PDL ISG - PoC Proposal Template

1 PoC Project Details

1.1 PoC Project

PoC Number (assigned by ETSI): PoC#04

PoC Project Name: IoT-based access control system using NFT ticket to prevent scalping

PoC Project Host: Sejong University

Short Description: Traditional access authentication systems face multiple security vulnerabilities, including forgery, tampering, and server hacking. For example, issues with scalpers who steal identities to buy and illegally transfer bulk tickets for cultural performances highlight the need for a system that ensures access only with legitimately issued tickets. This PoC introduces a new ticket issuance and anti-counterfeiting solution using blockchain's Non-Fungible Tokens (NFTs) to combat scalping and counterfeit tickets. Integrated with an IoT access control system, it allows entry solely to individuals holding validly issued tickets. Utilizing a decentralized distributed ledger enhances security by preventing unauthorized access from forged passes or compromised servers. The system employs blockchain standard PDL and IoT standard oneM2M technologies, enhancing interoperability and facilitating future expansion with other IoT devices.

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	Sejong University (SJU)	Yes	jssong@sejong.ac.kr	X	Application provider	Blockchain Development, oneM2M Development
2	Guarantable	No	TBD	TBD	TBD	Blockchain Development
3	ETRI	No	TBD	TBD	TBD	oneM2M Development
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:

- Utilization of PDLs in oneM2M using standardized and interoperable interfaces, related to ETSI GR PDL 028 (Study on Utilising PDLs to Standardized IoT Service Layer Platform oneM2M)
- Developing a secure, verifiable, and immutable ticket system using smart contracts, related to ETSI GS PDL 004 (Smart Contracts System Architecture and Functional Specification)

1.3.2 PoC Topics

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

Table A.2

PoC Topic Description (see note)	Related WI	Expected Contribution	Target Date
Utilization of PDLs in oneM2M using standardized and interoperable interfaces	related to ETSI GR PDL 028 (Study on Utilising PDLs to Standardized IoT Service Layer Platform oneM2M)	Validation of PDL utilization in oneM2M	2024-06
Developing a secure, verifiable, and immutable ticket system using smart contracts	related to ETSI GS PDL 004 (Smart Contracts System Architecture and Functional Specification)	Smart contract application and validation	2024-06
Integrating the PDL-based ticket system with oneM2M access control system	related to ETSI GR PDL 028 (Study on Utilising PDLs to Standardized IoT Service Layer Platform oneM2M)	Interworking between oneM2M and PDL	2024-10
NOTE: This column should be filled according to the contents of table 1.			

1.3.3 Other topics in scope

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

Table A.3

PoC Topic Description	Related WI	Expected Contribution	Target Date
Validate use cases that utilize PDL in oneM2M	related to ETSI GR PDL 028 (Study on Utilising PDLs to Standardized IoT Service Layer Platform oneM2M)	Demonstration to validate PDL utilization in oneM2M	2024-06

1.4 PoC Project Stages/Milestones

Table A.4

PoC Milestone	Stages/Milestone description	Target Date	Additional Info
P.S	PoC Project Start	2024-05	
P.D1	PoC Demo 1	2024-06	PDL#18, F2F Develop an NFT-based ticket system to prevent ticket scalping
P.D2	PoC Demo 2	2024-10	Develop an NFT-based ticket system and gate access control system using PDL and oneM2M
P.C1	PoC Expected Contribution	2024-06	PDL features to support NFT-based ticket system
P.C2	PoC Expected Contribution 2	2024-10	oneM2M interworking proxy application
P.R	PoC Report	2024-11	
P.E	PoC Project End	2024-12	

1.5 Additional Details

For example, URL, planned publications, conferences, etc.

2 PoC Technical Details

2.1 PoC Overview

PDL-based oneM2M access authentication systems that use distributed ledgers for authentication can address many vulnerabilities by leveraging the security and immutability features of blockchain technology. In high-security environments, such as international airports, where advanced authentication systems are essential, IoT platforms leveraging permissioned distributed ledgers (PDLs) can provide hardened access control policies based on trust and privacy. Additionally, implementing two-factor authentication (2FA) through PDLs and the oneM2M standard can help ensure that smart systems operate securely and reliably.
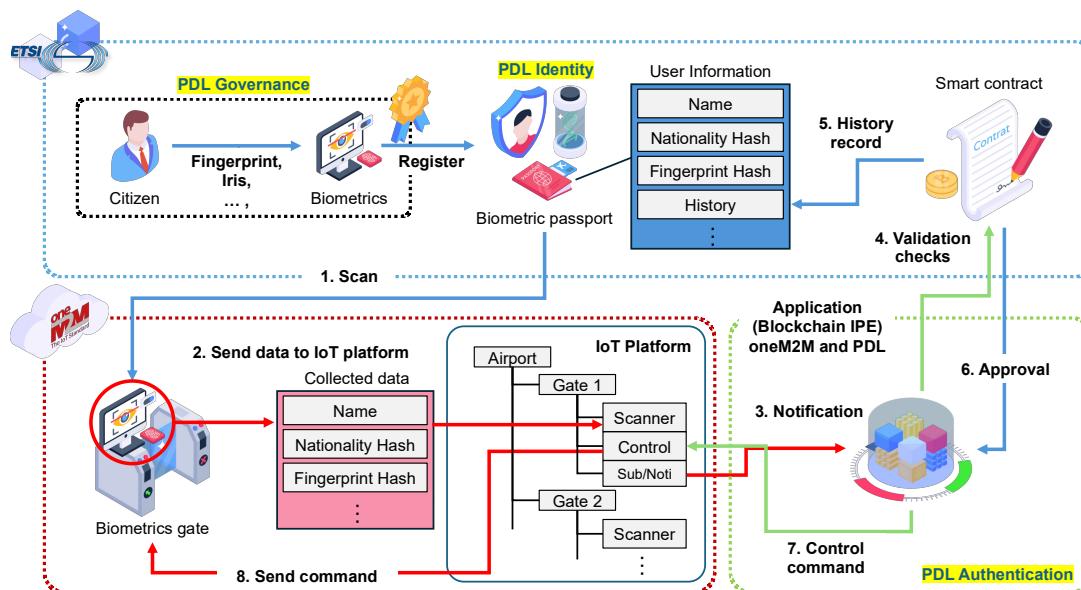

Figure 1. PDL-based oneM2M access authentication system overview

2.2   PoC Architecture

The detailed PDL-based access authentication system PoC architecture is shown below.
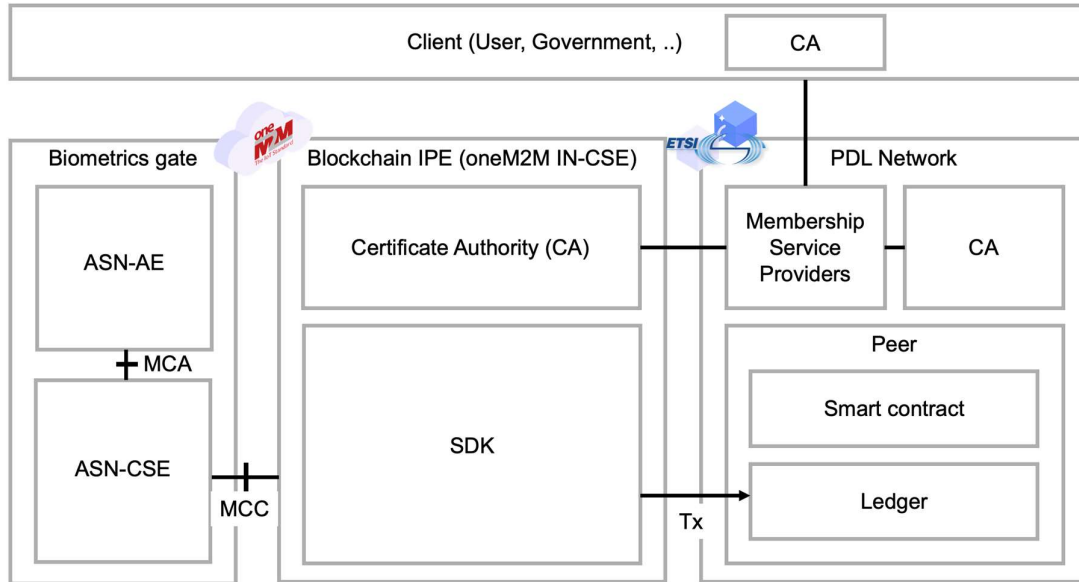

Figure 2. PDL-based access authentication system architecture

2.3   PoC Success Criteria

The success of the PoC is demonstrated by the verification of the interaction between oneM2M-PDL through the demonstration. It does not include non-functional requirements such as performance or availability goals. Consequently, validation of the functional use case via a demo is sufficient.

2.4   Additional information

No additional information