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Internet of Things (IoT) — System requirements of IoT and sensor network technology-based integrated platform for chattel asset monitoring

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The UK participation in its preparation was entrusted to Technical Committee IOT/1, Internet of Things.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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INTERNET OF THINGS (IoT) – SYSTEM REQUIREMENTS OF IOT AND SENSOR NETWORK TECHNOLOGY-BASED INTEGRATED PLATFORM FOR CHATTEL ASSET MONITORING

FOREWORD

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International Standard ISO/IEC 30163 was prepared by subcommittee 41: Internet of Things and related technologies, of ISO/IEC Joint Technical Committee 1: Information technology.

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

FDIS	Report on voting
JTC1-SC41/189/FDIS	JTC1-SC41/204/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

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INTRODUCTION

In traditional chattel mortgage processes, the financial industry lacks standardized management for accessing chattel assets' information, assessing them and sharing the asset and mortgage information among stakeholders such as financial institutions. Furthermore, there is no standardized chattel asset monitoring and tracking (or no monitoring at all) which can quantify and validate chattel assets used as mortgage for loan applications. Even worse, some bad actors commit fraudulent activities by taking advantage of loopholes (i.e. no monitoring and lack of shared information), which damages both the financial and the chattel asset industries.

To resolve and avoid the unnecessary high risks borne by both financial and the chattel asset industries, sensor network (SN) and IoT technologies are highly applicable to real-time monitoring and tracking of stored and mobile chattel assets, although such kinds of technologies were not available in the past. However, no single SN or IoT technology will satisfy the entirety of chattel asset monitoring and tracking that can be accepted by stakeholders, especially the financial institution stakeholders. It will be an integrated system of multiple SN and IoT technologies, which will satisfy the requirements of the stakeholders.

By standardizing the system requirements of the integrated IoT/SN system, the real-time, on-demand, continual mobile asset monitoring and tracking can be achieved, for example, to verify the chattel assets' physical characteristics (weight, volume, location, etc.) during storage and in transit, to evaluate the chattel assets' true and actual market values, to validate the legitimacy of the chattel assets, etc.

This document promotes the development of the integrated IoT/SN platform for chattel asset mortgage management, which enables on-demand, real-time, continual chattel asset monitoring and tracking with verification, quantification, evaluation, and validation. This standardized integrated platform prevents fraudulent activities, protecting the chattel assets owned by the mobile asset industry and reducing unnecessary high risks borne by the financial institution. Furthermore, this document fills the gap between financial systems and the integrated platform utilizing the SN and IoT technologies.

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INTERNET OF THINGS (IoT) – SYSTEM REQUIREMENTS OF IOT AND SENSOR NETWORK TECHNOLOGY-BASED INTEGRATED PLATFORM FOR CHATTEL ASSET MONITORING

1 Scope

This document specifies the system requirements of an Internet of Things (IoT) and Sensor Network (SN) technology-based platform for chattel asset monitoring supporting financial services, including:

– system infrastructure that describes functional components;
– system and functional requirements during the entire chattel asset management process, including chattel assets in transition, in/out of warehouse, storage, mortgage, etc.;
– performance requirements and performance specifications of each functional component;
– interface definition of the integrated platform system.

This document is applicable to the design and development of IoT/SN system for chattel asset monitoring supporting financial services.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

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

4 Abbreviated terms

ACD access and communication domain
ASD application and service domain
OMD operation and management domain
PED physical entity domain
RA reference architecture
SCD sensing and controlling domain
UD user domain

5 Motivation

The chattel mortgage process usually consists of five steps, as shown in Figure 1.

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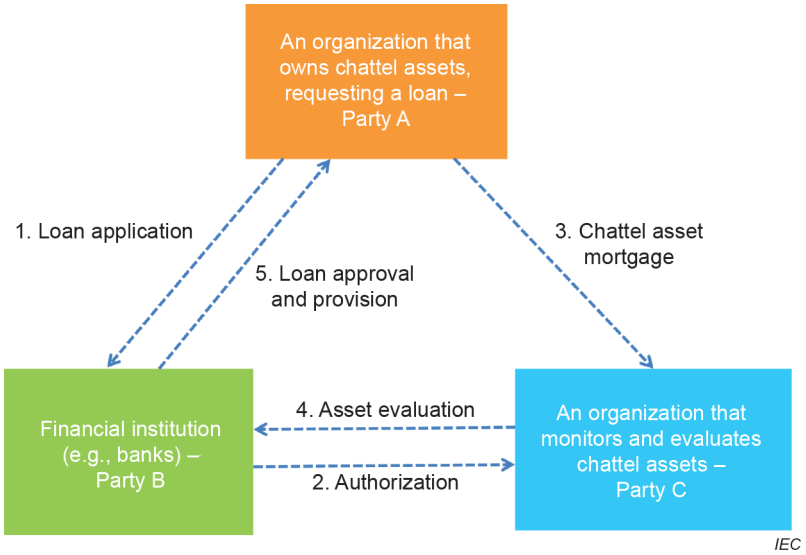

Figure 1 – Involved parties and their relationships in chattel mortgage financial services

1) Party A submits loan applications to Party B.
2) Party B authorizes Party C to deliver the chattel mortgage service, which is an organization responsible for monitoring and evaluating the chattel assets, usually owned by a third-party.
3) Party A mortgages its chattel asset to Party C.
4) Party C issues chattel asset evaluation for Party B, which acts as an important evidence in judging the loan repayment capacity of Party A.
5) After reviewing the loan application from Party A, the loan application evaluation by Party B, and the asset validation and evaluation report from Party C, Party B makes its final decision whether or not to approve the loan application from Party A.

Traditionally the responsibilities of Party C have been taken by humans, which makes the mobile assets vulnerable to fraudulent activities. For example, Company A applies for loans from Bank A using chattel mortgage, where mobile assets are stored in Warehouse A. However, Company B can illegally use mobile assets stored in Warehouse A that belong to Company A to apply for loans from Bank B. This case can occur because Bank B has no information for mobile assets stored in Warehouse A. The information asymmetry between banks causes lack of effective management on monitoring collateral assets. Another example could be that Company A illegally delivers those mobile assets stored in Warehouse A to Warehouse B for repeated applications for loans from Bank B. This can also occur because there is no standardized management for in- and out-of-warehouse check of collateral assets. To avoid the unnecessary loss of both financial and the chattel asset industries, this document provides the standardization of the IoT/SN platform, which integrates multiple SN and IoT technologies to realize the real-time, on-demand, continual chattel asset monitoring and tracking.

6 System infrastructure description of the integrated IoT/SN system

Figure 2 illustrates the system infrastructure of the IoT/SN integrated system for chattel asset and mortgage management. This system consists of six domains, which are in accordance with the IoT Reference Architecture (IoT RA) specified in ISO/IEC 30141.

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