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

*Infrastructures urbaines intelligentes — Lignes directrices relatives
au transport intelligent utilisant l'identification et l'authentification
par QR code dans le domaine du transport et de ses services connexes
ou supplémentaires*



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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 268, *Sustainable cities and communities*, Subcommittee SC 1, *Smart community infrastructures*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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 has 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 cultivate improved transportation and its related or additional service fields, such as money transfer services for payment and charging pre-paid cards. Thereby, ensuring that the services are more beneficial for customers and assist service agents with the more highly accurate and functional informational data flow. In geographic information systems where large data are traded, supported with such efforts, QR code applications already started for data provenance indication, metadata linkage, dictionary organization, data integration, qualification and exchange as well as security.

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 authentication 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.

3 Terms and definitions

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

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

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

3.1

QR code

<smart transportation> quick response (QR) code, such ones as designated in ISO/IEC 18004, which is to be used for identification and authentication in data transfer in or for smart transportation in a general meaning defined in ISO 37154:2017, 3.7

Note 1 to entry: Smart transportation in a general meaning is transportation that provides city issue solutions by transportation system.

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

Note 3 to entry: QR codes designated by ISO/IEC 18004 should be used in smart transportation. When using other QR codes not covered by ISO standards, the user would be charged on the utilization even while such QR codes still technically work for smart transportation.

3.2

QR code identification

process to identify data senders and recipients with *QR codes* (3.1) when transferring data in transportation and its related or additional services

3.3

QR code authentication

process to authenticate information contents with *QR codes* (3.1) when transferring data in transportation and its related or additional services