PD CEN/TS 16406:2013

BSI Standards Publication

# Intelligent transport systems — Public transport — Indirect Fulfilment for Rail



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## National foreword

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# CEN/TS 16406

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English Version

# Intelligent transport systems - Public transport - Indirect Fulfilment for Rail

Émission indirecte de titres de transport ferroviaire

Intelligente Transportsysteme - Öffentlicher Verkehr - Indirekte Schienenverkehrserfüllung

This Technical Specification (CEN/TS) was approved by CEN on 13 August 2012 for provisional application.

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# Foreword

This document (CEN/TS 16406:2013) has been prepared by Technical Committee CEN/TC 278 “Road transport and traffic telematics”, the secretariat of which is held by NEN.

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# 0 Introduction

## 0.1 General

This document has been prepared as a Technical Specification (TS) because the subject of indirect fulfilment for rail is a volatile and fast-moving business and technical subject. Moreover, it is expected that a revision to the TS will be needed, specifically to make changes related to the indirect fulfilment of "Non-integrated reservation tickets" (NRT tickets"), and will take place no longer than two years after its bringing into force. At that time it is expected that the TS after having become an EN will have been referenced by the TAP-TSI and any variation will require to be approved not only by CEN/TC 278 but the European Rail Agency's Change Control Management process for changes to TSIs.

The purpose of the TAP-TSI is to introduce a statutory framework of requirements and obligations for railway operators, infrastructure managers and others that will ensure interoperability in rail transport ticketing and information provision. Within the 2011 version of the TAP-TSI text there are some open points related to indirect fulfilment and Security.

This document is intended to become a European standard contributing towards closing these open points relating to the subsystem 'Telematics applications for passenger services' of the trans-European rail system (TAP-TSI) as well as to the relevant technical documents listed in Annex III of the TAP-TSI (see Annex A).

## 0.2 Indirect fulfilment open points

The open points in the TAP-TSI cover indirect fulfilment used for international services and cross-border sales. In these cases, the TAP-TSI already has layout specifications for the RCT2 paper ticket used in direct fulfilment, based on UIC leaflet 918-2, and for the A4 print-at-home indirect fulfilment method, based on UIC leaflet 918-3.

Fulfilment specifications are missing

— for ticket on departure (TOD - where the passenger is given a code at the time of sale, and uses the code or a payment card to collect the RCT2 paper ticket at the station), and

— for manifest-on-list (or e-ticket or paperless ticket – where there is no ticket at all, the ticket control staff having pre-loaded or over-the-air access to the reservation database, and the passenger proves they can travel by showing some ID).

To meet the indirect fulfilment needs of the open points, a set of specifications are needed for a generic indirect fulfilment request framework and for a security method for fulfilment requests. These specifications are given by this TS.

In order to ensure the compatibility between this TS and in particular between the future standard and the TAP-TSI, several changes to the TAP-TSI are needed after agreement by the ERA and the rail sector. The changes are in three main parts. The first is the change to the Basic Parameters in chapter 4 of the TAP-TSI where the obligations are defined. The second change is to the technical documents being annexes to the TAP-TSI (see Annex A) that specify the method by which timetable, fares, reservation and other data has to be exchanged. For indirect fulfilment, the Technical Document affected is B5, covering reservations. The third change is to the glossary, which defines what the terms used in the TAP-TSI mean.

The analysis later in this document demonstrates that, although security requirements are relevant for indirect fulfilment, no rail-specific requirements exist at this time and open standards for key distribution and management are sufficient. As a result, no specification is needed for the TAP-TSI to meet the Open Point.

# 1 Scope

This Technical Specification provides, in Clause 2, new and changed glossary items needed to define indirect fulfilment and its characteristics and to support the changes to the TAP-TSI and ERA Technical Document B5.

Clause 3 defines the layout formats used for international rail services fulfilled using the ticket on departure and print-at-home ticket methods.

Clause 4 provides the changes to ERA Technical Document B5 that are required to provide the generic indirect fulfilment framework, covering ticket on departure, print-at-home and e-ticket fulfilment methods, although the main use of the specification is expected to be for ticket on departure.

Clause 5 provides the analysis of the security requirements of indirect fulfilment, and the conclusion that no rail-specific specifications are needed.

# 2 Terms and definitions

For the purposes of this document, the terms and definitions given in TAP-TSI and the following apply.

## 2.1 Additional terms for the TAP-TSI Glossary

**2.1.1**
**indirect fulfilment**
the process of fulfilment where the customer purchases a ticket other than at a station or face to face at a ticket vendor

Note 1 to entry: Indirect fulfilment methods are conventional ticket on departure, print-at-home ticket, e-ticket and smart ticket on departure.

**2.1.2**
**indirect fulfilment message framework**
a set of computer-to-computer messages between involved parties including carriers, issuers, retailers, distributors, attributors, station managers and TCOs that allow for the indirect fulfilment of all types of tickets excluding a conventional ticket

**2.1.3**
**indirect fulfilment security framework**
the set of equipment, processes and messages that ensures the security of the indirect fulfilment and ticket control of all forms of tickets

**2.1.4**
**product owner**
the product owner is responsible for his products

— Functions of Ownership: Specifying pricing, usage rules and commercial rules.

— Functions of Clearing: Trip reconstruction, product aggregation based on received usage data using product definition rules, linking of aggregated usage data with acquisition data, preparation of apportionment data based on product specification rules.

— Functions of Reporting: Detailed acquisition data with no link to usage data within the reporting period, usage data with no link to acquisition data within the reporting period, linked aggregated product data within the reporting period

Note 1 to entry: This term is required as ticketing equipment is not always defined by carrier(s), as it could be defined by an organisation owned wholly or partly by Transport Authorities.

[SOURCE: ISO 24014-1:2007, 5.1]

**2.1.5**
**conventional ticket**
a ticket for a product printed as specified by the carrier(s) on paper or paper-derived card and optionally with machine-readable magnetic stripe and/or optically readable product data which the TCO(s) for the transport service are equipped to read

Note 1 to entry: A conventional ticket provides autonomous and independent title to the transport contract and does not require further information such as from a sales or reservation database.

Note 2 to entry: Each RU as carrier maintains its own specifications for conventional tickets and is eligible to participate in the maintenance of the specification for conventional tickets used for international rail passenger services.

**2.1.6**
**conventional ticket on departure**
a conventional ticket that is printed on the demand of the passenger subsequently to the conclusion of the sale of the product using instructions supplied by the carrier(s) and as advised to the passenger by the retailer

**2.1.7**
**print-at-home ticket**
a ticket for a product printed by the passenger as specified by the carrier(s) on plain paper or a mobile phone display with optional security devices in the design and with optional optically readable product data which the TCO(s) for the transport service are equipped to read

Note 1 to entry: A print-at-home ticket provides autonomous and independent title to the transport contract and does not require further information such as from a sales or reservation database.

Note 2 to entry: Each RU as carrier maintains its own specifications for print-at-home tickets and is eligible to participate in the maintenance of the specification for print-at-home tickets used for international rail passenger services.

**2.1.8**
**smart ticket**
a ticket for a product stored as specified by the carrier(s) in an application on media that is machine-readable using the iso/iec 14443 standard which the retailer is able to store and which the TCO for the transport service is equipped to read

Note 1 to entry: Such media is commonly known as a chipcard or smartcard but also an emulation of a chipcard or smartcard on an NFC mobile or a secure device as defined by global platform specifications.

Note 2 to entry: A smart ticket provides autonomous and independent title to the transport contract and does not require further information such as from a sales or reservation database.

Note 3 to entry: Each RU as carrier maintains its own specifications for smart tickets. There is currently no expectation that a specification for smart tickets to be used for international rail passenger services will be developed.

**2.1.9**
**smart ticket on departure**
a smart ticket that is stored on the demand of the passenger subsequently to the conclusion of the sale of the product using instructions supplied by the carrier(s) and as advised to the passenger by the retailer

Note 1 to entry: The equipment used to fulfil the smart ticket on departure has to be as specified by the carrier(s).

**2.1.10**
**e-ticket**
a ticket for a product stored on a sales or reservation database and not printed or stored on any other media. the passenger may be supplied with a receipt that appears to be another form of ticket, but the receipt is not an e-ticket

Note 1 to entry: The passenger demonstrates his/her right to use the transport service defined by the product by providing such identification and in such a manner as specified by the carrier(s) and as advised to the passenger by the retailer. One such manner is manifest on list.

Note 2 to entry: The e-ticket receipt does not provide autonomous and independent title to the transport contract and depends on further information such as from a sales or reservation database.

Note 3 to entry: Each RU as carrier maintains its own specifications for e-tickets and is eligible to participate in the maintenance of the specification for e-tickets used for international rail passenger services.

## 2.2 Changed terms in the TAP-TSI Glossary needed to support indirect fulfilment

**2.2.1**
**attributing (allocating) system**
an electronic system hosting the catalogue of transport services for which a transport service provider authorises retailers to issue and fulfil travel documents

**2.2.2**
**attributor**
a company managing an attributing system

Note 1 to entry: This may be a carrier.

**2.2.3**
**decryption**
the converting of encrypted data back into its original form

**2.2.4**
**distributor**
an undertaking providing equipment and services to issuers and retailers to sell rail products

Note 1 to entry: This may be a carrier.

**2.2.5**
**encryption**
the encoding of data to keep it secret

**2.2.6**
**fulfilment**
the process which delivers the product to the customer after his/her purchase

**2.2.7**
**issuer**
an undertaking selling the ticket and receiving payment, which is the carrier

Note 1 to entry: the issuer is the undertaking indicated on the ticket with its code and possibly its logo.

**2.2.8**
**manifest on list**
indirect fulfilment e-ticket method where the customer receives only a confirmation, usually with a reference code

Note 1 to entry: The undertaking performing this kind of sale provides to the TCO a list of all customers and reference codes. The customer proves their identity for the TCO before/after departure in order to embark/be accepted on the train. The TCO controls whether the Customer is admitted to embark/stay on the train.

**2.2.9**
**product**
the unique combination of some or all of origin, destination, route, specific trains, date and time, tariff type, and discount category that uniquely defines what transport service can be/has been purchased by the customer

Note 1 to entry: Product in the transport sense is identical to the use of the word in the retail industry, being the unambiguous description of things that can be bought.

Note 2 to entry: See also Attributing System.

**2.2.10**
**reservation system**
a computerised system used to store and retrieve information about the availability and price of seats, sleeping compartments and similar assets on trains, and conduct transactions related to the use of those assets

Note 1 to entry: A reservation system is capable to keep the inventory correct in real or near-real time.

**2.2.11**
**retailer**
an undertaking which sells to the customer a ticket without or with a reservation for a rail service

Note 1 to entry: A retailer can be an Issuer or a Ticket Vendor licensed by an Issuer.

**2.2.12**
**technical document**
any technical document published by the European Railway Agency according to Article 5.8 of Directive 2008/57

**2.2.13**
**ticket on departure**
**TOD**
a ticket that is printed on the demand of the passenger subsequently to the conclusion of the sale of the product using instructions supplied by the carrier(s) and as advised to the passenger by the retailer

# 3 Indirect fulfilment formats for international rail services

## 3.1 Ticket on departure method

Where a ticket for an international rail service is fulfilled indirectly using the ticket on departure method, then the ticket shall be printed using the format defined in ERA Technical Document B6 – Electronic Seat/Berth Reservation and Electronic Production of Transport Documents (RCT2 Standards).

Where the ticket is not for an international rail service then the product owner is free to specify the fulfilment format(s) that may be offered by the retailer to the customer.

## 3.2 Print-at-home ticket method

Where a ticket for an international rail service is fulfilled indirectly using the print-at-home ticket method, then the ticket shall be printed using the format defined in ERA Technical Document B7 – International Rail Ticket for Home Printing.

Where the ticket is not for an international rail service then the product owner is free to specify the fulfilment format(s) that may be offered by the retailer to the customer.

## 3.3 E-tickets

Where a ticket for an international rail service is fulfilled indirectly using the e-ticket method, then there is no physical ticket issued and therefore no requirement for a standardised fulfilment format.

# 4 Indirect fulfilment framework

## 4.1 Actors involved in the indirect fulfilment framework

### 4.1.1 General

Indirect fulfilment links together a wide range of actors in rail retail. Figure 1 summarises their roles, and the relationships between them.

NOTE 1 One organisation can perform several roles.

NOTE 2 Boxes in orange are organisations; boxes in blue are systems.

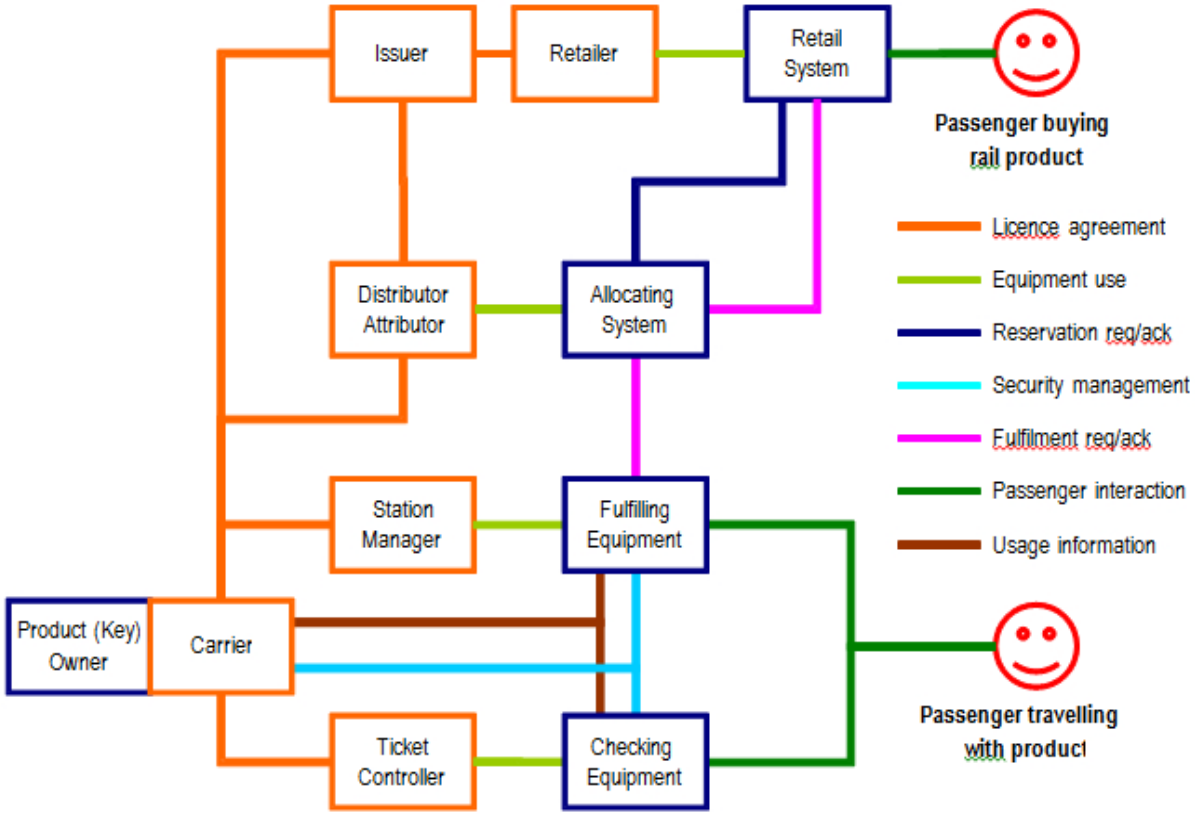


**Figure 1 — Roles, and relationships of the actors involved in the indirect fulfilment framework**

In the following, an outline description of the relationships is given.

### 4.1.2 Commercial links

Organisations are linked together by licence or similar commercial agreements. Product owners, carriers, issuers and attributors are linked. The product owner and the carrier are usually the same organisation for conventional rail, although a public authority can be the product owner in cases of public service contracts. Product owners and carriers agree that Issuers and their retailers can sell their products, and jointly agree that distributors (or attributors) can manage the reservation and eventual fulfilment of the services offered by the product owners and carriers.

Issuers licence retailers to sell products; Issuers can also act as retailers. Retailers have the primary relationship with passengers, and are responsible for sale and after-sale transactions. The exception is during travel, where primary responsibility for passenger support lies with the carrier.

Carriers licence station managers to provide fulfilment equipment on stations that can be used by passengers to collect tickets. Carriers and others can act as station managers. Carriers and product owners provide on-train equipment for ticket controllers that hold the manifests or provide the online database access needed for e-ticket fulfilment, and the readers for print-at-home and other tickets.

Ticket control at stations is carried out by station managers using equipment specified by carriers and product owners. Ticket control on trains is carried out by ticket controllers, who can be carriers and others, using equipment specified by carriers and product owners.

#### 4.1.3 Reservation requests

The link between the retail equipment and the reservation system allows requests for reservations to be made, changed and deleted. In TAP-TSI terms, this link is covered by ERA Technical Document B5, derived from UIC leaflet 918-1.

#### 4.1.4 Security management

A new link is needed to meet the open points. This is between the product owner or carrier, whoever holds the security keys, and all the passenger-facing equipment. The link can operate in two ways. The first is where the carrier's security management service distributes both the write and read keys for the products that the retailer sells, that the ticket on departure or on-train equipment fulfils, and that the ticket control equipment checks. This arrangement is used largely in smartcard schemes, which need to be able to work without frequent online references to the product owner's systems, and where symmetric keys are often needed for speed of operation. Such ticketing schemes are excluded from the list of TAP-TSI open points and therefore do not need to be addressed by the CEN work under this Mandate at this time.

The second way is where the carrier's security management service holds in secret the private write keys. In this latter case, the security management service can provide a digital seal for each product on request of the retailer. It can return to the retailer all the data needed from which, for example, a barcode can be printed for an A4 print-at-home ticket, without the retailer needing to know the carrier's write key. In fact, it need only return to the retailer an Internet link from where the passenger can directly print the ticket, essentially passing fulfilment responsibility back to the carrier. Where ticket control equipment needs to read and check a barcode, it does so using the carrier's public key. Public keys can be freely distributed using IT industry standards.

#### 4.1.5 Fulfilment requests

The other new link need to meet the open points is that between the retail equipment and the reservation system. This link allows requests for indirect product fulfilment, using a fulfilment request framework. With indirect fulfilment the retailer is able, if desired, to pass full responsibility for fulfilment to the carrier.

Each method of fulfilment needs an appropriate physical layout format and a set of product details. The overlap between data elements for each method is substantial. Fulfilment requests need to accommodate the ERA TAP-TSI fulfilment method specifications for international service and cross border sales, and eventually include those that will continue in parallel using domestic indirect fulfilment methods.

#### 4.1.6 Use reporting

Another link, out of scope for this document, is product use reporting from ticket control equipment back to the product owner or carrier. Work has been carried out in UIC leaflet 918-4, but has not been included in the CEN standard, as it is not part of the open points.

### 4.2 Indirect fulfilment dialogues

Indirect fulfilment is executed through five dialogues. For an IRT product, each of these dialogues requires that a reservation has been made prior to fulfilment using the specifications in ERA Technical Document B5.

All fulfilment messages and data elements in this document are additions to that Technical Document and should be read alongside that document.

The first dialogue, fulfilment options, allows the allocating system to advise the retailer which fulfilment options are available for the product. The retailer asks the allocating system which fulfilment options are available and agrees with the passenger which one is to be requested. This dialogue may be omitted where the preferred fulfilment method is agreed in advance.

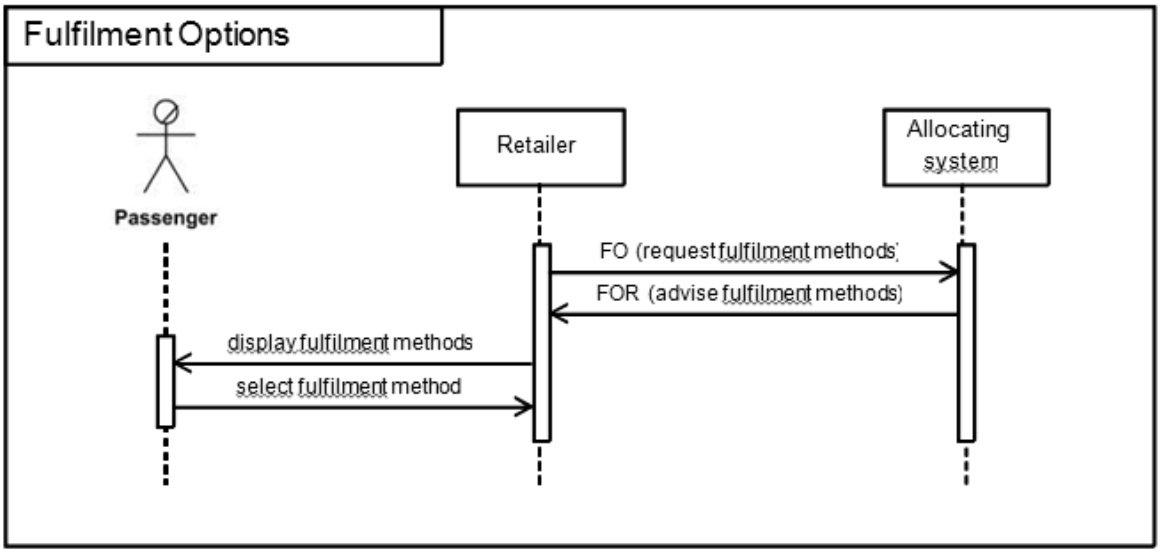


**Figure 2 — Fulfilment options**

The next dialogue, normal fulfilment, is the successful execution of an indirect fulfilment. The retailer requests fulfilment using the method chosen by the customer from the options available, requesting for example with ticket on departure the station where the customer would like to collect the ticket. The allocating system replies in the FRR message with the details needed by the customer, for example the ticket collection code. Once the customer has collected the ticket, the allocating system advises the retailer.

If the allocating system needs to update the information for the passenger after the immediate response with the FRR message, this is done with the FD message.

In the case of ticket on departure, the retailer needs to know when the ticket has been printed. In the case of e-ticket, the retailer needs to know when the ticket has been used. The FD message is used to provide this information.

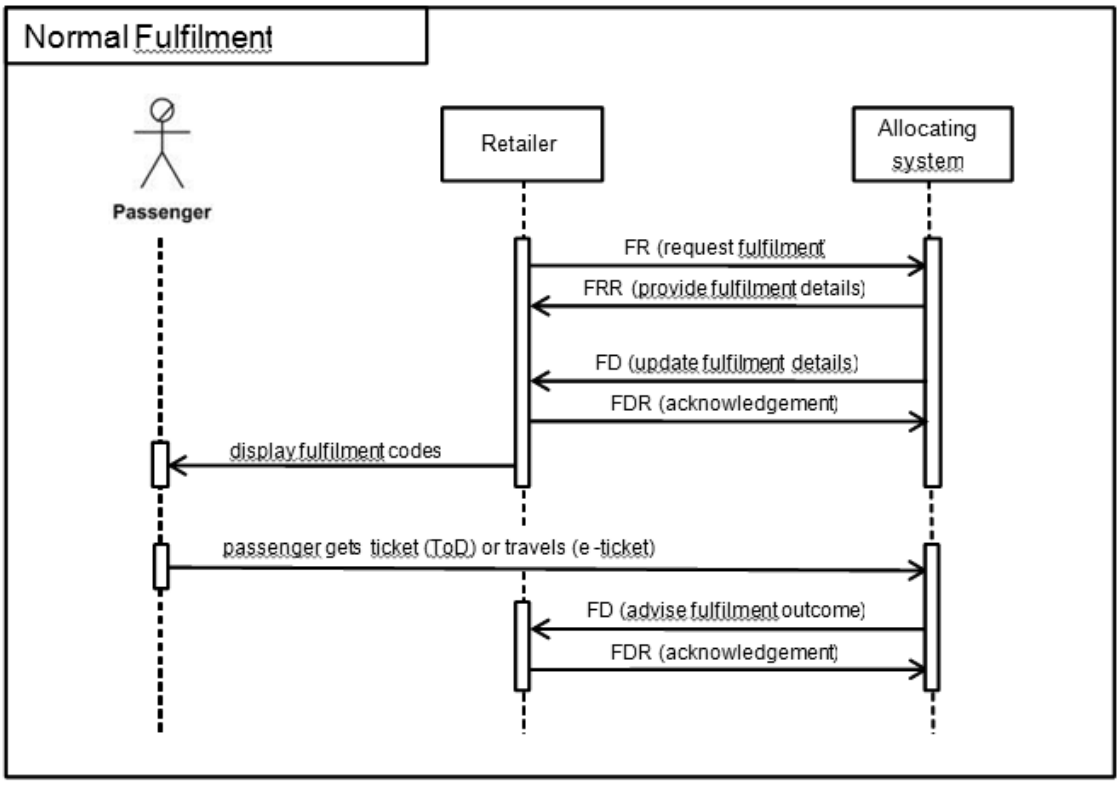


**Figure 3 — Normal fulfilment**

In the third dialogue, change fulfilment, the customer can change method of fulfilment. The retailer requests a cancellation of the original fulfilment request and then recommences the normal fulfilment dialogue using one of the available fulfilment methods.

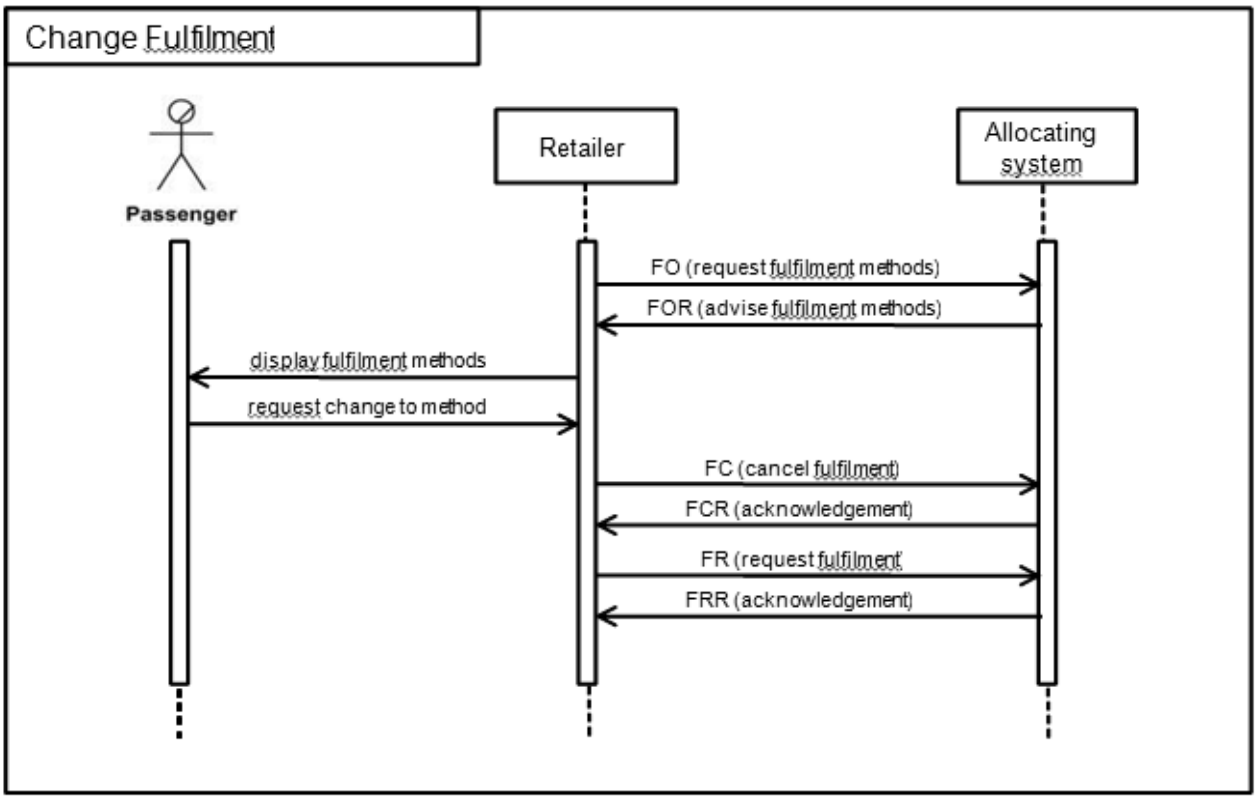


**Figure 4 — Change fulfilment**

The fourth dialogue, cancel fulfilment, is triggered by the retailer. The retailer can request a cancellation if for example the ticket will now be sent by post or has been printed at a station.

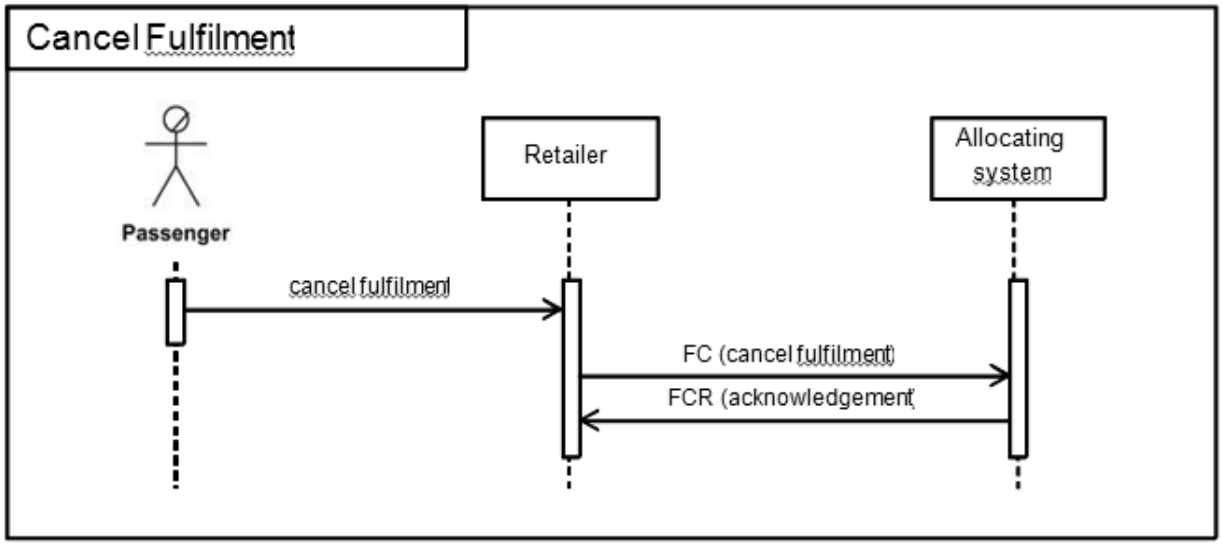


**Figure 5 — Cancel fulfilment**

In the final dialogue, fulfilment failure, the normal fulfilment dialogue is interrupted by a permanent problem that means the request for fulfilment cannot be honoured. In this case, the allocating system advises the retailer that the ticket cannot be fulfilled and the retailer passes on this message to the customer. It is then up to the customer to decide what further action to take, such as changing the method of fulfilment using the dialogue change fulfilment.

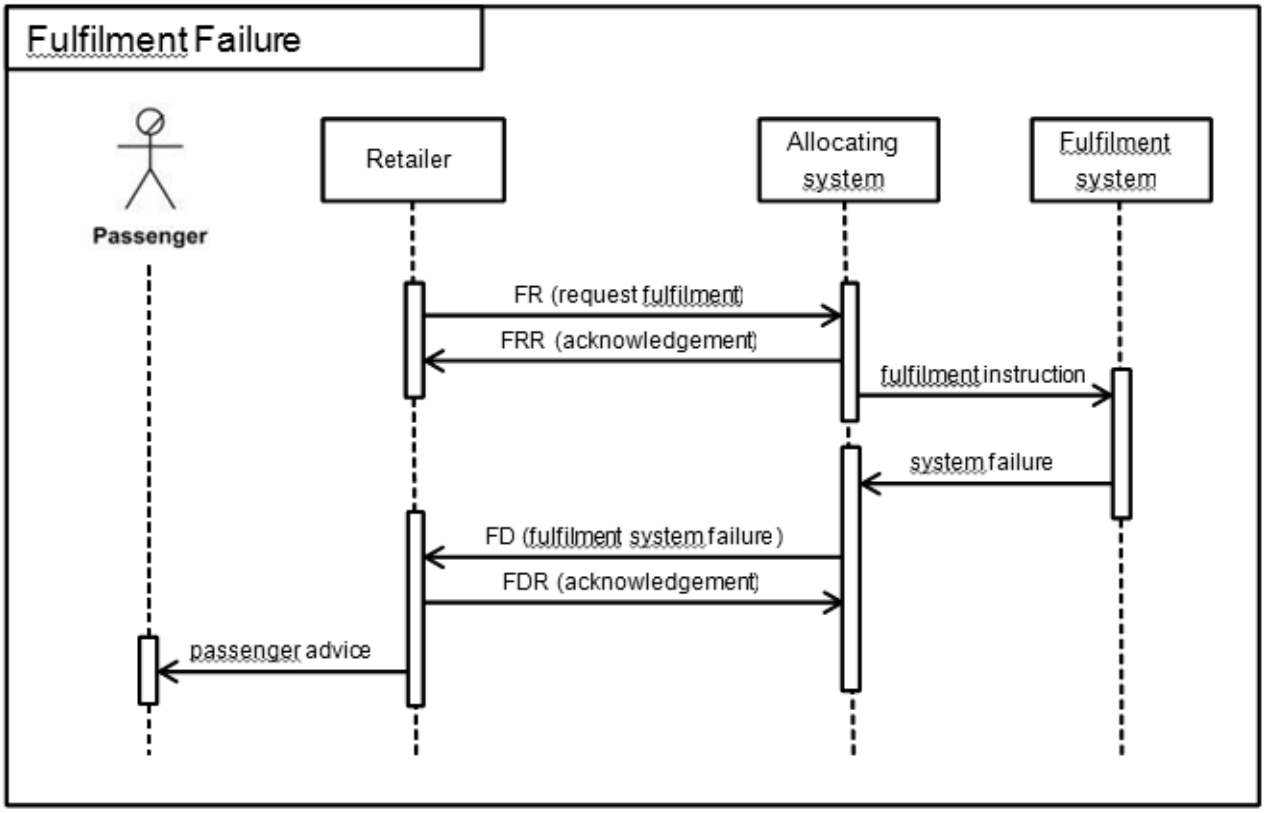


**Figure 6 — Fulfilment failure**

Other dialogues cover synchronisation and recovery from error conditions. They are already covered by ERA Technical Document B5, as are the relevant error codes, and they are not described here.

## 4.3 Indirect fulfilment messages

### 4.3.1 General

All dialogues are based on a set of eight messages in pairs specifically related to fulfilment. The new message pairs are:

### 4.3.2 *FO* *Get Fulfilment Options*

*FOR* *Fulfilment Options Reply*

The message key ID will be the combination of the reservation reference number together with the retailer sales transaction reference and the journey number within that transaction. This message is initiated by the retailer and the reply by the allocating system.

The FO message asks the allocating system what are the possible methods of fulfilment for the chosen product, and the reply gives the options.

### 4.3.3 *FR* *Fulfilment Request*

*FRR* *Fulfilment Reply*

The message key ID will be the combination of the reservation reference number together with the retailer sales transaction reference and the journey number within that transaction. This message is initiated by the retailer and the reply by the allocating system.

Retailers are recommended to make one Fulfilment Request per passenger journey, although for some IRT tickets it is possible to make one Fulfilment Request per journey where more than one passenger is making an identical journey and the fulfilment is to a single coupon.

The FR message shall include the chosen method of fulfilment, plus further information relevant to that method. For example, with ticket on departure the information will be the required location for collecting the ticket and the ID that the customer will produce as proof of identity.

The fulfilment information needed by the customer is provided in the fulfilment reply message. With ticket on departure, for example, this would be the collection code. For e-ticket, this would be the carrier's reference used by the passenger in demonstrating their entitlement to travel. For print-at-home, this would be a link either to the ticket or to the security information needed to create a ticket.

In the case of an IRT (Global Price) ticket, the request for indirect fulfilment will follow a successful reservation request. The allocating system will know all the details of the product needed to print the ticket and so the FR message for an IRT ticket does not need to include the conditional product data shown in the tables in 4.4.

In the case of an NRT (TCV) ticket, the request for indirect fulfilment will be the first contact from the retailer to the allocating system and therefore the FR message shall include all the product data elements in the tables in 4.4 that the retailer decides are needed to print the ticket. The allocating system will indirectly fulfil the ticket using the data provided by the retailer.

#### 4.3.4 *FD Fulfilment Details*

#### *FDR Fulfilment Details Reply*

The message key ID will be the combination of the reservation reference number together with the retailer sales transaction reference and the journey number within that transaction. This message is initiated by the allocating system and the reply by the retailer. The FD message is used in three cases.

The first case is where an indirect fulfilment has been requested and the allocating system needs to advise the retailer that there is a change to the fulfilment information provided to the passenger, for example where not all of the relevant information could be supplied in the original FRR message.

The second case is where the product has been fulfilled, either successfully or an attempt at fulfilment has been made but has not succeeded. This information is needed by the retailer to manage their after sales service.

The third case is where the allocating system is no longer able to meet the fulfilment request, for example where the printer at a location is no longer available. The message is used to advise the retailer so he can contact the passenger and decide what to do.

#### 4.3.5 *FC Fulfilment Cancellation Request*

#### *FCR Fulfilment Cancellation Reply*

The message key ID will be the combination of the reservation reference number together with the retailer sales transaction reference and the journey number within that transaction. This message is initiated by the retailer and the reply by the allocating system, except where the fulfilment cancellation is triggered by the cancellation in an allocating system of a reservation in which case FCR is initiated on its own by the allocating system.

The FC message provides a method for the retailer to request that the fulfilment request is cancelled, for example because an NRT ticket is to be refunded, or because the customer would like to change the method of fulfilment.

The FCR message is used either to acknowledge an FC message, or to advise that the fulfilment request for a cancelled reservation has itself been cancelled.

With indirect fulfilment it is possible with the asynchronous nature of the transactions for the retailer and the allocating system to be in different states as regards a fulfilment request. For example, after a request has been made and fulfilled, the retailer may still be asked to cancel the sale and cancel the fulfilment. To avoid possibilities of fraud and error all implementations need to consider sensible delays before making refunds to passengers to ensure that all relevant information has been received.

## 4.4 Indirect fulfilment message composition

Tables 1, 2 and 3 provide the first of two changes to ERA Technical Document B5. It specifies the composition of data elements that are to be used with the eight messages defined in 4.3. The second of the changes is in 4.5.

The respective priority of a given data element is denoted by the letter (O) for Obligatory or (F) for Facultative (or optional). In cases where specific circumstances determine whether the data element is mandatory or not, the letter (C) is used to denote its Conditional nature.

**Table 1 — Message composition: Header**

| No. | Element | L+C | FO |
|---|---|---|---|
| 1 | Receiving reservation system | 2 N | O |
| 2 | Sending reservation system | 2 N | O |
| 3 | Dialogue number | 5 N | O |
| 4 | Number of the day in the year | 3 N | O |
| 5 | Type of message | 1 N | O |
| 6 | Type of service | 1 N | O |
| 7 | Number of the requesting terminal | 7 A | O |
| 8 | Type of requesting office or type of protocol message | 1 N | O |
| 9 | Number of the application version | 1 N | O |
| 10 | Field at disposal | 2 A | O |
| 11 | Test | 1 N | O |

**Table 2 — Message composition: Prefix**

| No. | Element | L+C | FO |
|---|---|---|---|
| 15 | Service | 2 N | O |
| 16 | Type of request or reply | 1 N | O |
| 17 | Serial number | 2 N | O |
| 18 | Type of text | 2 N | O |

**Table 3 — Message composition: Indirect fulfilment messages** *(1 of 2)*

| No. | Element | L+C | FO | FOR | FR | FRR | FD | FDR | FC | FCR |
|---|---|---|---|---|---|---|---|---|---|---|
| 20A | Train number | 5 A | O | O | O | O | O | O | O | O |
| 21 | Departure date | 4 N | O | O | O | O | O | O | O | O |
| 34A | Reservation reference number | 12 N | C | C | C | C | C | C | C | C |
| 401 | Fulfilment method | 3 N | F | | O | | | | | |
| 405 | Fulfilment method list | 10*3 N | | O | | | | | | |
| 402 | Fulfilment execution code | 2 N | | | | | O | | | |
| 306A | Customer family name | 20 A | | | F | | | | | |
| 306B | Customer given name | 20 A | | | F | | | | | |
| 306C | Customer type ID | 4 A | | | O | | | | | |
| 306D | Customer ID | 20 A | | | O | | | | | |
| | retailer sales transaction reference | 12 N | | | O | O | O | O | O | O |
| | retailer sales transaction reference journey number | 2 N | | | O | O | O | O | O | O |
| | carrier sales transaction reference | 12 N | | | | O | O | | | |
| 22H | Station to fulfil ticket | 7 N | C | | C | | | | | |
| 403 | Fulfilment reference for customer | 12 A | | | | O | O | | | |
| 404 | Link to print-at-home ticket or secure element | 160 A | | | | C | C | | | |
| **The following data elements are needed for NRT tickets and reservations only<br>The standard is limited to those forms of NRT ticket in this version** | | | | | | | | | | |
| 34G | Ticket number | 12 N | | | C | | | | | |
| 52A | Amount | 7 N | | | C | | | | | |
| 67 | Type of price | 1 N | | | C | | | | | |
| 52G | VAT amount | 7 N | | | C | | | | | |

**Table 3 — Message composition: Indirect fulfilment messages** *(2 of 2)*

| No. | Element | L+C | FO | FOR | FR | FRR | FD | FDR | FC | FCR |
|---|---|---|---|---|---|---|---|---|---|---|
| 305 | Currency code | 3 A | | | C | | | | | |
| 325 | Rate of VAT | 3 N | | | C | | | | | |
| 49A | Boarding station | 30 A | | | C | | | | | |
| 49B | Destination station | 30 A | | | C | | | | | |
| 312 | Forward/return identifier | 1 N | | | C | | | | | |
| 327 | Tariff code | 2 A | | | C | | | | | |
| 333 | Tariff route | 30 A | | | C | | | | | |
| 42A | Tariff 1 | 9 N | | | C | | | | | |
| 42B | Tariff 2 | 9 N | | | C | | | | | |
| 24 | Class | 1 A | | | C | | | | | |
| 20A | Train number | 5 A | | | C | | | | | |
| 21A | Departure date | 4 N | | | C | | | | | |
| 41A | Departure time | 4 N | | | C | | | | | |
| 21H | Arrival date | 4 N | | | C | | | | | |
| 41H | Arrival time | 4 N | | | C | | | | | |
| 27 | Coach | 3 A | | | C | | | | | |
| 28A | Seat | 3 A | | | C | | | | | |
| 78 | carrier | 4 A | | | C | | | | | |
| 83 | Service brand abbreviation | 3 A | | | C | | | | | |
| 84 | Service brand name | 33 A | | | C | | | | | |
| 50 | Place allocation | 32 A | | | C | | | | | |
| 51 | Type of compartment allocated | 6 N | | | C | | | | | |

## 4.5 Additional coding for indirect fulfilment message elements

The following data element descriptions provide the second of two changes to ERA Technical Document B5. It specifies the details of the data elements that are to be used with the eight messages defined in 4.3.

**18 – Type of text**

Length = 2, coding = Numeric

The additional coding is:

31 = FO and FOR

32 = FR and FRR

33 = FD and FDR

34 = FC and FCR

**22H – Station to fulfil ticket**

Length = 7, coding = Numeric

This data element contains the station location code where the customer has requested the fulfilment to take place. Although most Ticket on departure fulfilment systems allows ticket fulfilment at all stations the standard provides for the case where there is a limitation to a single station.

**306A – Customer family name**

Length = 20, coding = Alphanumeric

This data element contains the customer's family name where this is required by the product rules. All passenger data shall be stored and used in accordance with applicable personal data protection laws.

**306B – Customer given name**

Length = 20, coding = Alphanumeric

This data element contains the customer's given name where this is required by the product rules. All passenger data shall be stored and used in accordance with applicable personal data protection laws.

**306C - Customer type ID**

Length = 4, coding = Alphanumeric

The coding for this data element is defined in the TAP-TSI codelist B.7.1.

**306D - Customer ID**

Length = 20, coding = Alphanumeric

This data element allows for the ID of the type defined in data element 306C to be enumerated. For payment card industry security reasons it is likely that bank-issued cards will need to use a format XXXXXXXXXXXXNNNN where NNNN is the last four digits on the card.

**401 - Fulfilment method**

Length = 3, coding = Numeric

The coding is:

1 = ticket on departure using ticket format defined in ERA Technical Document B6

2 = print-at-home using ticket format defined in ERA Technical Document B7

3 = e-ticket as defined in UIC leaflet 918-5

Other codes specific to individual RUs can be added as needed.

**402 - Fulfilment execution code**

Length = 2, coding = Numeric

The coding is:

1 = successfully fulfilled

2 = fulfilment attempted but failed

3 = fulfilment no longer possible (retailer to advise customer)

Further work will be beneficial on these codes in due course.

**403 - Fulfilment reference for customer**

Length = 12, coding = Numeric

This is the code given to the customer needed to collect a ticket on departure, or to quote during e-ticket control. It is not mandatory, for example if the customer simply needs to provide ID.

**404 - Link to print-at-home ticket or secure element**

Length = 160, coding = Alphanumeric

This message element contains the URL containing the PDF-image of the print-at-home ticket or the security device created by the carrier on the instruction of the retailer.

**405 - Fulfilment method list**

Length = 30, coding = Numeric

This message element contains ten times data element 401 and allows the allocating system to provide the retailer with up to ten fulfilment methods valid for the requested product.

# 5 Security requirements for indirect fulfilment

## 5.1 Security architecture

A link introduced by the open points is that between the carrier or product owner, who owns the key associated with the product, and all the passenger-facing equipment. The product owner and the carrier are usually the same organisation for conventional rail, although a public authority can be the product owner in cases of public service contracts. The link can operate in two ways.

The first is where the carrier's security management service distributes both the write and read keys for the products that the retailer sells, that the ticket on departure or on-train equipment fulfils, and that the ticket control equipment checks. This arrangement is used largely in smartcard schemes, which need to be able to work without frequent online references to the product owner's systems, and where symmetric keys are often needed for speed of operation. Such ticketing schemes are excluded from the list of TAP-TSI open points and therefore do not need to be addressed by the CEN work under this mandate at this time.

The second way is where the carrier's security management service holds in secret the private write keys. In this case, the security management service can provide a digital seal for each product on request of the retailer. It can return to the retailer all the data needed from which, for example, a barcode can be printed for an A4 print-at-home ticket, without the retailer needing to know the carrier's write key. In fact, it need only return to the retailer an Internet link from where the passenger can directly print the ticket, essentially passing fulfilment responsibility back to the carrier. As an alternative, the process defined in ERA Technical Document B7 can be followed, where the carrier creates a secure element with its private key and makes this available to the retailer to include in a retailer-assembled ticket.

Where ticket control equipment needs to read and check a barcode, it does so using the carrier or product owner's public key.

The security architecture for this second case is shown in Figure 7.

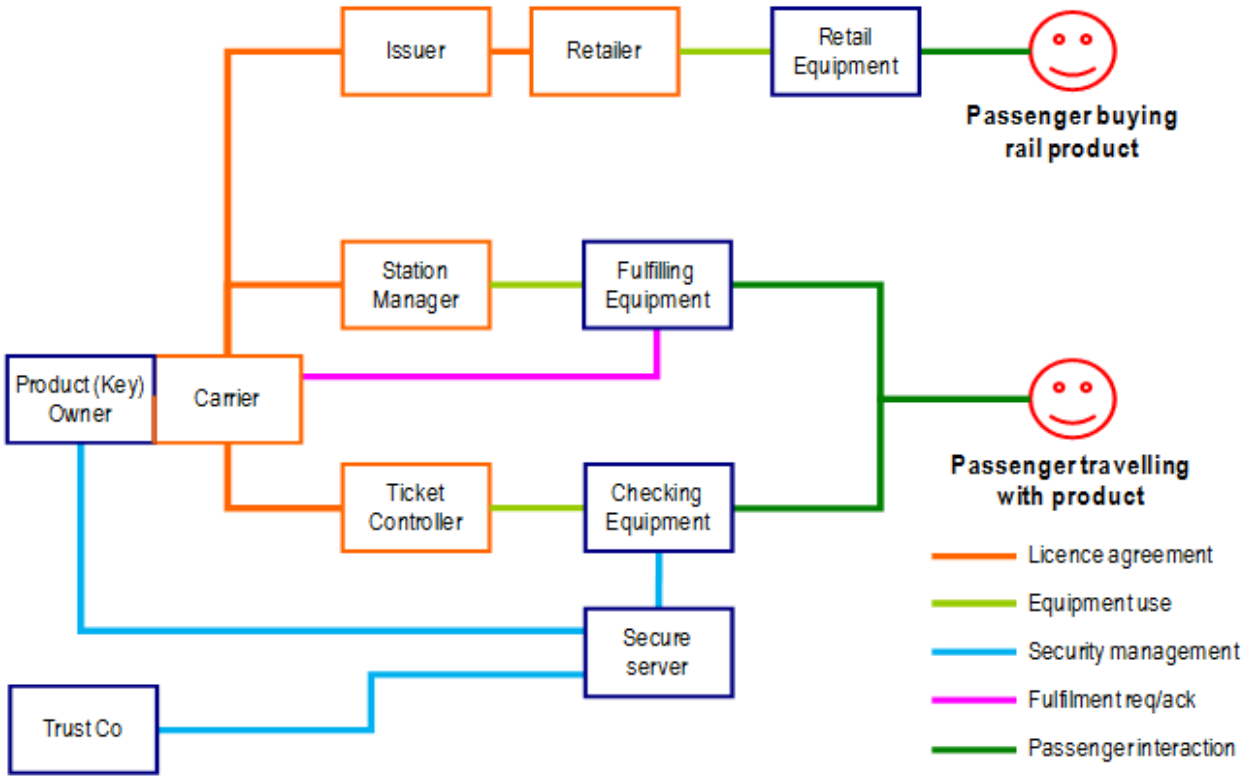


**Figure 7 — Security architecture in case of secret private write keys**

In this architecture, the retailer knows nothing of the private key held by the carrier or product owner. The carrier is responsible for the creation and fulfilment of the products that are indirectly fulfilled, such as print-at-home tickets or ticket on departure.

Where a public key is needed to check that a product is authentic and not counterfeit, then the ticket controller obtains the public key from the carrier or product owner. This is done by accessing a secure server that points to the locations holding the public keys. The keys are then obtained using processes and certificates covered by the X.509 specification. To check that the digital certificate is authentic, the ticket controller can check with any suitable trust company, who can confirm that the certificate is actually from the named key holder.

Acceptable public key algorithms are RSA and elliptic curve cryptography. The latter, although newer, is more efficient and may replace RSA over time. Carriers or product owners may elect to use whichever they consider appropriate to their business risk.

For the rail industry, there is no requirement for rail-specific security standards. However, there may be business drivers that promote the use of a secure server provided within the TAP-TSI infrastructure. In addition, the industry may choose to adopt a convention of two keys per carrier, each lasting two years and three months. Such a convention will allow sufficient time for key distribution and will ensure that even annual tickets can be accommodated by checking equipment.

## 5.2 Security architecture dialogue

The diagram below shows the process flow for the retailer to obtain and check the provenance of the product owner's public key.

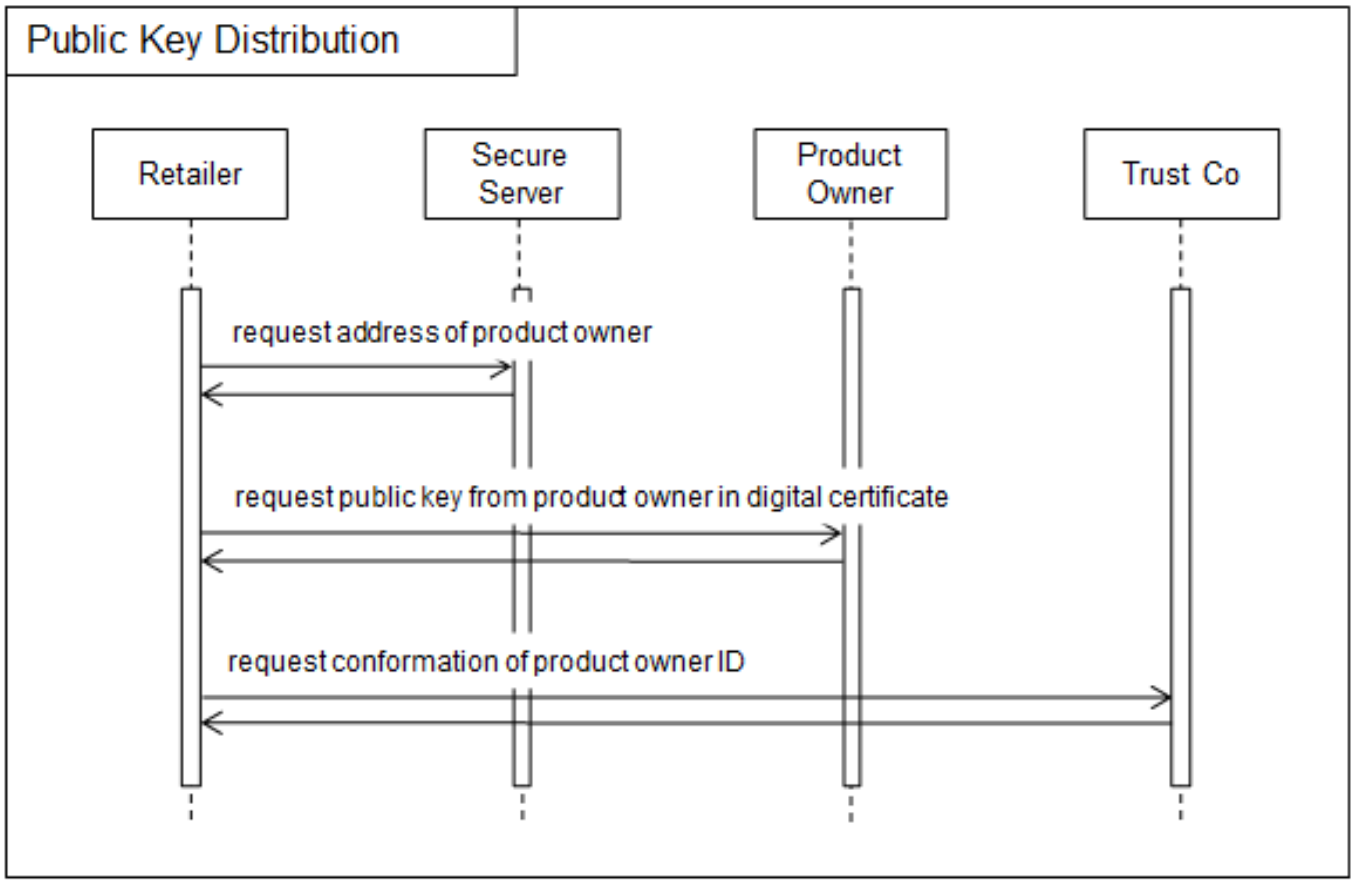


**Figure 8 — Security architecture: Public key distribution**

# Annex A
(informative)

# Technical documents

## A.1 Technical documents referenced in the TAP-TSI

There are no normative documents in this Annex, although the implementation of the Indirect Fulfilment Messages defined in 4.4 requires a prior implementation of the ERA Technical Document B5 referenced below. In all other respects the Technical Documents referenced below are informative.

The technical documents in Table A.1 are referenced in Annex III of TAP-TSI.

**Table A.1 — Technical documents referenced in the TAP-TSI**

| Reference | Label |
|---|---|
| B.1. (V1.1) | Computer generation and exchange of tariff data meant for international or foreign sales – NRT tickets |
| B.2. (V1.1) | Computer generation and exchange of tariff data meant for international and foreign sales – Integrated Reservation Tickets (IRT) |
| B.3. (V1.1) | Computer generation and exchange of data meant for international or foreign sales – Special offers |
| B.4. (V1.1) | Implementation guide for EDIFACT messages covering timetable data exchange |
| B.5. (V1.1) | Electronic reservation of seats/berths and electronic production of travel documents - Exchange of messages |
| B.6. (V1.1) | Electronic seat/berth reservation and electronic production of transport documents (RCT2 standards) |
| B.7. (V1.1) | International Rail ticket for Home Printing |
| B.8. (V1.1) | Standard numerical coding for railway undertakings, infrastructure managers and other companies involved in rail-transport chains |
| B.9. (V1.1) | Standard numerical coding of locations |
| B.10 (V1.1) | Electronic reservation of assistance for persons with reduced mobility - Exchange of messages |
| B.30. (V1.1) | Schema - messages/datasets catalogue needed for the RU/IM communication of TAP TSI |

# Bibliography

[1] TAP-TSI, Commission Regulation 454/2011 on the technical specification for interoperability relating to the subsystem 'telematics applications for passenger services' of the trans-European rail system

[2] ISO/IEC 14443 (all parts), Identification cards - Contactless integrated circuit cards - Proximity cards

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