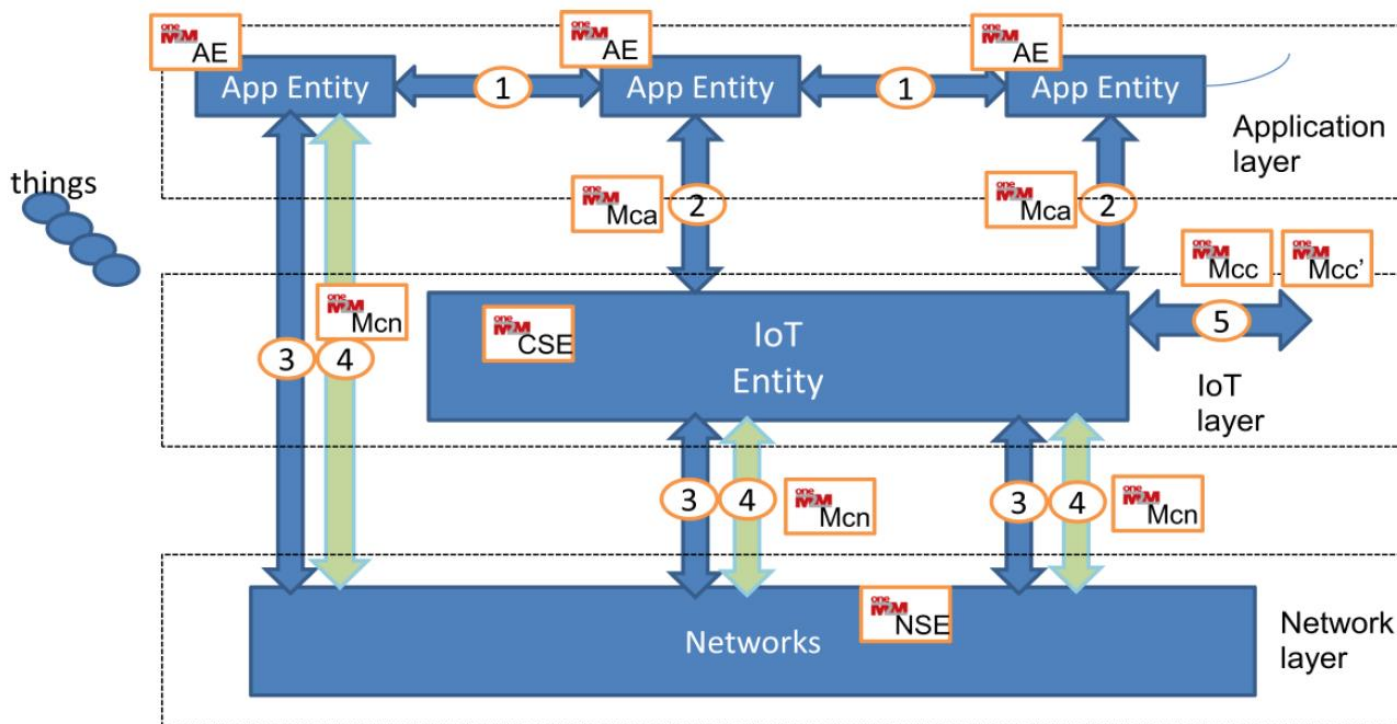
Main standardized IoT service platforms

- oneM2M (*oneM2M*)
- AllJoyn (*AllSeen Alliance*)
- IoTivity (*Open Connectivity Foundation*)
- IPSO Framework (*IPSO Alliance*)
- Thread (*Thread Group*)



- Overview:
 - Generic IoT service platform, designed for multiple verticals.
- Set of standards:
 - HTTP, MQTT, COAP, LWM2M, WebSocket, SAREF, etc.
- Interworking with other IoT platforms / Systems
 - **Interworking Proxy Entity (IPE)** to develop “translators” towards other technology/protocol/system/IoT platform:
 - OIC Interworking Proxy (TS-0024)
 - AllJoyn Interworking Proxy (TS-0021)
 - 3GPP Rel-13 Interworking (TS-0024)
 - **FlexContainer** to ease data exchange between different platforms.
 - **Semantics support.**
- Availability
 - Implementation:
 - Both open source and vendor specific implementations exist.
 - IPR:
 - FRAND IPR regime

AIOTI WG3 HLA Mapping



CSE: Common Services Entity - **NSE:** Network Services Entity - **AE:** Application Entity

Mcn: reference point between a CSE and the Network Services Entity (NSE), enable a CSE to use network services such as location and QoS
Mcc/Mcc': reference point between a CSE and a CSE. It allows registration, security, data exchange, subscribe/notify, etc.

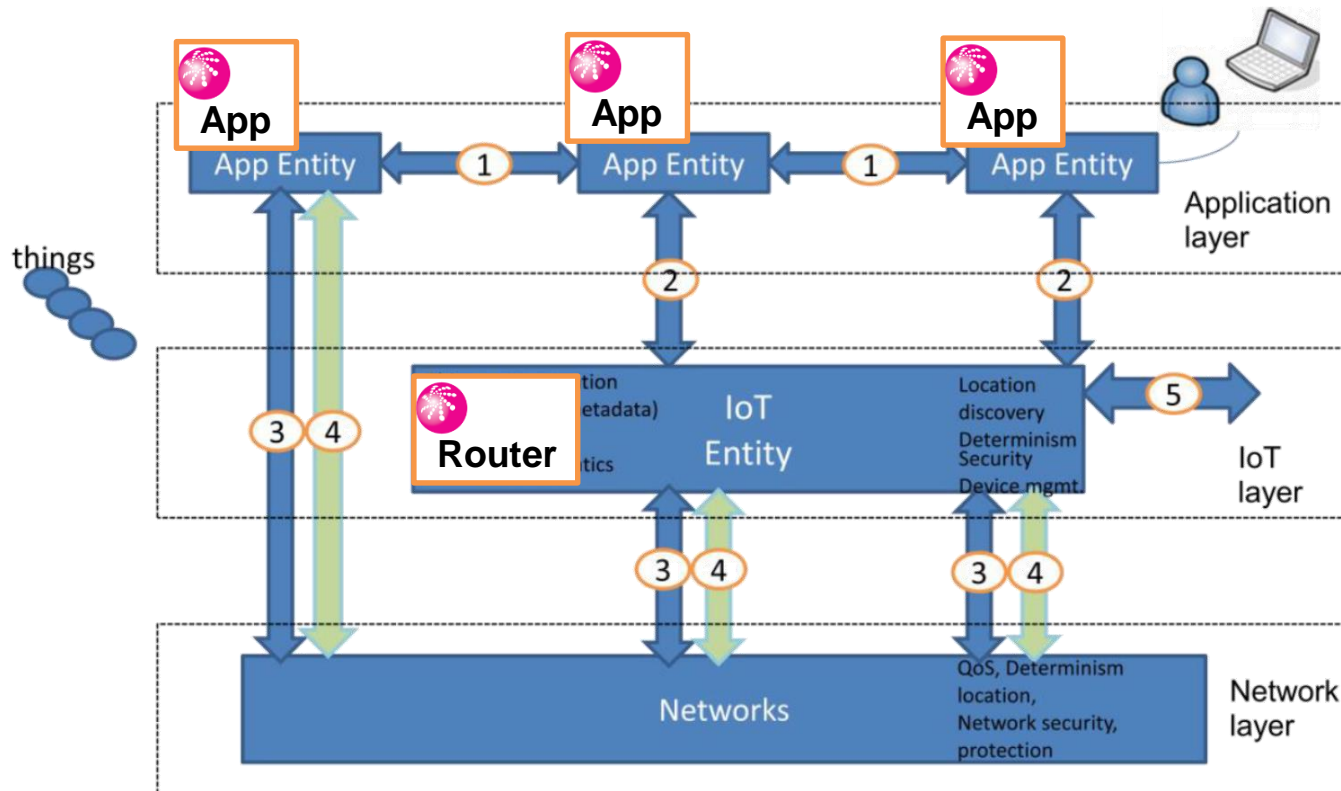
Mca: API to Application Entities that expose functions of the CSE.

oneM2M CSE functions include: device management, registration, discovery, group management, data management and repository, etc.



- Overview:
 - Software framework for seamless device-to-device communications in local networks. Especially targeted for smart home scenarios.
- Set of standards:
 - SoA standards, Wi-Fi, UPnP, Bluetooth, etc.
- Interworking with other IoT platforms / Systems
 - Gateway Agent to connect to external networks and services.
 - Analytics Connector to collect/transmit data outside AllJoyn proximal network.
 - Device System Bridge to connect local non-AllJoyn devices.
- Availability
 - Implementation:
 - Open source implementation provided by AllSeen Alliance.
 - IPR:
 - Source code under ISC licence.
 - Patent Non-Assertion Pledge (contributors).

AIOTI WG3 HLA Mapping



- ① Commands/data structure
- ② Interfaces to access IoT capabilities
- ③ Data plane
- ④ Network control plane interfaces (location, QoS, etc)
- ⑤ Horizontal services

Overview:

- Software framework for communication interoperability between wired and wireless devices with a focus on localized deployments (smart home & office scenarios).

Set of standards:

- Wi-Fi Direct, BLE, ANT+, Zigbee, Z-Wave, OAuth, CBOR, etc.

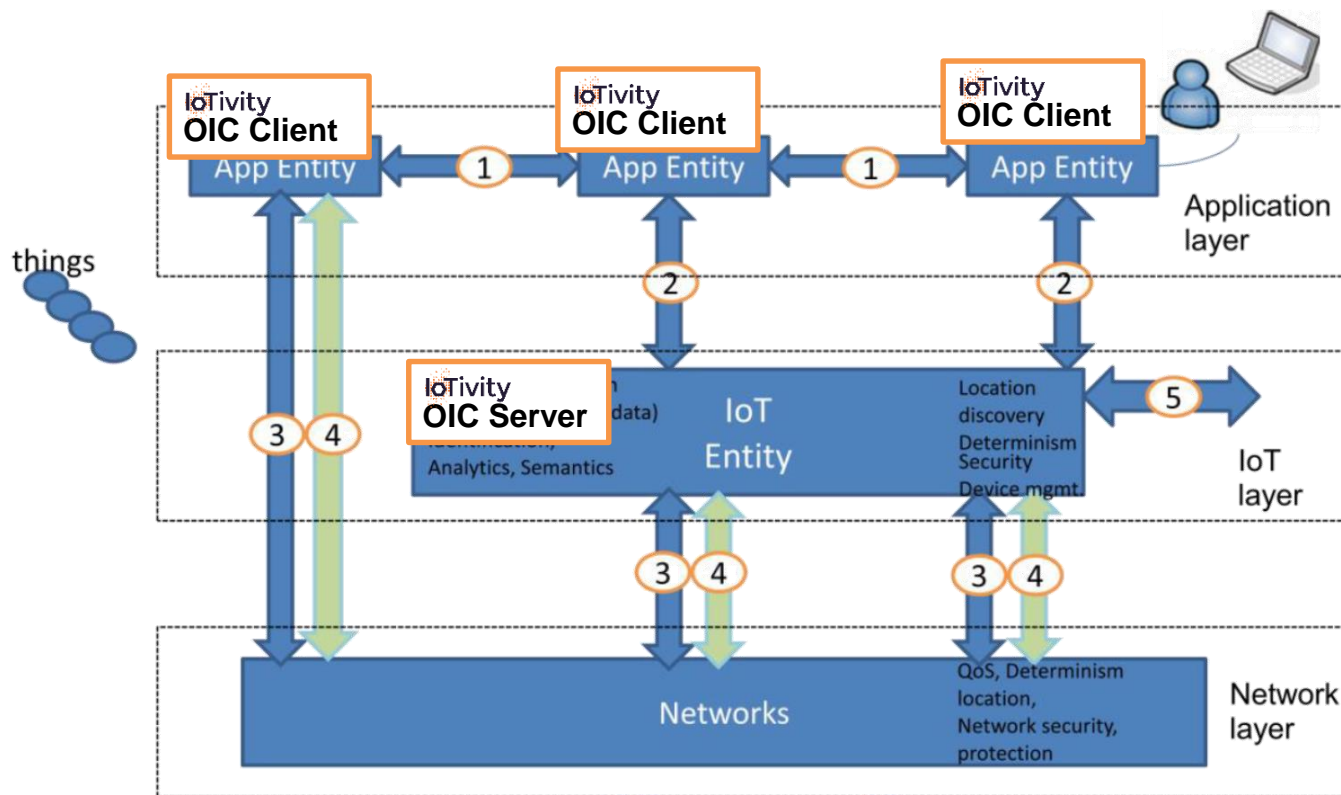
Interworking with other IoT platforms / Systems

- Connectivity Abstraction to support different communication technologies and protocols.

Availability

- Implementation:
 - Open source implementation provided by Open Connectivity Foundation.
- IPR:
 - Source code under Apache Licence (v2.0).
 - OCF IPR Policy

AIOTI WG3 HLA Mapping



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- ⑤ Horizontal services

Overview

- Models/protocols, guidelines and best practices to allow IoT devices to communicate, understand and trust each other.

Set of standards:

- CoAP, MQTT, LWM2M, Bluetooth, Zigbee, 6lowpan, etc.

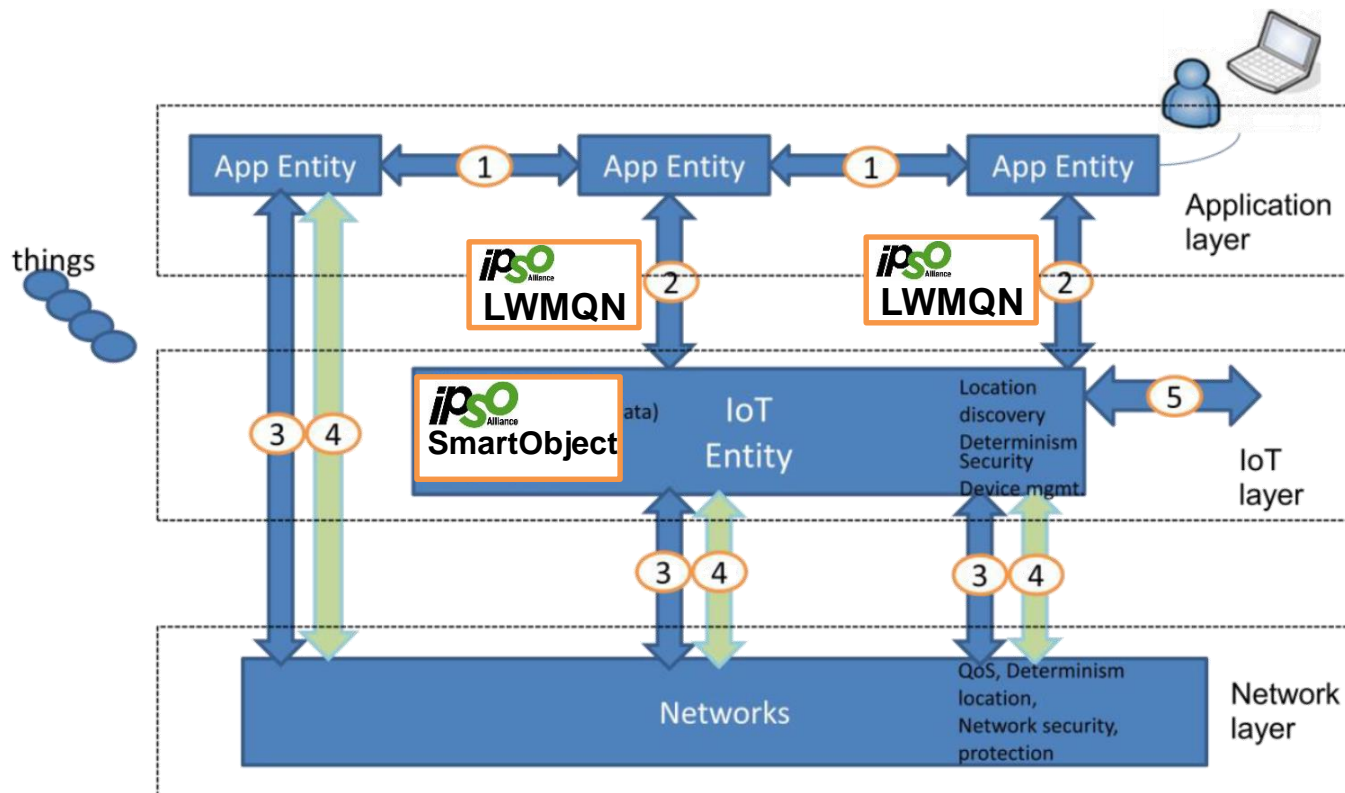
Interworking with other IoT platforms / Systems

- Mapping of meta-model to specific bindings (LWM2M, OIC).
- Semantics support.

Availability

- Implementation:
 - Open source implementation provided by IPSO Alliance.
- IPR:
 - Source code under MIT licence.
 - IPSO Alliance IPR.

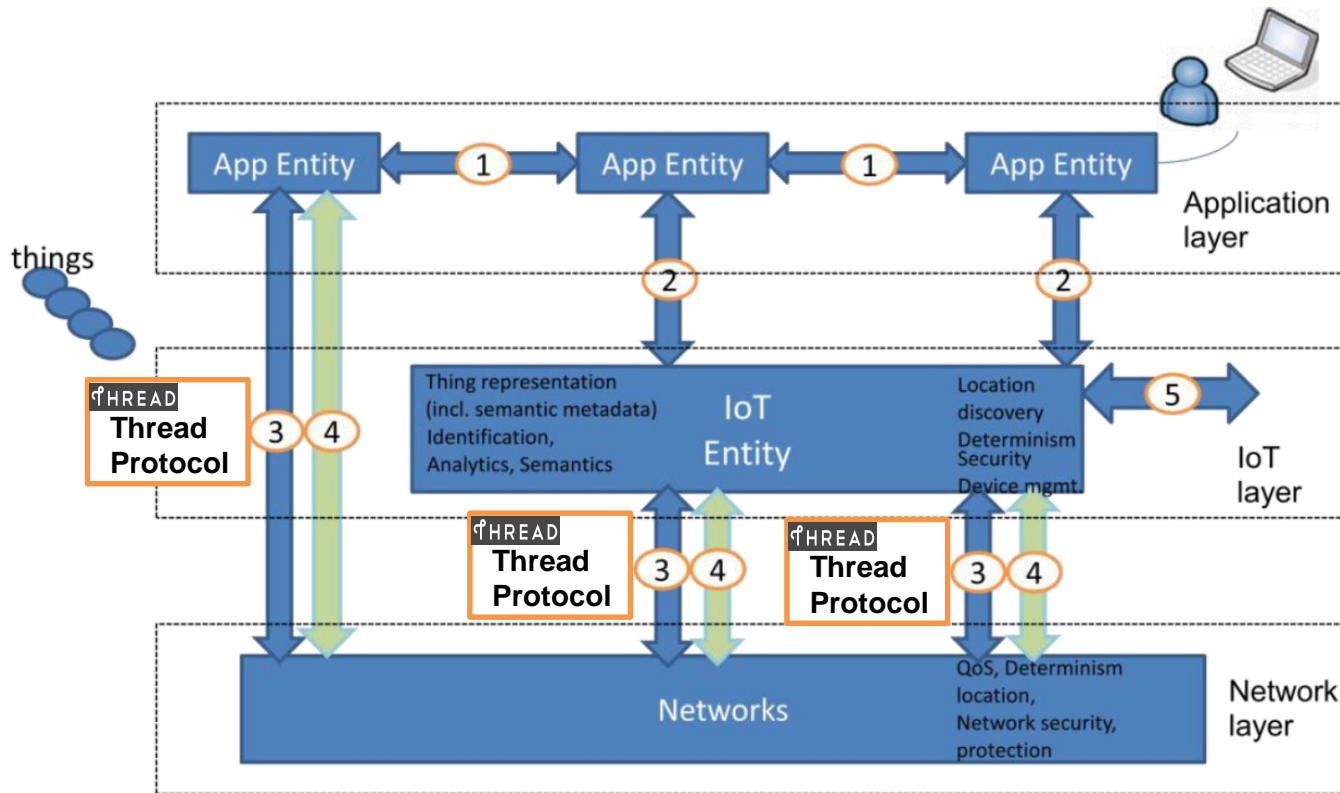
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- Overview:
 - A network and transport stack that is open and secure with a support for a wide variety of products for the smart home (appliances, access control, climate control, energy, safety, etc.)
- Set of standards:
 - IEEE 802.15.4, 6lowpan, IPv6, etc.
- Interworking with other IoT platforms / Systems
 - N/A
- Availability
 - Implementation:
 - Open source implementation provided by NEST (OpenThread under BSD-3)
 - IPR:
 - RAND-RF IPR regime

AIOTI WG3 HLA Mapping



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Eclipse OM2M



- A flexible oneM2M-based platform to implement horizontal M2M servers, gateways and devices.
- Modular architecture, running on top of OSGi, and extensible through plug-ins.

OpenDaylight IoTDM



- Part of the OpenDaylight project (Linux Foundation),
- oneM2M-based IoT data broker to enable authorized applications to retrieve IoT data uploaded by devices.

Mobius and « &Cube » (OCEAN)



- *Mobius* : oneM2M-based IoT server platform
- *&Cube*: oneM2M-based device platform

OASIS SI



- Part of Open-Source Architecture Semantic IoT Service-platform project.
- oneM2M-based IoT server platform
- Protocol binding, controller and resource handling
- Database laser for flexibility

IoT Service Platforms Analysis

- Highly fragmented landscape
 - Offered features
 - Supported technologies
 - Interoperability with other systems/platforms
- More than 350 IoT platform on the market
 - Vendor-specific / proprietary
 - Often with partial coverage of the complete IoT architecture
 - Based on standard technologies
 - The platform is not standardized (through SDOs or alliances)
- Few standardized IoT service platforms
 - Developed within alliances rather than within SDOs
- oneM2M
 - The most advanced standardized IoT platform
 - Great interest from industry
 - Good adoption by the open source community

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Thank you for your attention!