

# INTERNATIONAL STANDARD

Internet of things (IoT) **iTeh STANDARD**  
IoT applications for electronic label system (ELS)  
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## INTERNET OF THINGS (IoT) – IoT APPLICATIONS FOR ELECTRONIC LABEL SYSTEM (ELS)

### FOREWORD

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ISO/IEC 30169 has been prepared by subcommittee 41: Internet of Things and Digital Twin, of ISO/IEC joint technical committee 1: Information technology. It is an International Standard.

The text of this International Standard is based on the following documents:

Draft	Report on voting
JTC1-SC41/277/FDIS	JTC1-SC41/287/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs) and [www.iso.org/directives](http://www.iso.org/directives).

## INTRODUCTION

The development of information technology has brought a lot of changes in daily life, especially with the invention and emergence of IoT technology. IoT technology makes things connected with each other, in order to enhance the efficiency, provide effective monitoring and reduce the cost for all the regular management, maintenance, and other business events for those things.

Because of the information explosion era, there is rapid replacement of information, along with the rich variety of the information and the extremely short life cycle of the information. It is very difficult for traditional labels (the paper labels) to adapt to such a quick pace of information updates. Affected by the IoT technology, traditional labels began the process of becoming digitalized and interconnected.

However, the process of promotion and distribution of the electronic label system (ELS) is much faster than the formation of the worldwide marketing regulation system for such a newly emerging IoT application. To help the marketing maintain the operation under a healthy, sustainable, and controllable condition, it is urgent to develop the ELS focused standard(s) to accelerate standardization for the ELS design and distribution. At the same time, the ELS focused standard(s) will actually support the relevant global marketing regulation.

This document is in response to the demand described above. To achieve this goal, the first step is to provide a general design guide, and the overall technical requirements. This document briefly defines the system framework and IoT application model for ELS, which will firstly specify the components of ELS, duties of each component, regulations for business access logic and data flow between adjacent components. Then, the overall requirements in terms of system functions, system interfaces and system performances are specified in this document to simplify and unify the design of ELS. In conclusion, the purpose of this document is to help ensure the quality of service (QoS) and design conformance of ELS in the retail industry.

In order to avoid some unnecessary confusion regarding this document and to distinguish this document from other publications, the core concepts of this document are focused only on the overview and general requirements (discussed above) of the ELS itself.

For example, typical things out of the scope of this document include, but are not limited to,

- a) electronic product labelling,
- b) RFID-specified applications, and
- c) health informatics.

# INTERNET OF THINGS (IoT) – IoT APPLICATIONS FOR ELECTRONIC LABEL SYSTEM (ELS)

## 1 Scope

This document specifies the system framework, IoT application model and overall technical requirements for electronic label system (ELS).

This document applies to the design and development of the IoT applications for ELS.

The IoT applications for ELS specified in this document are mainly applicable to the retail industry, and can also provide reference for the design and development of the IoT applications for ELS in other industries.

## 2 Normative references

There are no normative references in this document.

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

### 3.1

#### electronic label

##### EL

<in retail industry> IoT device which attaches to a physical item having a display for the information about the item and its perceived environment and also having information transmission via an RF data link

Note 1 to entry: Examples of the information about the item and its perceived environment include, but are not limited to, prices, stock status, promotional advertisement, barcode, two-dimensional code, temperature, humidity, ambient light conditions.

### 3.2

#### electronic label system

##### ELS

<in retail industry> system with a few to a large number of electronic labels designed for IoT applications

### 3.3

#### ELS backend system

subsystem intended to realize the business service functions and the equipment control functions of ELS

Note 1 to entry: The ELS backend system provides unified planning and management services for business activities that utilize the ELS, and it also provides a centralized equipment monitoring service.





In terms of other application fields, the application of ELS in global markets shows a quick growth trend. Therefore, ELS has great market potential, and ELS is the mainstream of future development.

**5.2 Purpose and significance**

At present, ELS has rapidly and globally penetrated into our daily life. When an innovative technology is rapidly promoted and deployed, the problems and potential risks are revealed gradually. These problems and potential risks are mainly raised from the technical level and business consistency level.

- a) In terms of technology, the technologies to realize the ELS have diversified forms. The problems caused by the lack of standardization and uniformity will mainly focus on the following four points:
  - 1) uncertainty of ELS system framework and IoT application model;
  - 2) uncertainty of ELS functions;
  - 3) uncertainty of the necessary interfaces;
  - 4) uncertainty of ELS performance.
- b) In terms of business consistency, when some businesses need to extend ELS in parallel to integrate two or more ELSs (ELSs are from different manufacturers or different series) into a larger ELS, a unified requirement for ELS design and distribution is the key.

In conclusion, normalization and standardization are the optimal solution to address the above problems. Therefore, applications for ELS has been proposed as the subject of a future International Standard. The follow-up development of this standard project will be researched and reviewed closely related to the above issues, in order to make this International Standard implementable. In addition, this solution will also contribute to the standardization of ELS product acceptance and ensure the QoS for consumers.

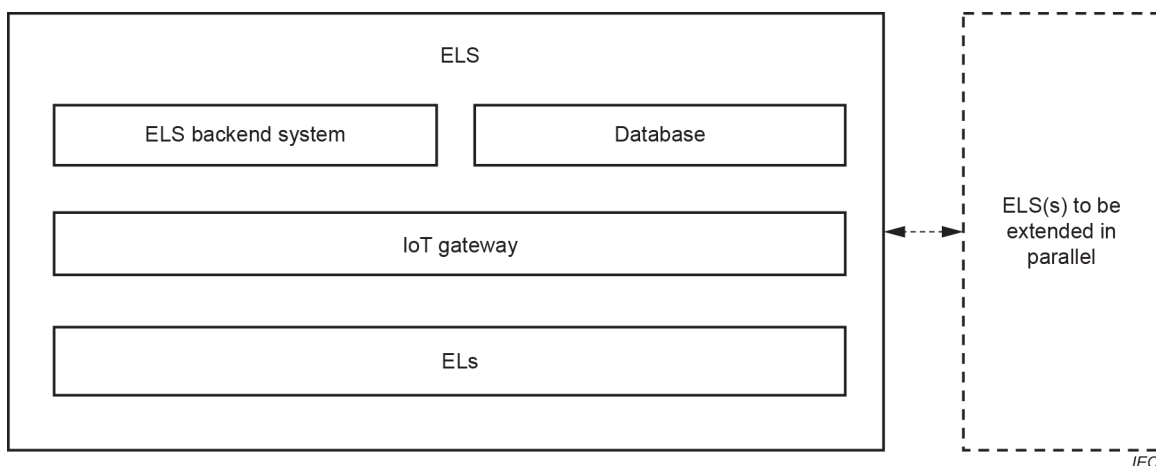
**6 System framework and IoT application model**

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**6.1 General**

Clause 6 specifies the system framework and IoT application model for ELS.

**6.2 System framework**



**Figure 1 – System framework of the IoT applications for ELS**

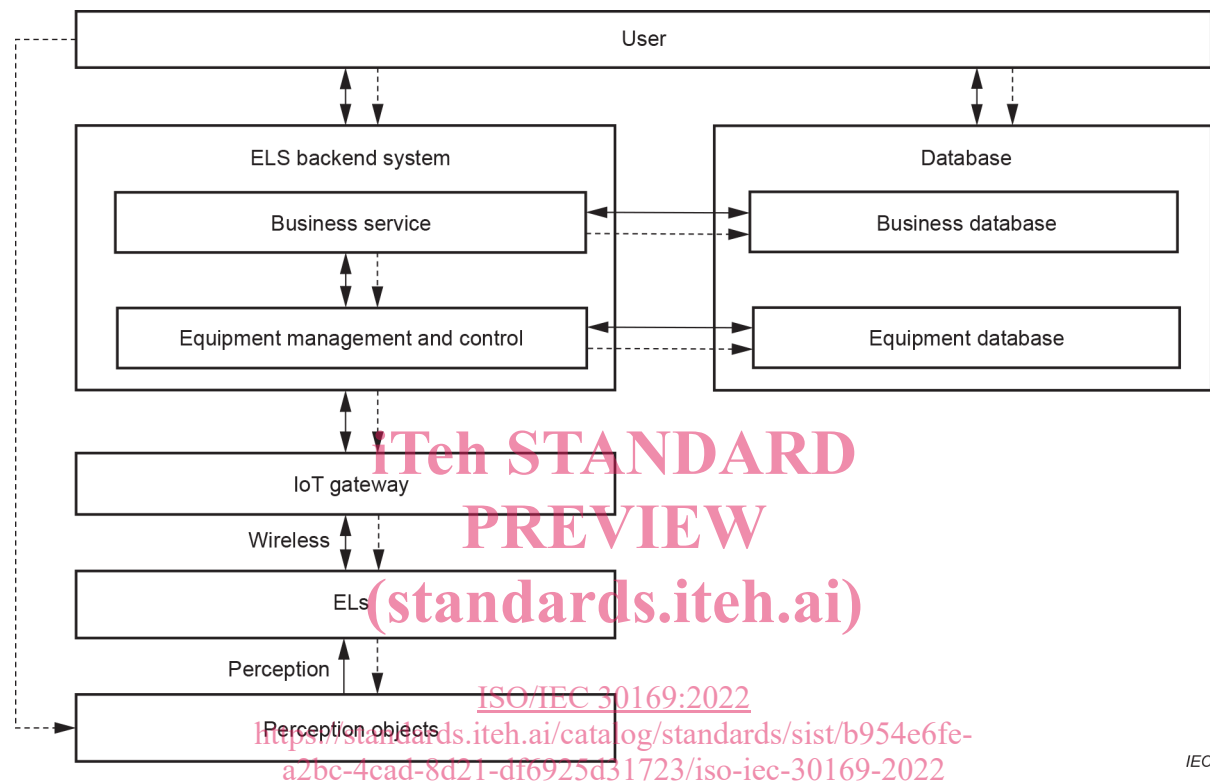
As shown in Figure 1, the system framework of the IoT applications for ELS shall be based on a complete ELS. It shall be able to extend with a single ELS or multiple ELSs in parallel (via third-party bridging service or services) according to the actual business requirements.

Each complete ELS shall be composed of ELS backend system, database, IoT gateway and ELs.

- a) The backend system shall include two functions: business service, equipment management and control.
- b) The data categories in the database shall include business data and equipment data.

### 6.3 IoT application model

#### 6.3.1 General



**Figure 2 – IoT application model of the IoT applications for ELS**

As shown in Figure 2, the IoT application model of the IoT applications for ELS shall be able to be divided into five levels. The order of authority from top to bottom is user, ELS backend system and database, IoT gateway, ELs, perception objects.

The data flow direction and business access logic in Figure 2 have been marked with solid arrows and dash arrows, respectively.

Access between all levels shall be performed downward/upward level-by-level; no cross-level access(s) is allowed, except from the user to the ELs.

Subclauses 6.3.2 to 6.3.7 provide the description how each part relates to the domain-based reference model in the IoT Reference Architecture.

#### 6.3.2 User

This level relates to the user domain of the domain-based reference model, but more focuses on human user.