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Smart community infrastructures — Guidance on smart transportation with QR code identification and authentification in transportation and its related or additional services

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Foreword

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This second/third/... edition cancels and replaces the first/second/... edition (), [clause(s) / subclause(s) / table(s) / figure(s) / annex(es)] of which [has / have] been technically revised.

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Introduction

Quick Response (or QR) codes are widely used worldwide due to their extremely large capacity for data storage and data transfer instead of barcodes. In the transportation field, QR codes have been used for over 20 years. However, their application is limited since the identification and authentication procedure with QR codes in data transfer takes over one second. In cities, a ticket inspection gate should communicate with 60 customers per minute for their ticket validation at rail stations. As the number of people delayed due to ticket processing in a concourse increases, this results in more risk leading to passenger injuries. A typical example is the metro in Bangkok, Thailand. The slow processing rate of ticket inspection machines disturbs passenger flows in the station. The passengers are delayed frequently at the gate due to the processing resulting in missed trains.

In the past, the security of QR codes was very limited, and so it was highly risky to use the QR code for ticket value information retention. If the QR codes were falsely duplicated, the copies would work as a valid ticket. Transportation operators were hesitant to apply QR codes in ticketing and used the code only for specific purposes or particular situations. For example, a bus stop numbered ticket for fare adjustment in bus services and seat reservation sold within one hour of train departure.

However, the lack of security features have been overcome by improving QR code identification and authentication procedures through the use of dynamic encryption keys and their matching fields. These processes aid in achieving fluidity enhancement, controllable anonymity, non-forgery, non-repeatable data transfer and non-repudiation. QR codes are now effective tools to identify data senders and recipients. Further, QR codes can be used to authenticate information contents and authorize personal status, by completing the procedures safely and quickly. This advanced performance and security cultivates improved transportation and its related or additional service fields. Thereby, ensuring that the services are more beneficial for customers and assists service agents with more highly accurate and functional informational data flow.

This guidance document describes QR code identification and authentication to be applied in such services.

In the development of this document, ISO Guide 82 has been taken into account in addressing sustainability issues.

Smart community infrastructures — Guidance on smart transportation with QR code identification and authentification in transportation and its related or additional services

1 Scope

This document provides guidance on transportation and its related or additional services using quick response (QR) codes for identification and authentication in data transfer, in order to make their services both convenient and advantageous for customers and service agents while protecting them from cheating and illegal action in data transfer.

2 Normative references

There are no normative references in this document.

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

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:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
QR code in or for smart transportation
quick response (QR) code that is to be used for identification and authentication in data transfer in or for smart transportation in a general meaning defined by 3.7 in ISO 37154

Note 1 to entry: Smart transportation in a general meaning is transportation that provides smart-transportation solutions to cities.

Note 2 to entry: In smart transportation in a general meaning, data is usually transferred between customers and service agents in transportation and its related or additional services and between the agents.

Note 3 to entry: 3 QR codes designated by ISO/IEC 18004 should be used in smart transportation while other QR codes not standardized as ISO still technically work for smart transportation, since the user of such QR codes would be charged on the use.

3.2
QR code identification
process to identify data senders and recipients with QR codes when transferring data in transportation and its related or additional services

3.3
QR code authentication
process to authenticate information contents with QR codes when transferring data in transportation and its related or additional services

3.4
QR code authorization
process to authorize personal status by QR code identification and authentication in transportation and its related or additional services

3.5
service agent
person working for operators, administrators and facilities owners in transportation and its related or additional services

4 Concept of smart transportation with QR code identification and authentication

4.1 Background

In transportation and its related or additional services, data should be transferred safely and quickly between customers and service agents for specific purposes such as fare or fee payment and receipts, seat, bed and room reservations and confirmation as well as delivery item and freight tracking. In this case, data sender and recipient identification and information content authentication should be completed instantaneously, where identification confirms who is who and authentication recognizes what is whose, what is to, from, for or with whom and how what does. Identification and authentication work to make sure of right persons and right information, respectively. For example, it can be checked with a QR code printed on a ticket that the ticket is valid, held by a qualified person and fixed for the fare and fee payment to transportation operators.

4.2 Practical usefulness of QR codes

QR codes have good readability helpful in identifying persons, authenticating information contents and retaining multiple types of information.

QR codes are applied by printing directly on paper or other materials such as plastic tickets and pasting a sticker printed therewith anywhere convenient for services (e.g. ticket vending machine bodies, transportation vehicle fee boxes, cashier counters) for identification of data senders and recipients (e.g. customers, service agents) and authentication of information contents (e.g. reservations, money transaction, enquiries). As almost all customers hold smart phones that are normally equipped with digital camera functions, smart phones work effectively as a QG code reader and indicator. PC displays are also useful QR code indication devices, which show homepages linked to official websites for information enquiries. QR codes protect customers, if used with identification and authentication, from cheating action through phishing websites while customers are communicating therewith.

4.3 Satisfaction of SDGs

Smart transportation works to satisfy the United Nations' Sustainable Development Goals, especially goal 8 "Decent work and economic growth", goal 9 "Industry, innovation and infrastructure", goal 10 "Reduced inequalities", goal 11 "Sustainable cities and communities", goal 12 "Responsible consumption and production" and goal 15 "Life on land."

5 QR code identification and authentication-applicable transportation and its related or additional services

5.1 General

QR code identification and authentication are employed normally as methods for highly securing data transfer. When applied in transportation and its related or additional services, they work for data sender (e.g. customers) and recipient (e.g. transportation service agents) identification and information content (e.g. reserved seats, beds and rooms) authentication. The applicable services to customers and

business work by operators, administrators and facilities owners are as already described in ISO 37154. Check 5.2 to 5.6 for easy reference on the applicable services.

5.2 Services to customers in public transportation

For passenger as well as delivery items and freight services, see a and b, respectively, in ISO 37154, 5.2.6.2.

EXAMPLE   QR code identification and authentication work on ticketing and ticket inspection, fare and fee payment and collection, travel planning, shipping and receiving planning, delivery items and freight tracking, weather forecast and its information delivery, emergency communication, information provision and indication, and internet connection.

5.3 Services to customers in private transportation

For common and pooling vehicles, see a and b, respectively, in ISO 37154, 5.2.6.3.

EXAMPLE   QR code identification and authentication work on information provision, parking lot services as well as vehicle sharing and rental services.

5.4 Services to customers in inter-modal, carrier or line operational transportation for public and private purposes

For the same transportation mode services, inter-modal services and interface services between public and private transportation, see ISO 37154, 6.3.2, 6.3.3 and 6.3.4, respectively.

EXAMPLE   QR code identification and authentication work on ticketing for travelling to other same-mode carriers and by inter-modal transport, arrangements for shipping to different-mode carriers and parking lot services on inter-modal interfaces.

5.5 Business work by operators, administrators and facilities owners of public transportation and its related or additional services

For rail, bus and truck, ferry as well as air vehicle modes, see a, b, c and d, respectively, in ISO 37154, 5.2.5.2.

EXAMPLE   QR code identification and authentication work on passenger, delivery items and freight services as well as the operation, its technical support, safety ensuring and information provision in the services.

5.6 Business work by operators, administrators and facilities owners of private transportation and its related or additional services

For the business work and personal-use public transportation, see a and b, respectively, in ISO 37154, 5.2.5.3.

EXAMPLE   QR code identification and authentication work on vehicle sharing and rental services.

6   QR code identification, authentication and authorization in or for smart transportation

6.1   General

QR codes in or for smart transportation to be used with temporary keys and matching fields work for personal identification and information content authentication, whenever customers and service agents transfer data. Such QR codes enable safe and quick enquiries on transportation and its related or additional services, which are linked to appropriate websites by protecting customers from tricks and information disclosure.