INTERNATIONAL STANDARD

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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

Reference number
ISO 24534-1:2010(E)

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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.

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ISO 24534-1 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 278, *Road transport and traffic telematics*, in collaboration with Technical Committee ISO/TC 204, *Intelligent transport systems*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This first edition of ISO 24534-1 cancels and replaces ISO/TS 24534-1:2007, which has been technically revised.

ISO 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 in respect of both 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 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.

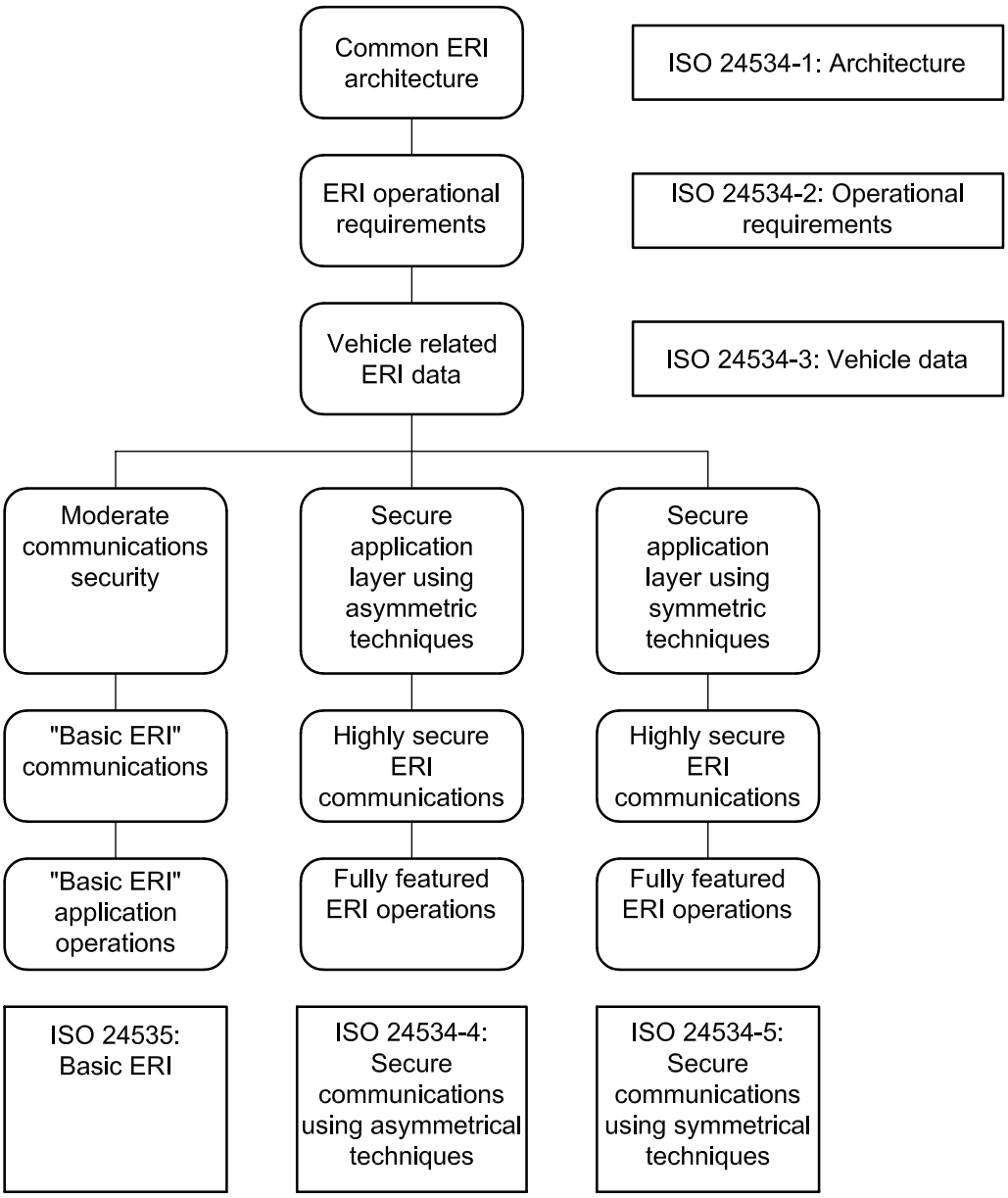


Figure 1 — Functional stack accommodating both “fully featured” and “basic” ERI

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

Part 1: Architecture

1 Scope

This part of ISO 24534 provides requirements for electronic registration identification (ERI) that are 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;

— commercial services.

It adheres to privacy and data protection regulations.

This part of ISO 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 Parts 2, 3, 4 and 5 of ISO 24534 and more limited, though relevant, provisions are defined in ISO 24535.

2 Terms and definitions

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

2.1
additional vehicle data
ERI data in addition to the vehicle identifier

2.2
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 14814:2006, definition 3.2]

2.3
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

2.4
confidentiality
property that information is not made available or disclosed to unauthorized individuals, entities, or processes

[ISO 7498-2:1989, definition 3.3.16]

2.5
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 24534

2.6
ERI data
vehicle identifying data which can be obtained from an ERT

NOTE ERI data consists of the vehicle identifier and possible additional vehicle data.

2.7
electronic registration reader
ERR
device used to read or read/write data from or to an ERT

2.8
electronic registration tag
ERT
onboard ERI device that contains the ERI data, including relevant security provisions and one or more interfaces to access data

NOTE 1 In cases of high security, the ERT is a type of SAM (secure application module).

NOTE 2 The ERT may be a separate device or may be integrated into an onboard device that also provides other capabilities (e.g. DSRC communications).

2.9
key
sequence of symbols that controls the operations of a cryptographic transformation (e.g. encipherment, decipherment, cryptographic check function computation, signature generation, or signature verification)

[ISO/IEC 9798-1:1997, definition 3.3.13]

NOTE See ISO/IEC 9798-1 for the meaning of the terms used for the examples of cryptographic transformations.

2.10
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.

2.11
registration authority
⟨for vehicles⟩ authority responsible for the registration and maintenance of vehicle records

NOTE The authority can provide vehicle records to accredited organizations.

2.12
registration authority
⟨for ERI data⟩ organization responsible for the ERI data and security data according to local legislation

NOTE The registration authority for ERI data can be the same as the registration authority for vehicles. This part of ISO 24534, however, does not require this.

2.13
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

[ISO/IEC 12207:2008, definition 4.39]

2.14
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 is 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 is known with such precision that not more than one vehicle can be present at the same time at 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.

2.15
vehicle identification
action or act of establishing the identity of a vehicle

NOTE For the purposes of this part of ISO 24534, a distinction is made between specific vehicle identification and vehicle vicinity identification.

2.16
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 that a specific vehicle identity has passed in the vicinity of a reader.

3 Abbreviated terms

AEI automatic equipment identification
AVI automatic vehicle identification
ELV end-of-life vehicles
OBE onboard equipment (including non-ERI equipment)
SAM secure application module
VIN vehicle identification number

4 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.

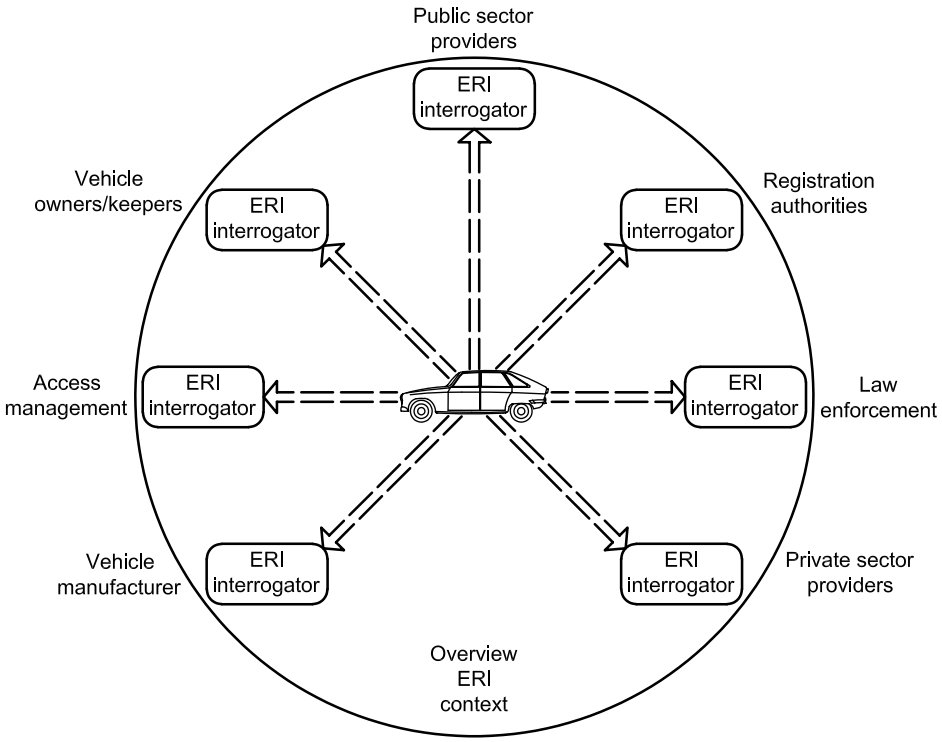
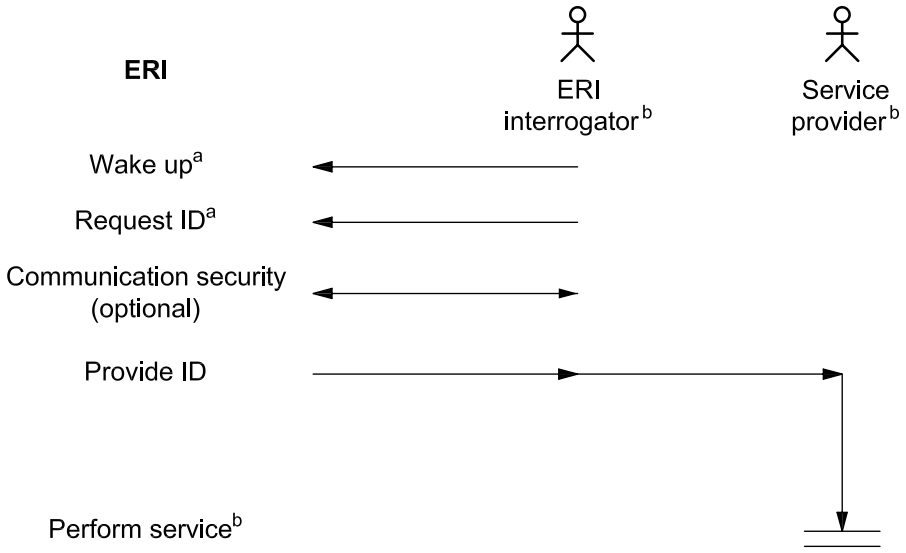


Figure 2 — High-level overview of the ERI context

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 to 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:

a) mutual authentication phase;

b) data exchange phase;

c) session release phase with the end-of-session transaction.

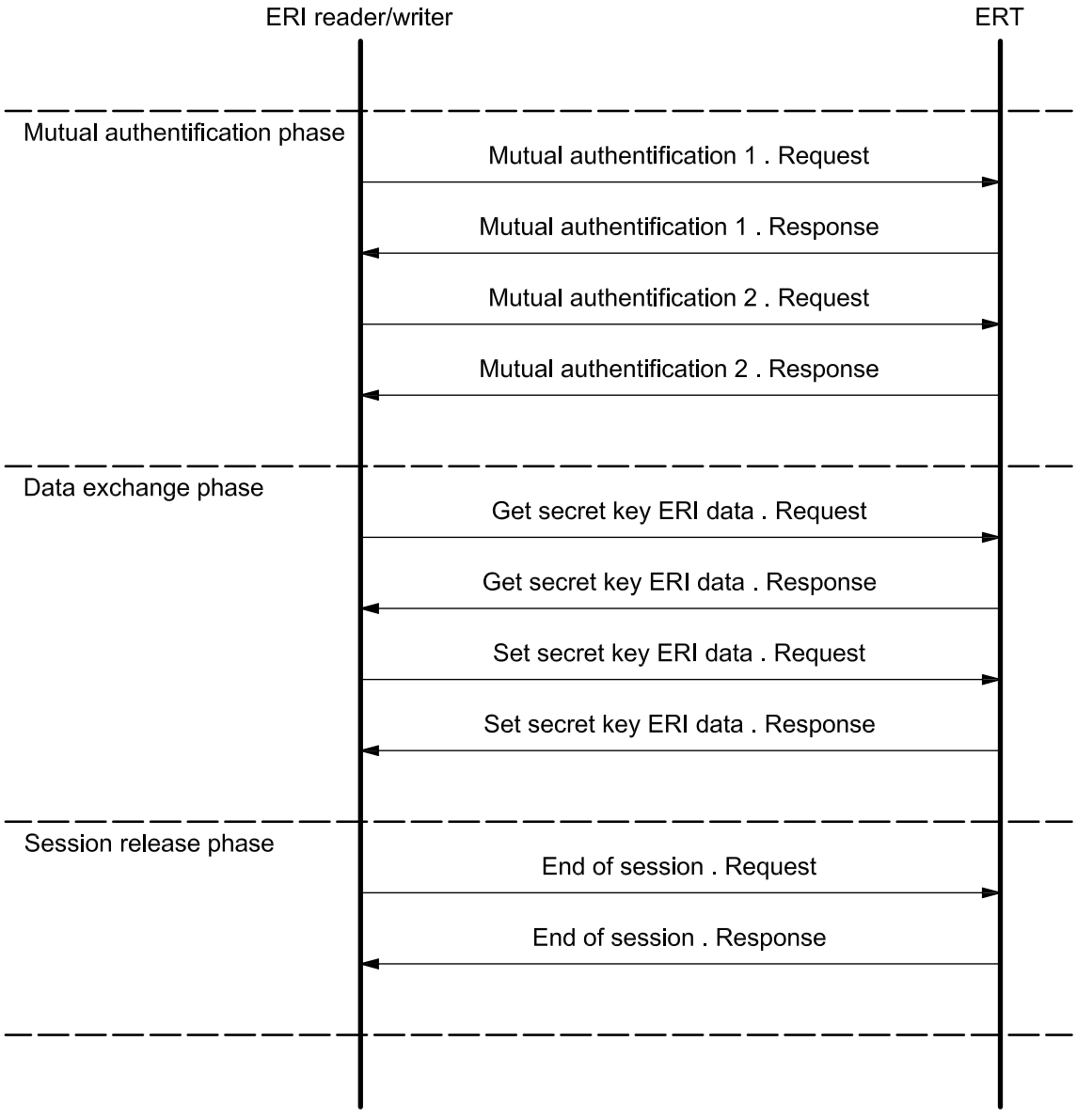


Figure 4 — ERI data read-write session

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.

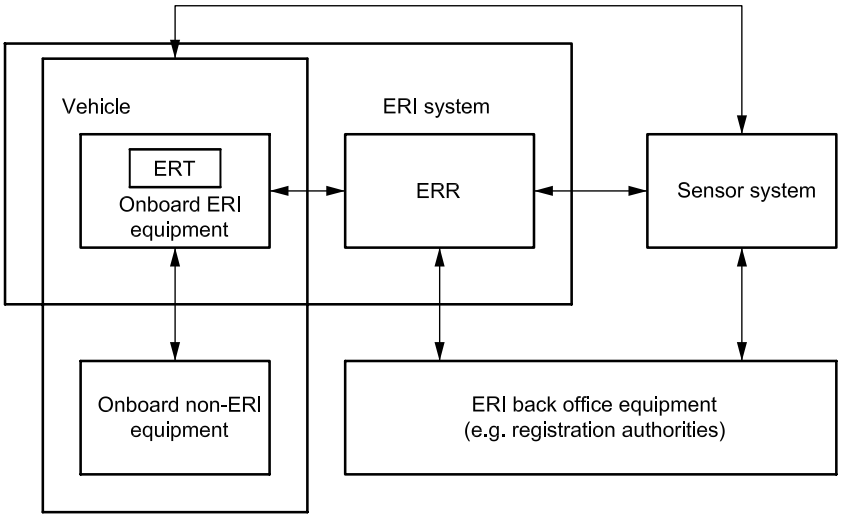


Figure 5 — Fully featured ERI system, with onboard ERT component

NOTE In Figure 5, the interface shown between the onboard ERI equipment and the ERR, and the interface shown between the onboard ERI equipment and the onboard non-ERI equipment, are within the scope of this part of ISO 24534.

The fully featured ERI system concept includes some or all of the following:

— onboard ERT;

— secure ERI data storage;

— air interface between the vehicle ERT and a roadside reader/writer;

— onboard interface between the ERT and non-ERI vehicle equipment;

— sensor system to detect the presence of a vehicle at a specific location and initiate communications between the reader and the ERT. (Additionally, the sensor system may be required to initiate communication with onboard, non-ERI, vehicle equipment.);

— ERI (back office) to support the ERI system application and which may be a destination, or source, of ERI data. (Optionally, the back office of an ERI system may also communicate with the back office of another ERI system.)

5 Electronic registration tag and security provisions

5.1 Example ERT architecture

An example ERT architecture is shown in Figure 6. An ERI application may require variants of this architecture, enabling an ERT to function with one or more interfaces. An ERI application may also require the ERT to function with one or more applications.

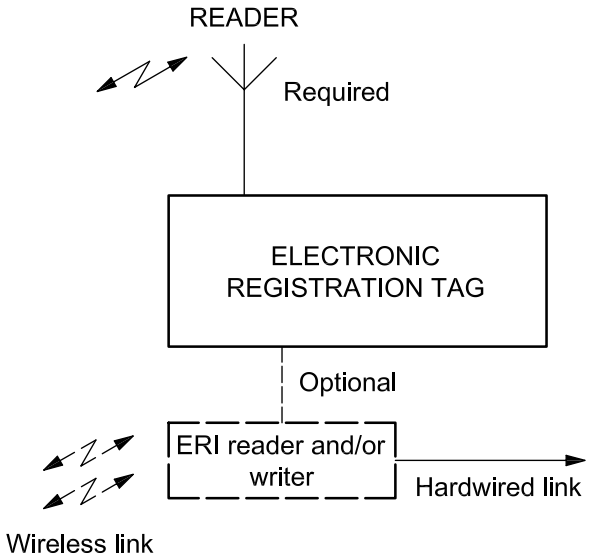


Figure 6 — Example ERT architecture

5.2 ERT security provisions

The ERT provides a secure environment for the ERI data and one or more interfaces to access data. Access to the secure environment may be provided either with asymmetric or symmetric techniques.

Where asymmetric techniques are used, ISO 24534-4 specifies the requirements for a wide range of interoperable ERTs and ERRs. The security provisions for the ERT may vary from being read-only to sophisticated confidentiality and/or authentication provisions. See ISO 24534-4 for details.

Where symmetric techniques are used, ISO 24534-5 specifies the requirement and additional specifications can be found in ISO 24535. In either case, confidentiality and authentication are provided by means of secret keys shared among a group of trusted (registration) authorities. See ISO 24534-5 and ISO 24535 for details.

Data security provisions for the ERT are shown in Figure 7.

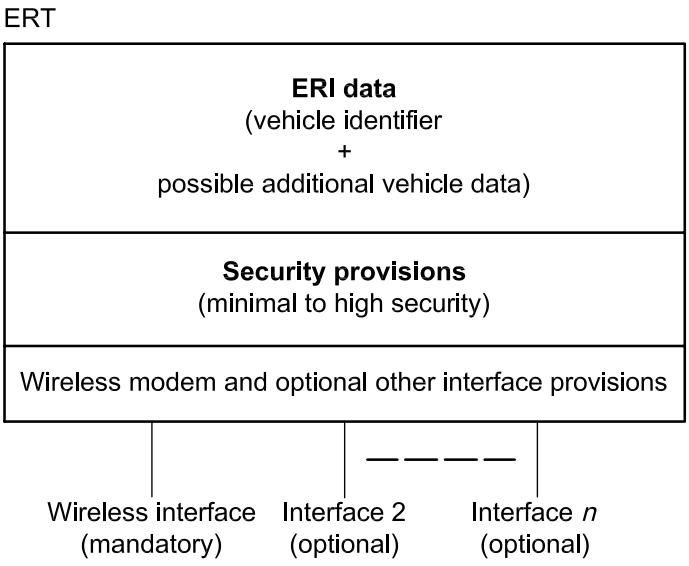


Figure 7 — Data security provisions for the ERT

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