

ETSI TS 103 410-2 V2.1.1 (2024-10)



SmartM2M; Extension to SAREF; Part 2: Environment Domain

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Smart Machine-to-Machine communications (SmartM2M).

The present document is part 2 of a multi-part deliverable covering SmartM2M; Extension to SAREF, as identified below:

Part 1: "Energy Domain";

Part 2: "Environment Domain";

Part 3: "Building Domain";

Part 4: "Smart Cities Domain";

Part 5: "Industry and Manufacturing Domains";

Part 6: "Smart Agriculture and Food Chain Domain";

Part 7: "Automotive Domain";

Part 8: "eHealth/Ageing-well Domain";

Part 9: "Wearables Domain";

Part 10: "Water Domain";

Part 11: "Lift Domain";

Part 12: "Smart Grid Domain";

Part 13 Maritime Domain.

Modal verbs terminology

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1 Scope

The present document presents SAREF4ENVI, an extension of SAREF for the Environment Domain.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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The following referenced documents are necessary for the application of the present document.

- [1] [ETSI TS 103 264](#): "SmartM2M; Smart Applications; Reference Ontology and oneM2M Mapping".
- [2] [ETSI TS 103 548](#): "SmartM2M; SAREF reference ontology patterns".
- [3] [ETSI TS 103 673](#): "SmartM2M; SAREF Development Framework and Workflow, Streamlining the Development of SAREF and its Extensions".

2.2 Informative references

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The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] ETSI TS 103 410-2 (V1.1.2): "SmartM2M; Extension to SAREF; Part 2: Environment Domain".
- [i.2] ETSI TR 103 411: "SmartM2M; Smart Appliances; SAREF extension investigation".
- [i.3] ETSI TR 103 781 (V1.1.1): "SmartM2M; Study for SAREF ontology patterns and usage guidelines".
- [i.4] Zamorano, J., García, C., González, R., Gallego, J., Pascual, S., Tapia, C., Nievas, M., Sánchez, A., Cardiel, N. Deliverable D4.1: "Photometer sensor (prototype)". STARS4ALL project. March 30th, 2016.
- [i.5] "[Variación espacial, temporal y espectral de la contaminación lumínica y sus fuentes: Metodología y resultados](#)". Ph.D. thesis. Universidad Complutense de Madrid. February, 2015.
- [i.6] ISO 6707-1:2020: "Buildings and civil engineering works -- Vocabulary -- Part 1: General terms".
- [i.7] ISO 24161:2022: "Waste collection and transportation management -- Vocabulary".
- [i.8] ISO 18606:2013: "Packaging and the environment -- Organic recycling".

- [i.9] ISO 59004:2024: "Circular economy -- Vocabulary, principles and guidance for implementation".
- [i.10] ISO 27065:2017: "Protective clothing -- Performance requirements for protective clothing worn by operators applying pesticides and for re-entry workers".
- [i.11] ISO 5149-1:2014: "Refrigerating systems and heat pumps -- Safety and environmental requirements -- Part 1: Definitions, classification and selection criteria".
- [i.12] ISO 10088:2022: "Small craft -- Permanently installed fuel".
- [i.13] ISO 8157:2022: "Fertilizers, soil conditioners and beneficial substances -- Vocabulary".
- [i.14] ISO 8887-1: "Technical product documentation -- Design for manufacturing, assembling, disassembling and end-of-life processing -- Part 1: General concepts and requirements".
- [i.15] ISO 18400-204:2017: "Soil quality -- Sampling -- Part 204: Guidance on sampling of soil gas".
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- [i.17] OpenstreetMap Wiki: "[Proposal: Key: light source](#)".
- [i.18] ISO 21928-2:2023: "Sustainability in buildings and civil engineering works -- Sustainability indicators. Part 2: Framework for the development of indicators for civil engineering works".

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI TS 103 673 [3] and the following apply:

ontology: formal specification of a conceptualization, used to explicit capture the semantics of a certain reality

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ESCP	École Supérieure de Commerce de Paris
OM	Ontology of units of Measure
OWL	Web Ontology Language
OWL-DL	Web Ontology Language Description Logic
RDF	Resource Description Format
RDF-S	Resource Description Format Schema
SAREF	Smart Applications REference ontology
TESS	Telescope Encoder and Sky Sensor
TR	Technical Report
TS	Technical Specification
WGS84	World Geodetic System 1984

4 SAREF4ENVI ontology and semantics

4.1 Introduction

The present document is a technical specification of SAREF4ENVI, an OWL-DL ontology that extends SAREF [1] for the Environment domain.

The present document is a major revision of SAREF4ENVI ontology extension, developed in the context of the STF 641 (<https://portal.etsi.org/xtfs/#/xTF/641>), using updated reference ontology patterns specified in ETSI TS 103 548 [2] to solve the harmonization needs identified in ETSI TR 103 781 [i.3], with updated development framework and tools defined in ETSI TS 103 673 [3].

ETSI TS 103 410-2 (V1.1.2) [i.1] was created in collaboration with domain experts in the field of light pollution that worked in the STARS4ALL European H2020 project (<https://cordis.europa.eu/project/id/688135/>). The STARS4ALL project was composed of partners such as Universidad Politécnica de Madrid, Universidad Complutense de Madrid, ESCP Europe, Leibniz Institute of Freshwater Ecology and Inland Fisheries, Instituto de Astrofísica de Canarias, University of Southampton, European Crowdfunding Network, and CEFRIEL (Società Consortile a Responsabilità Limitata). As such, V1.1.2 of the present document focused on extending SAREF for photometers to solve the lack of interoperability between sensors that can measure and share information about light pollution. Such extension involves the following use cases (more details can be found in ETSI TR 103 411 [i.2]):

- **Use case 1:** Monitor light pollution in a city, through the data collected by photometers about the magnitude of the light emitted in a given area.
- **Use case 2:** Adjust lampposts light intensity due to high pollution, after identifying the most contaminating lampposts and therefore the areas where more energy is being thrown away.
- **Use case 3:** Register a photometer, in which a new collection of photometers is incorporated into an existing sensor network.

Added in the present document is the covering of the waste management domain, as a collaboration between IMT - Mines Saint-Étienne and the company Compost'Ond, specialized in composting biodegradable waste. The Waste Management Domain is divided into three modules: Waste, Collection and Treatment. They correspond chronologically to the three stages of waste management systems, from the moment a material becomes waste to the moment it is either transformed into another resource or becomes a final waste:

- The Waste module of the Waste Management Domain covers waste, those who produce it and where, its type, and the containers in which it is disposed before collection.
- The Collection module of the Waste Management Domain covers waste collection, the vehicles used and the journeys made to do so.
- The Treatment module of the Waste Management Domain covers waste processing (pre-treatment, treatment, disposal), the processes that can be used for doing so, the organisations involved, the emissions produced, and the final outputs.

The intention of SAREF4ENVI includes:

- to be the basis for enabling the use of SAREF in the environment domain;
- to exemplify how to enable interoperability between environmental devices in cooperation.

As all the SAREF ontologies, SAREF4ENVI is a dynamic semantic model that is meant to evolve over time. Therefore, the stakeholders in the Environment domain are invited to use, validate and provide feedback on SAREF4ENVI, collaborating with the SAREF ontology experts to improve and evolve SAREF4ENVI in an iterative and interactive manner, so that changes and additions can be incorporated in future releases of the present document.

The prefixes and namespaces used in SAREF4ENVI and in the present document are listed in Table 1.