
**Automatic vehicle and equipment
identification — Electronic Registration
Identification (ERI) for vehicles —**

**Part 1:
Architecture**

*Identification automatique des véhicules et des équipements —
Identification d'enregistrement électronique (ERI) pour les véhicules —
Partie 1: Architecture*



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Contents

Page

Foreword.....	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions.....	2
4 Abbreviated terms	3
5 Electronic registration identification system context.....	4
6 Electronic registration tag and security provisions.....	7
6.1 Example ERT Architecture.....	7
6.2 ERT security provisions.....	8
Bibliography	9

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

- an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;
- an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

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.

ISO/TS 24534-1 was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems*, and by Technical Committee CEN/TC 278, *Road transport and traffic telematics* in collaboration.

ISO/TS 24534 consists of the following parts, under the general title *Automatic vehicle and equipment identification — Electronic Registration Identification (ERI) for vehicles*:

- *Part 1: Architecture*
- *Part 2: Operational requirements*
- *Part 3: Vehicle data*
- *Part 4: Secure communications using asymmetrical techniques*
- *Part 5: Secure communications using symmetrical techniques*

Introduction

A quickly emerging need has been identified with administrations to improve the unique identification of vehicles for a variety of services. Situations are already occurring where manufacturers intend to fit lifetime tags to vehicles. Various governments are considering the needs and benefits of Electronic Registration Identification (ERI) as a legal proof of vehicle identity with potential mandatory uses. There is commercial and economic justification both in respect of tags and infrastructure that a standard enables an interoperable solution.

ERI is a means of uniquely identifying road vehicles. The application of ERI will offer significant benefits over existing techniques for vehicle identification. It will be a suitable tool for the future management and administration of traffic and transport, including applications in free-flow, multi-lane traffic conditions with the capability to support mobile transactions. ERI addresses the need of authorities and other road users for a trusted electronic identification, including roaming vehicles.

The unique vehicle identifier is held in a secure environment within an Electronic Registration Tag (ERT) fitted to a vehicle. The identifier used to identify a vehicle is called the vehicle identifier or vehicleId. The preferred vehicle identifier is the VIN, assigned to the vehicle by its manufacturer in accordance with ISO 3779, or a variant of this vehicle identifier.

The ERT may contain vehicle data in addition to the unique identifier, as required by authorities or their agents for ERI applications (e.g. vehicle registration details). An ERT is the core component for simple to complex applications of ERI, ranging from a simple read-only device, with more complex applications requiring one or more communications systems.

The ERT may be accessed by an Electronic Registration Reader (ERR), either to read, or read/write data, from or to an ERT.

Optionally, the ERT may communicate with other onboard vehicle equipment. The potential range of ERI applications, simple to complex, will require interoperability to exist between an ERT and an ERR by application.

This part of ISO/TS 24534 illustrates the ERI system concept and the fully featured ERI function enabling simple to complex applications of ERI.

The various parts of ISO 24534 provide the overall framework for ERI and specification of requirements for “fully featured” ERI. An associated International Standard in this family of ERI standards, ISO 24535, provides a subset of these requirements to provide a “basic ERI” functionality. Figure 1 shows the functional stack accommodating both fully featured and basic ERI.

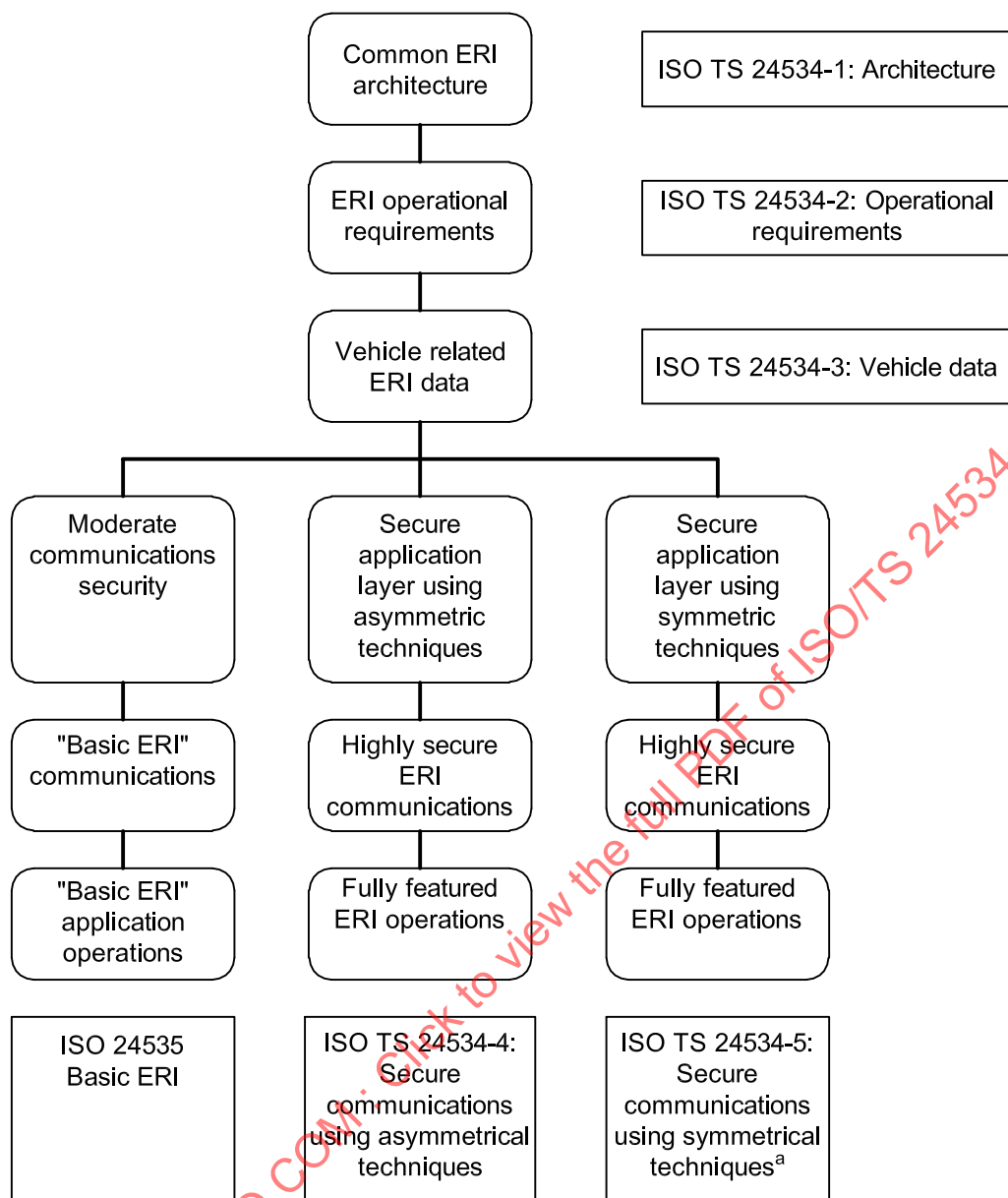


Figure 1 — Functional stack accommodating both "fully featured" and "basic" ERI

Automatic vehicle and equipment identification — Electronic Registration Identification (ERI) for vehicles —

Part 1: Architecture

1 Scope

This part of ISO/TS 24534 provides the requirements for electronic registration that is based on an identifier assigned to a vehicle (e.g. for recognition by national authorities), suitable to be used for:

- electronic identification of local and foreign vehicles by national authorities,
- vehicle manufacturing, in-life maintenance and end-of-life identification (vehicle life cycle management),
- adaptation of vehicle data (e.g. for international resales),
- safety-related purposes,
- crime reduction, and
- commercial services.

It adheres to privacy and data protection regulations.

This part of ISO/TS 24534 provides an overview of the ERI system concept, in terms of the onboard vehicle components and the external off-vehicle components required for an operational system. The detailed requirements are defined in the Parts 2, 3, 4 and 5 of ISO 24534 and for the more limited, relevant provisions of ISO 24535.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 7498-2, *Information processing systems — Open Systems Interconnection — Basic Reference Model — Part 2: Security Architecture*

ISO 14814, *Road transport and traffic telematics — Automatic vehicle and equipment identification — Reference architecture and terminology*

ISO/IEC 9798-1, *Information technology — Security techniques — Entity authentication — Part 1: General*

3 Terms and definitions

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

3.1

additional vehicle data

vehicle related data in addition to the vehicle identifier

3.2

air interface

conductor-free medium between onboard ERI equipment and the reader/interrogator through which the linking of the onboard equipment to the reader/interrogator is achieved by means of electro-magnetic signals

[ISO 14814]

3.3

back office

facility for the control and data management of an ERI system by an authority, or for the provision of related services by a service provider

3.4

confidentiality

information not made available or disclosed to unauthorized individuals, entities, or processes

[ISO 7498-2]

3.5

Electronic Registration Identification

ERI

action or act of identifying a vehicle with electronic means for purposes described in the scope of this part of ISO/TS 24534

3.6

ERI data

ERI data consisting of the vehicle identifier and possible additional vehicle data as defined in ISO/TS 24534-3

3.7

Electronic Registration Reader

ERR

device used to read or read/write data from or to an "Electronic Registration Tag"

3.8

Electronic Registration Tag

ERT

onboard ERI device that contains the ERI data, including relevant security provisions and one or more interfaces to access that data

NOTE In cases of high security, this is a type of SAM. The ERT interfaces with onboard ERI equipment to communicate with external systems and may also interface with onboard non-ERI equipment components.

3.9

key

sequence of symbols that controls the operations of a cryptographic transformation (e.g. encipherment, decipherment, cryptographic check function, signature generation, or signature verification)

[ISO/IEC 9798-1]

3.10**onboard ERI equipment**

equipment fitted within or on the outside of the vehicle and used for ERI purposes

NOTE The onboard equipment includes the ERT and any communication provisions for the exchange of ERI data with an ERI reader or writer.

3.11**security**

protection of information and data so that unauthorized persons or systems cannot read or modify them and authorized persons or systems are not denied access to them

3.12**specific vehicle identification**

action or act of establishing the identity of a specific vehicle

NOTE 1 This is in contrast to vehicle vicinity identification, where the vicinity of a vehicle with a specific identity is detected. With specific vehicle identification, it also known which specific vehicle has been identified.

NOTE 2 Two kinds of specific vehicle identification may be distinguished; first, localized vehicle identification in which case the location of the identified vehicle known which such a precision that not more than one vehicle can be present at the same time on that location; second, peer communication identification, in which case the identification of the vehicle engaged in some form of communication (e.g. an EFC transaction) is established.

3.13**vehicle identification**

action or act of establishing the identity of a vehicle. For the purpose of this part of ISO/TS 24534, a distinction is made between specific vehicle identification and vehicle vicinity identification

3.14**vehicle vicinity identification**

action or act of establishing the identity of a specific vehicle near an external ERI reader (ERR) without pinpointing the exact position of the vehicle

NOTE If there is more than one vehicle present in the vicinity of a reader, no specific vehicle, or its exact location, is identified. However, it will establish a specific vehicle identity has passed in the vicinity of a reader.

4 Abbreviated terms**4.1****AEI**

Automatic Equipment Identification

4.2**AVI**

Automatic Vehicle Identification

4.3**ELV**

End of Life Vehicles

4.4**ERI**

Electronic Registration Identification

4.5**ERR**

Electronic Registration Reader

4.6

ERT

Electronic Registration Tag

4.7

OBE

Onboard equipment (including non-ERI equipment)

4.8

SAM

Secure Application Module

4.9

VIN

Vehicle Identification Number

5 Electronic registration identification system context

ERI is used, or may be used, for a number of purposes and with a range of capabilities. A high-level view of the ERI context is shown in Figure 2.

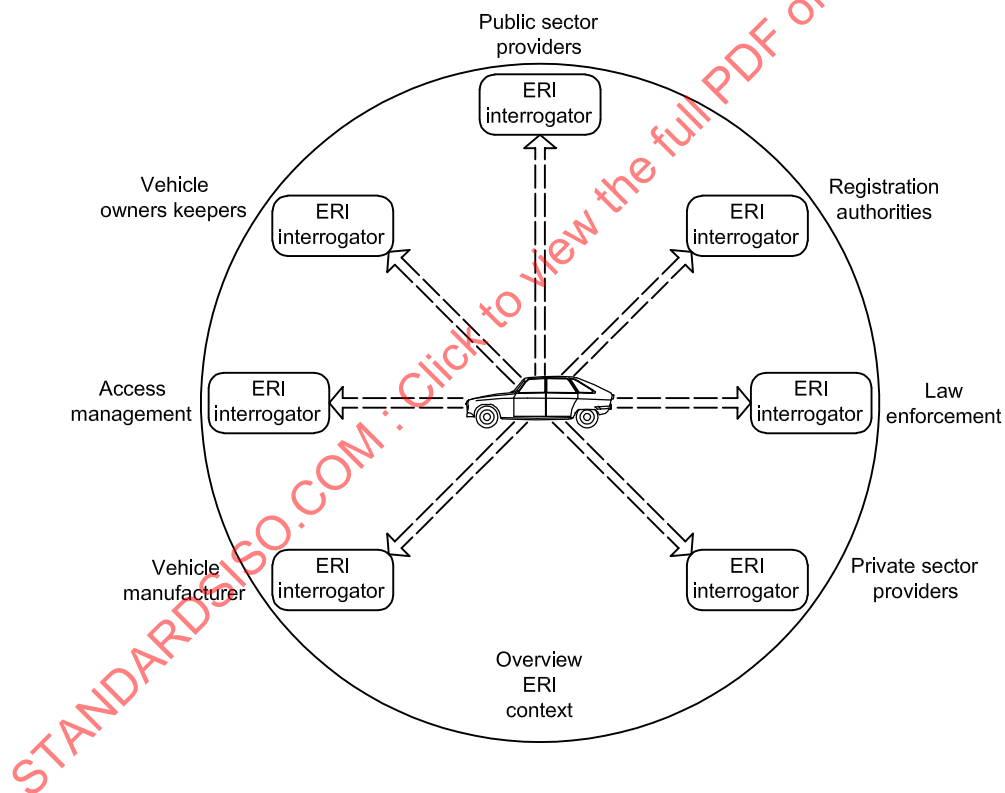
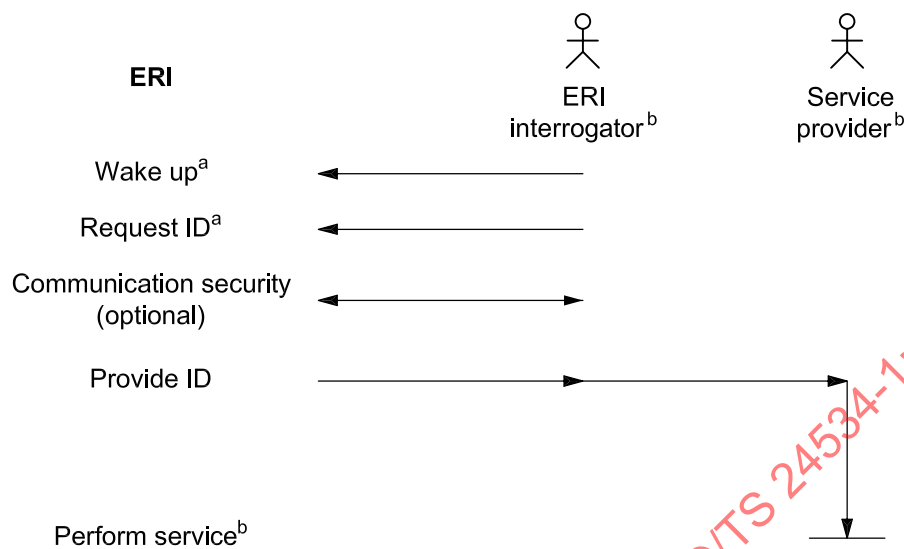


Figure 2 — High level overview of the ERI context

At its simplest level, “Basic ERI” involves the sequence shown in Figure 3.



^a In some instances the ERT may initiate the transaction, e.g. ERT awareness of vehicle location.

^b Services in this context may be anything from recognition for access control through enforcement.

Figure 3 — Example sequence diagram for basic ERI

Basic ERI is further defined in ISO 24535. However, many envisaged ERI transactions are more complex than simple identification. A transaction sequence for a fully featured ERI system may take many forms. Figure 4, is an example of a more complex communication scenario for the reading and writing of ERI data.

This scenario comprises the following steps:

- mutual authentication phase,
- data exchange phase, and
- session release phase with the end of session transaction.

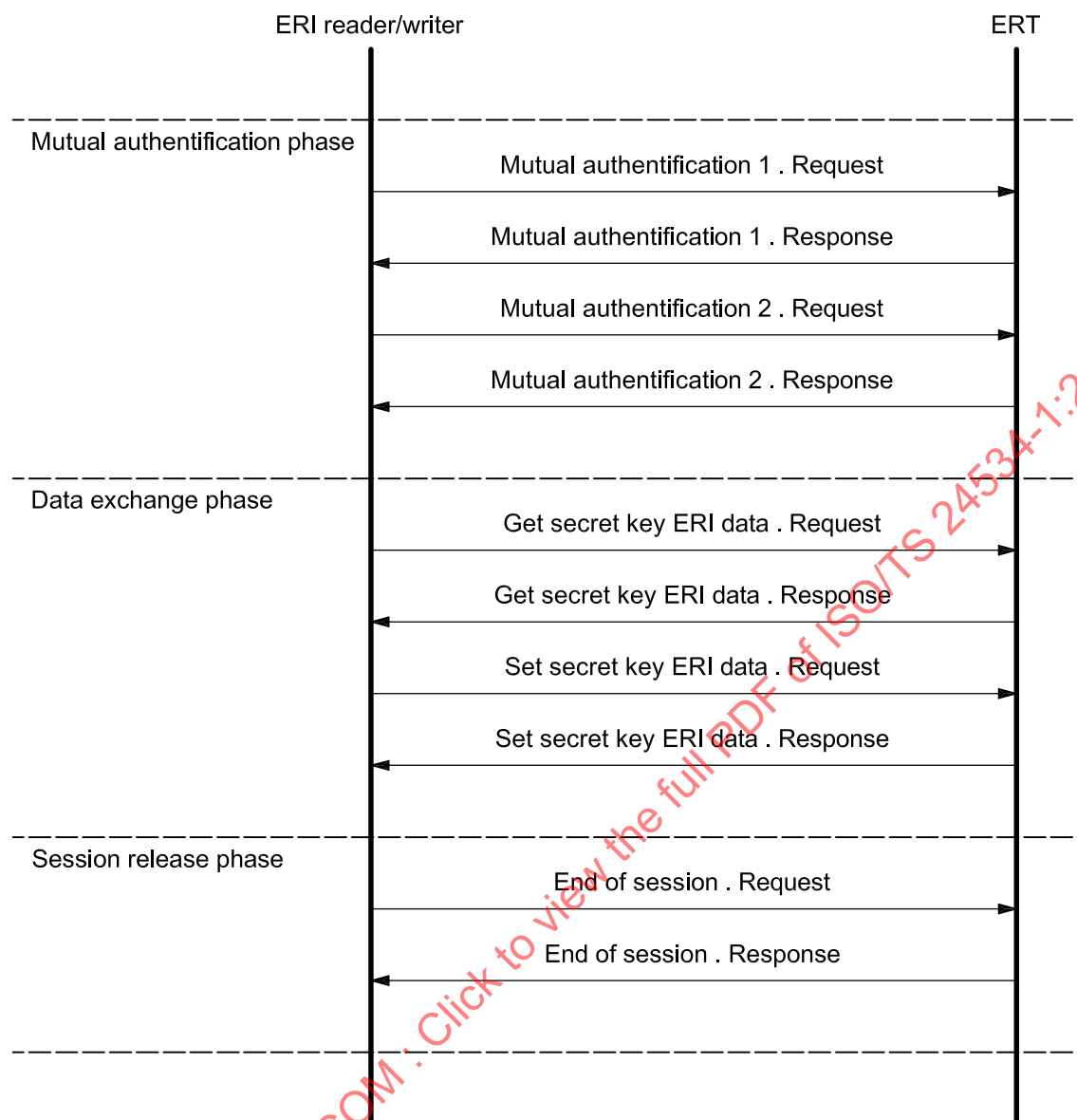


Figure 4 — ERI data read-write session

Whilst Figure 4 provides an example of a fully featured ERI transaction, it is only one example. A further complexity can be added if the ERI Tag function is not simply represented by a tag, but is an identification function within more complex onboard equipment, possibly even transacting with other onboard vehicle systems.

Figure 5 provides a context diagram of the environment within which the ERT functions, with the wider relationships which may exist with other components of an ERI system.