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SERIES Y: GLOBAL INFORMATION
INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS,
NEXT-GENERATION NETWORKS, INTERNET OF
THINGS AND SMART CITIES

Internet of things and smart cities and communities –
Requirements and use cases

Requirements and reference model of IoT- related crowdsourced systems

Recommendation ITU-T Y.4205



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For further details, please refer to the list of ITU-T Recommendations.

Recommendation ITU-T Y.4205

Requirements and reference model of IoT-related crowdsourced systems

Summary

Recommendation ITU-T Y.4205 introduces the concept of crowdsourced systems, as well as the reference model of IoT-related crowdsourced systems for the support of Internet of things (IoT) applications and services to be provided via systems employing crowdsourcing principles. It addresses IoT-related crowdsourced systems in terms of functional requirements and the reference model as well as identifying relevant security, privacy and trust issues.

In particular, the main contributions of Recommendation ITU-T Y.4205 can be summarized as follows:

- It identifies and provides the motivation for IoT-related crowdsourced systems (recent technological advancements and relevant emerging trends).
- It provides definitions of terms that are central when discussing crowdsourcing and crowdsourced systems, thus providing a basis of common understanding. So far, such terms have been used in layman's terms, outside a formal standardised framework; a practice which has led to ambiguity hindering further development of such systems. It is worth noting that the said definitions have been elicited via a rigorous methodology from a plethora of publications (both by academia and the industry); more information can be found in the body of the Recommendation.
- It provides a high-level reference model identifying the key layers and components of crowdsourced systems. The model does not dictate nor indicates a specific implementation or approach for building IoT-related crowdsourced systems. On the contrary, it provides a nominal model that facilitates the design and development of such systems by providing a common basis of reference.

History

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* To access the Recommendation, type the URL <http://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID. For example, <http://handle.itu.int/11.1002/1000/11830-en>.

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In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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Introduction

Recent technological advancements and corresponding trends have driven the rise of new networking and computing paradigms. For instance, high acceptance rates of smartphones, smart watches and other smart gadgets have led to an abundance of devices with significant communication and sensing capabilities. In addition, the increasing popularity of single-board computers (SBCs) enables the use of highly affordable platforms in the context of "made at home" projects.

This abundance of resources has led to new networking and computing paradigms, which enable crowd-provided resources to operate in a collaborative manner in order to carry out tasks or provide services. The embedded networking and sensing capabilities of such resources (e.g., smartphones) as well as their ad-hoc nature makes them highly relevant to Internet of things (IoT) systems. For instance, a ubiquitous sensor network (USN) can augment its resources and capabilities in a scalable and financially viable way by opportunistically incorporating crowdsourced resources. Such crowdsourcing methods in the context of IoT support novel economic and business models that are based on collaborative schemes, bottom up innovation and citizen-oriented data.

In order for the true potential of crowdsourced systems to unfold, several challenges need to be addressed. As a new and emerging paradigm, the notion of a crowdsourced system needs to be clearly defined in order for its particular characteristics and the derived challenges to be identified. The added value of a crowdsourced system relies on the size of the participating crowd and the corresponding number of resources. However, the great variety of software and hardware platforms and the lack of common development libraries, middleware and virtualization techniques hinder the development of truly interoperable applications and services. Also, the highly personal nature of crowdsourced resources drives the need for particular security, trust and privacy considerations.