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# Secure Marketplace for Access to Ubiquitous Goods (SMAUG) PoC

## 1 PoC Project Details

### 1.1 PoC Project

PoC Number (assigned by ETSI)

PoC Project Name: **Secure Marketplace for Access to Ubiquitous Goods (SMAUG)**

PoC Project Host: Ericsson

Short Description: The EU Horizon-2020 funded project “Secure Open Federation for Internet Everywhere” (SOFIE) facilitates the smooth creation of new IoT business platforms through secure open federation - powered by the SOFIE blockchain-based architecture, software framework, and a [reference implementation](#) which is available as [open source](#).

The use of said open source reference implementation is demonstrated by **Secure Marketplace for Access to Ubiquitous Goods, SMAUG** proof of concept. The Secure Marketplace for Access to Ubiquitous Goods (SMAUG) pilot is being developed to show the advantages provided by the SOFIE framework, particularly interoperability and the capability of federate multiple, siloed IoT systems or platforms.

The goal of the pilot is to create a secure and decentralised auction-based marketplace for the rental of smart lockers. The owners of smart lockers, both private actors and public organisations, can interact with the marketplace to publish the availability of one or more smart lockers: this advertisement will make those smart lockers available for rent to interested actors. These actors can use the marketplace to place bids for available smart lockers and, in case of win, to get temporary access to the locker.

As a proof of concept, SMAUG is using a “market of rentable smart lockers” as a concrete target as a development target. However, SMAUG demonstrates functionality that is applicable to many other use cases as well: the use of neutral third-party marketplace based on transparent and auditable smart contracts; the use of multiple ledgers with different governance structures; the linking of multiple ledgers using interledger techniques; and as an open source demonstration of SOFIE component integration.

## 1.2 PoC Team Members

Table A.1

	Organization name	ISG PDL participant (yes/no)	Contact (Email)	PoC Point of Contact (see note 1)	Role (see note 2)	PoC Components
1 (X)	Ericsson	Yes	<a href="mailto:santeri.paavolainen@ericsson.com">santeri.paavolainen@ericsson.com</a>	Santeri Paavolainen	Service Provider, Infrastructure provider, Other (Integrator)	Component integration and mobile application, demo space and presentation, equipment
2	Aalto	No	<a href="mailto:lei.1.wu@aalto.fi">lei.1.wu@aalto.fi</a> <a href="mailto:filippo.vimini@aalto.fi">filippo.vimini@aalto.fi</a>	Lei Wu Filippo Vimini	Application provider	Interledger; Offer marketplace; Semantic Representation component
3	Athens University of Economics and Business	No	<a href="mailto:fotiou@aueb.gr">fotiou@aueb.gr</a> <a href="mailto:vsiris@aueb.gr">vsiris@aueb.gr</a> <a href="mailto:polyzos@aueb.gr">polyzos@aueb.gr</a>	Nikos Fotiou Vasilios A. Siris George C. Polyzos	Application provider	Privacy and Data Sovereignty; Identity Authentication and Authorization
4	Rovio	No	<a href="mailto:david.mason@rovio.com">david.mason@rovio.com</a>	David Mason	Application provider	Discovery & Provisioning component
NOTE 1: Identify the PoC Point of Contact with an X.						
NOTE 2: The Role will be network operator/service provider, infrastructure provider, application provider or other as given in the Definitions of ETSI Classes of membership.						

All the PoC Team members listed above declare that the information in this proposal is conformant to their plans at this date and commit to inform ETSI timely in case of changes in the PoC Team, scope or timeline.

## 1.3 PoC Project Scope

### 1.3.1 PoC Goals

The PoC will demonstrate:

- Use of smart contracts to create a neutral, verifiable and auditable marketplace, related to ETSI GS PDL 004 (Smart Contracts).
- Use of multiple distributed ledgers and interledger operations between them, related to ETSI GS PDL 006 (Interop).
- Integration of SOFIE project components, which employ standardized and interoperable interfaces (such as DNS-SD, Eddystone BLE beacons, OAuth2.0, W3C WoT-TD, JWT, ERC721, Indy and W3C DID and VC, ERC20).

These capabilities are demonstrated through the six use cases as shown in the figure below. These uses are chosen to provide good coverage of the most salient features of SMAUG.

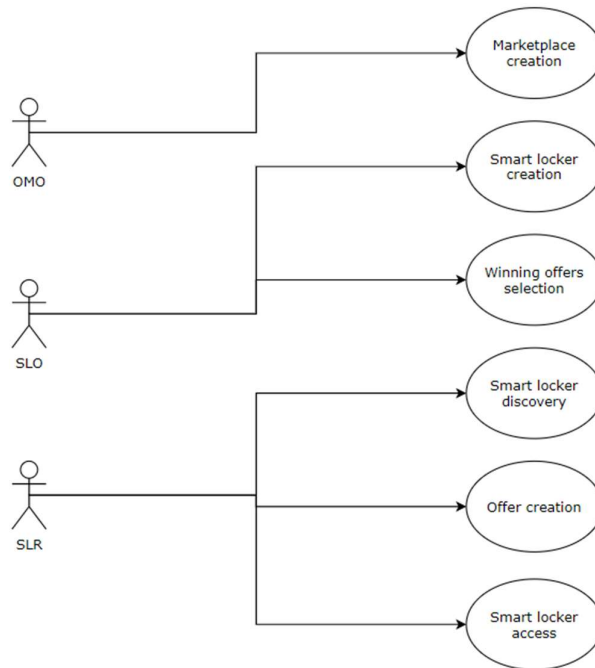


Figure 1: SMAUG PoC use cases. (OMO = Offer Marketplace Owner, SLO = Smart Locker Owner, SLR = Smart Locker Renter.)

### 1.3.2 PoC Topics

PoC Topics identified in this clause need to be taken for the PoC Topic List identified by ISG PDL and publicly available, i.e. the three topics identified in clause 4.5 of the PDL PoC Framework. PoC Teams addressing these topics commit to submit the expected contributions in a timely manner.

**Table A.2**

PoC Topic Description	Related WI	Expected Contribution	Target Date
Use of smart contracts to create a neutral, verifiable and auditable marketplace, related to ETSI GS PDL 004 (Smart Contracts).	related to ETSI GS PDL 004 (Smart Contracts)	Smart contract application and validation	31.12.2020
Use of multiple distributed ledgers and interledger operations between them, related to ETSI GS PDL 006 (Interop).	related to ETSI GS PDL 006 (Interop).	Validation of auditable bidirectional interledger operations	31.12.2020

Figure 2 below provide some further detail on the inter-ledger topic.

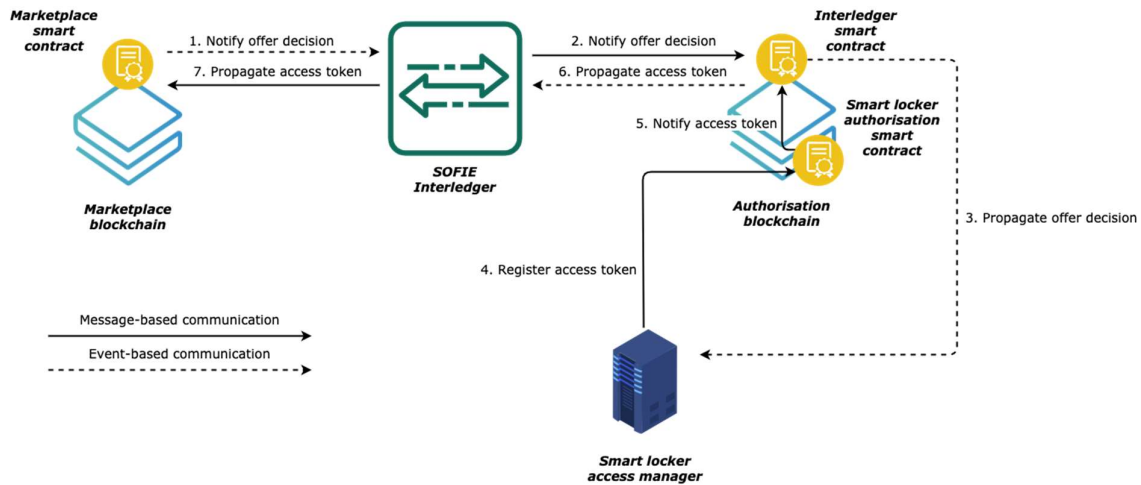


Figure 2: An illustration of the Interledger mechanism in SMAUG. When one or more offers are selected for a given request (step 1), the Interledger protocol is triggered, which makes use of an Interledger smart contract deployed on the authorization blockchain (step 2) to propagate the event to all the interested listeners (step 3). When an interested listener has issued one or more access tokens in response to the Interledger event received (step 4), a second Interledger transaction is performed by calling the Interledger smart contract (step 5), which will then propagate the event payload back to the marketplace blockchain, where the SMAUG smart contract will be listening (steps 6 and 7).

### 1.3.3 Other topics in scope

List here any additional topic for which the PoC plans to provide input/feedback to the ISG PDL.

Table A.3

PoC Topic Description	Related WI	Expected Contribution	Target Date
Integration and reuse of SOFIE project components supporting common marketplace for trading of goods.	PDL-004, PDL-006	Demonstration of smart contract marketplace leveraging multiple ledger technologies.	31.12.2020

## 1.4 PoC Project Stages/Milestones

Table A.4

PoC Milestone	Stages/Milestone description	Target Date	Additional Info
P.S	PoC Project Start	1.9.2020	
P.D1	PoC Demo 1	31.12.2020	Presentation in SOFIE led webinar and a blog post with video recording of the demonstration (or similar)
P.C1	PoC Expected Contribution 1	31.12.2020	Source code release
P.R	PoC Report	31.1.2021	Prior to PDL#7
P.E	PoC Project End	31.1.2021	

NOTE: Milestones need to be entered in chronological order.

## 1.5 Additional Details

The SMAUG source code is going to be published under the Apache 2.0 open source license. The SOFIE components that SMAUG integrates are available at the SOFIE project GitHub at <https://github.com/SOFIE-project/> under open source licenses.

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## 2 PoC Technical Details

### 2.1 PoC Overview

SMAUG integrates several SOFIE components and adds a layer of business logic and mobile application to implement the SMAUG use case. The SOFIE components that are integrated are listed in Table A.5 below.

**Table A.5**

Name	Acronym	Reference
Privacy and Data Sovereignty component	PDS	<a href="https://github.com/SOFIE-project/Privacy-and-Data-Sovereignty">https://github.com/SOFIE-project/Privacy-and-Data-Sovereignty</a>
Identity, Authentication and Authorization	IAA	<a href="https://github.com/SOFIE-project/identity-authentication-authorization">https://github.com/SOFIE-project/identity-authentication-authorization</a>
Semantic Representation	SR	<a href="https://github.com/SOFIE-project/Semantic-Representation">https://github.com/SOFIE-project/Semantic-Representation</a>
Marketplace	MP	<a href="https://github.com/SOFIE-project/Marketplace">https://github.com/SOFIE-project/Marketplace</a>
Interledger	IL	<a href="https://github.com/SOFIE-project/Interledger">https://github.com/SOFIE-project/Interledger</a>
Provisioning and Discovery	PD	<a href="https://github.com/SOFIE-project/Discovery-and-Provisioning">https://github.com/SOFIE-project/Discovery-and-Provisioning</a>

These are incorporated into three different distinct service domains:

- **Marketplace (MP) Domain** implementing the neutral market platform to offer locker rentals and rent lockers.
- **Smart Locker Owner (SLO) Domain** enabling the locker owner to manage his or her lockers, and interface to the locker marketplace as well as software running on the locker (embedded Raspberry Pi SBC).
- **Smart Locker Renter (SLR) Domain** which includes an Android application that enables an end-user to interact with the locker marketplace and interact with lockers.

Each of these domains implement multiple both internal and externally visible services and communication endpoints.

### 2.2 PoC Architecture

The detailed SMAUG PoC architecture is shown below.

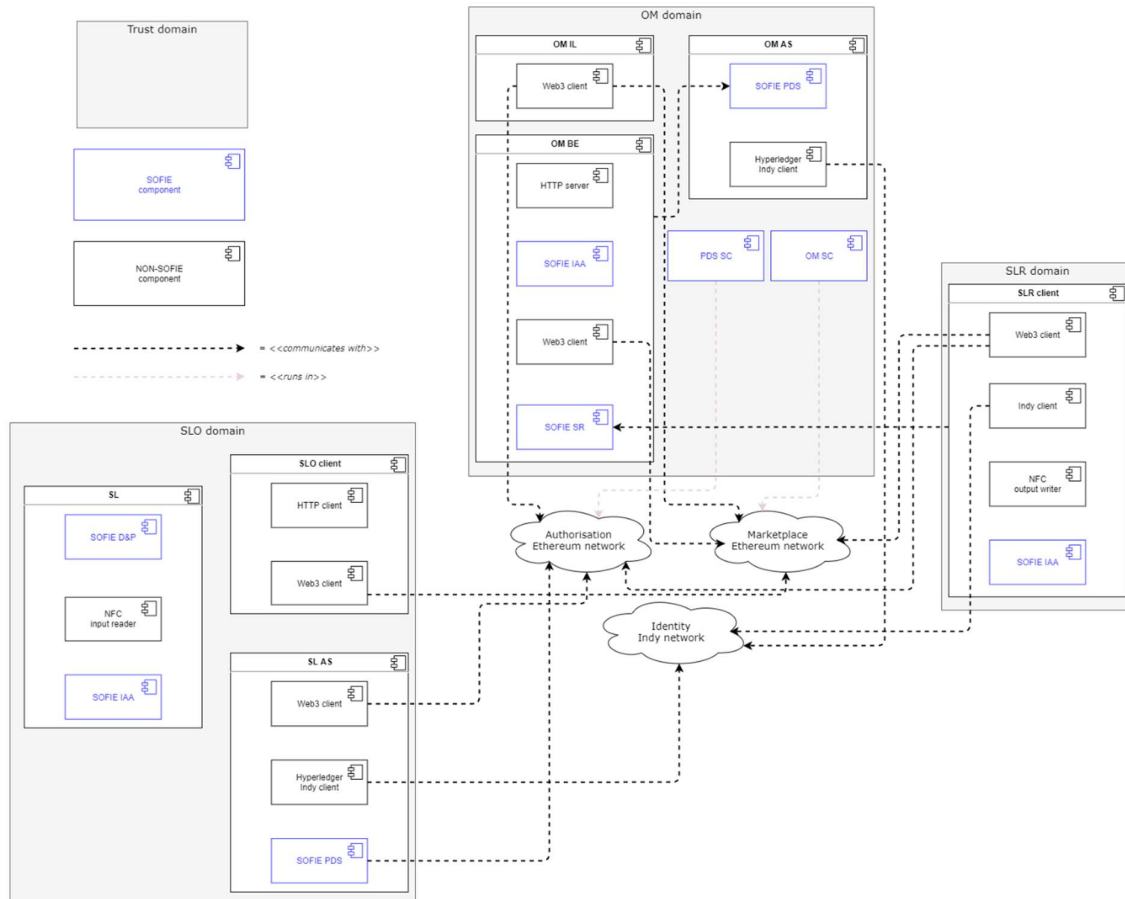


Figure 3: SMAUG architecture.

## 2.3 PoC Success Criteria

The success of the PoC is demonstrated via its use cases, including confirmation of the required interactions via quantitative or qualitative testing or analysis. SMAUG as an integration demonstrator has no non-functional requirements such as performance or availability goals, consequently verification of the functional use cases suffices.

## 2.4 Additional information

The SOFIE project open source component releases are summarized (with links) at <https://github.com/SOFIE-project/Framework>. More information on the SOFIE project, including the SOFIE framework architecture specification is available at <https://www.sofie-iot.eu/> and <https://www.sofie-iot.eu/results/project-deliverables>.