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RKF Travel Card
Implementation Specification Details Type 1

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1 INTRODUCTION

1.1 Scope

This document specifies the details of data element groups of travel card system objects and application objects of the RKF travel card as described in [RKF-0022]. This document and [RKF-022] in collaboration describes the implementation of the RKF travel card on a RKF Type CL-1 card, i.e. a contactless memory card compatible with Mifare® Standard (1 kB, type A card according to [ISO/IEC 14443-1 and -2], MF1 IC S50 chip).

The technical details of the RKF Type CL-1 card are specified in [RKF-0021].

The contents of this document is identical to the contents of the spreadsheet edition in [RKF-0025]. Changes to this document must be co-ordinated with changes to [RKF-0025].

1.2 Reader's Guide

Chapter 2 describes the data types used to specify data elements of system objects and application objects.

Chapter 3 describes the contents of data element groups of system objects and application objects of the RKF Type CL-1 travel card.

Chapter 4 is a table to help working with binary numbers.

A knowledge of the contents of the requirement specification [RKF-0020] is required.

It is recommended, that this document is read "in parallel" with the implementation specification in [RKF-0022] and the implementation guide in [RKF-0024].

2 DATA TYPES

This chapter describes the data types used to specify data elements of system objects and application objects in chapter 3.

The description is divided into:

1. Travel card data types specific to the travel card implementation.
2. Basic data types that are not specific to travel cards, e.g. binary numbers and BCD numbers.

The data types are described in tables having columns:

Data type: Name of data type.

The data types are sorted alphabetically according to this name.

Definition: Definition of data type in terms of basic data types.

The basic data types of unsigned binary numbers, signed binary numbers and BCD numbers are defined in section 2.2.

Size: Number of bits representing the data type.

Data type presence: Describes if a data type with this name and utilisation will be present in implementation specifications of all card technologies.

Marking values:

Common: The data type will be present for all card technologies.

Examples: *AID*, *EventLogRecordNumber*, *Identifier*, *PassengerClass*

CL-1: The data type is expected to be specific for RKF Type CL-1.

Examples: *AccessKey*, *BlockPointer*, *SectorStatus*

This marking is not relevant when using RKF Type CL-1. It is only relevant when changing the CL-1 implementation specification, and when preparing implementation specifications for additional card technologies.

Data type definition: Describes if the definition (i.e. range of values) of this data type will be identical for all card technologies.

Marking values:

Common: The data type must have the same definition for all card technologies.

Examples: *AID*, *PassengerClass*

If this marking value is used, the value of 'Data type presence' must be 'Common'.

CL-1: The data type is expected to have different definitions for each card technology.

Examples: *EventLogRecordNumber*, *Identifier*

This marking is not relevant when using RKF Type CL-1. It is only relevant when changing the CL-1 implementation specification, and when preparing implementation specifications for additional card technologies.

Value interpretation: Describes if the interpretation of the possible values of data elements having this data type have a fixed interpretation.

Marking values:

Fixed: The interpretation of values is fixed for all PTAs.

Examples: *AID*, *EventLogRecordNumber*, *Identifier*

Proposed: PTAs are free to define the interpretation of values. A proposal for the interpretation of some or all values is described.

Examples: *SupplementStatus*

Free: PTAs are free to define the interpretation of values.

Examples: *SupplementType*

The markings can be combined, e.g.:

Fixed/Free: Some values are fixed, other values are free for the PTAs to define.

Examples: *PassengerClass*

This marking is relevant when using RKF Type CL-1. It is also relevant when changing the CL-1 implementation specification, and when preparing implementation specifications for additional card technologies.

For some data types the interpretation of values is described.

If a data type is marked '(PTA specific)', PTAs (and other relevant organisations) accepting each others travel cards by an interoperability agreement must co-ordinate the interpretation of the data type.

Description/comments: Data types marked '(=Volume A)' are not changed from volume A of this specification.

2.1 Travel Card Data Types

Data type	Definition	Size	Data type presence	Data type definition	Value interpretation		Description/comments
AccessKey	0..281474976710655	48	CL-1	CL-1	Fixed	-	Access key used in sector trailers (block 3 of each sector) to control access authentication
AID	0..4095	12	Common	Common	Fixed	[RKF-0022] (section 'AID Values') defines special values to be used in the Directory. [RKF-0018][RKF-0019] (section 'Table of Existing Application Identifiers') defines values identifying PTAs	AID is a registered identifier unique to the RKF travel card. All PTAs (and some groups of PTAs) have their own AID to identify their applications. Resekortsföreningen is responsible for defining new AID values (= Volume A)
AutoLoadStatus	0..3	2	Common	Common	Fixed	0: Autoload disabled 1: Autoload enabled 2..3: RFU	Status of the autoload function of TCPU
BlockPointer	0..63	6	CL-1	CL-1	Fixed	The 4 most significant bits is interpreted as a *SectorPointer*, i.e. it is the number (0..15) of a sector. The 2 least significant bits is interpreted as the block number (0..3). In most cases, 0 can be used as an undefined value	This pointer can address one of the blocks of the travel card NUV-C

Data type	Definition	Size	Data type presence	Data type definition	Value interpretation		Description/comments
CardSerialNumber	0.. 4294967295	32	CL-1	CL-1	Fixed	Straightforward interpretation	Unique card number within the RKF CL-1 card technology (cf. [RKF-0021]). The number is selected by the manufacturers of RKF CL-1 cards from a sequence for the given line of production (= Volume A)
Checksum	0..255	8	CL-1	CL-1	Fixed	[RKF-0022] (section 'Checksum and MAC Calculation') defines how checksum values are calculated and verified	Last byte of blocks not protected by a MAC authenticator is an 8 bit cyclic redundancy code (CRC-8). The checksum is calculated when writing a block and recalculated and verified when reading a block (= Volume A)
ContractSerialNumber	0.. 4294967295	32	Common	Common	Free	(PTA specific)	PTA specific identification of a ticket or contract (= Volume A)
ContractTransaction-Number	0..4095	12	Common	Common	Fixed	The transaction number is increased by 1 for every change of the ticket or contract. The transaction number is used cyclically	Transaction counter that counts transactions to a ticket or contract. Unique within the context of an AID and a *ContractSerialNumber* (= Volume A)

Data type	Definition	Size	Data type presence	Data type definition	Value interpretation		Description/comments
CurrencyUnit	BCD(4)	16	Common	Common	Fixed	According to [CEN 1545-2] ('PayUnit'). If the value is 'xyyy' H, x is the unit, e.g.:	A currency unit defines the currency and unit for money amounts. Examples:
						0: Main unit	0752 H: SEK, unit "kronor"
						1: Minor unit, 1/10 of main unit	1208 H: DKK, unit "10 øre"
						2: Minor unit, 1/100 of main unit	2578 H: NOK, unit "1 øre"
						9: Minor unit, 1/2 of main unit (provider specific encoding)	(= Volume A)
						and yyy is the currency as defined in [ISO 4217], e.g.:	
						208: DKK	
						578: NOK	
						752: SEK	
CustomerNumber	0.. 17179869183	34	Common	Common	Free	(PTA specific)	10-digit customer number identifying a person or an organisation. Unique within the context of an AID or within the context of an AID and a PIX
CustomerProfile	0..63	6	-	-	-	-	Replaced by *PassengerType*
							NUV-C
							(= Volume A)
DateCompact	0..16383	14	Common	Common	Fixed	According to [CEN 1545-1] ('DateCompact', bit aligned).	Date, e.g. day of start time of travel
						Days are numbered sequentially.	~ 01.01.1997..01.01.2041
						Day 0 is 1 January 1997	(= Volume A)
DateMonth11	0..2047	11	Common	Common	Fixed	Months are numbered sequentially.	Month, e.g. birth month of customer
						Month 1 is January 1900	~ 01.1900..01.2070

Data type	Definition	Size	Data type presence	Data type definition	Value interpretation		Description/comments
DateMonth8	0..255	8	Common	Common	Fixed	Months are numbered sequentially. Month 1 is January 2000	Month, e.g. month for discount basis ~ 01.2000..03.2021
DateTime	0..16777215	24	Common	Common	Fixed	Minutes are numbered sequentially. Minute 1 is 0:01, 1 January 2000	Date and time of day with 1 minute resolution ~ 01.01.2000 0:00..23.11.2031 23:59
Device	0..65535	16	Common	CL-1	Free	(PTA specific)	Identification of a card handling device. Unique within the context of an AID (= Volume A)
DeviceTransaction-Number	0..16777215	24	Common	CL-1	Free	(PTA specific)	Transaction number of a card handling device. Unique within the context of an AID and a device (= Volume A)
DialoguePreferences	0..255	8	Common	Common	Free	(PTA specific)	Specification of the customer's preferences for dialogue with the front system, e.g. sound level, screen font size, level of detail
DiscountCounter12	0..4095	12	Common	Common	Free	(PTA specific)	High precision discount counter for the current period
DiscountCounter8	0..255	8	Common	Common	Free	(PTA specific)	Low precision discount counter for the current period
DiscountLevel	0..7	3	Common	Common	Free	(PTA specific)	Acquired discount level. Input to discount calculations
DiscountType	0..255	8	Common	Common	Free	(PTA specific)	Discount type specifying how to acquire and use discount counters and discount levels

Data type	Definition	Size	Data type presence	Data type definition	Value interpretation		Description/comments
DistanceValue	0..4095	12	Common	Common	Free	(PTA specific)	A number of distance units. The unit is PTA specific, e.g. number of zones or kilometers (= Volume A)
EventCode	0..63	6	Common	Common	Fixed	Event codes are defined in [RKF-0022] (section 'Event Codes')	Code designating the type of transaction being logged in a event log record (= Volume A)
EventData	-	24	Common	CL-1	Fixed/ Proposed/ Free	Interpreted as one of the *EventData* data element groups. If the data element group occupies less than 24 bits, the remaining bits must be 0	Data of *Event Log Record* specific to an *EventCode*
EventLogRecord-Number	0..15	4	Common	CL-1	Fixed	0: 1st log record 1: 2nd log record 2: 3rd log record ...	Number of a log record in TCEL
Identifier	0..255	8	Common	CL-1	Fixed	[RKF-0022] (section 'Identifier Values') defines allowed values	Identifier of a system object, an application object, or a data element group. Unique for all RKF CL-1 travel cards. Resekortsföreningen is responsible for defining new identifier values (= Volume A)
InterchangeNumber	0..63	6	Common	Common	Free	(PTA specific)	Number of allowed interchanges of a journey (= Volume A)
JourneyCounter	0..255	8	Common	Common	Fixed	Straightforward interpretation	Number of journeys, e.g. in a specified period of time

Data type	Definition	Size	Data type presence	Data type definition	Value interpretation		Description/comments
Language	0..15	4	Common	Common	Free	(PTA specific)	Specification of the customer's preferred language
MACAlgorithm-Identifier	0..3	2	Common	CL-1	Fixed	0: DES-MAC 1..3: RFU	This identifier identifies the algorithm used for the calculation of the MAC authenticator (= Volume A)
MACAuthenticator16	0..65535	16	Common	Common	Fixed	[RKF-0022] (section 'Checksum and MAC Calculation') defines how authenticator values are calculated and verified	Security information ("authenticator") allowing authorised users to verify the integrity of an application. The MAC authenticator is calculated when updating an application and recalculated and verified when reading an application
MACAuthenticator64	0..18446744073709551615	64	Common	Common	Fixed	-	NUV-C (= Volume A)
MACKeyIdentifier	0..63	6	Common	CL-1	Free	(PTA specific)	This identifier identifies the key that was used for calculating the MAC authenticator (= Volume A)
MADInfoByte	0..65535	16	CL-1	CL-1	Fixed	0: MAD not available	Specification of MAD (Mifare Application Directory) (= Volume A)
MoneyAmount20-Positive	0..1048575	20	Common	Common	Fixed	Interpreted using relevant currency unit as described in [RKF-0022] (section 'Management of Currency Unit and Money Values')	Positive money amount, e.g. ticket price

Data type	Definition	Size	Data type presence	Data type definition	Value interpretation		Description/comments
MoneyAmount24	-8388608.. 8388607	24	Common	Common	Fixed	According to [CEN 1545-2] ('Value') Interpreted using relevant currency unit as described in [RKF-0022] (section 'Management of Currency Unit and Money Values')	Positive or negative money amount, e.g. purse value (= Volume A)
PassengerClass	0..3	2	Common	Common	Fixed/ Free	According to [CEN 1545-2] ('ClassQualifier of PassengerClass'): 0: Not specified further 1: First class 2: Second class 3: Contract provider specific (PTA specific)	Passenger class denoting quality of transportation (= Volume A)
PassengerTotal	0..63	6	Common	Common	Fixed	0: Undefined 1: One passenger 2: Two passengers ...	Total number of passengers belonging to a certain *PassengerType* (= Volume A)

Data type	Definition	Size	Data type presence	Data type definition	Value interpretation		Description/comments
PassengerType	0..255	8	Common	Common	Fixed/ Free	According to [CEN 1545-2] ('CustomerProfile'), but augmented with more PTA specific values. Subset of [CEN 1545-2] values: 0: Unspecified 1: Adult 2: Child 3: Student 4: Old age pensioner 32..255: PTA specific values (PTA specific)	Type of passenger
PIX	0..4095	12	Common	Common	Fixed/ Proposed/ Free	The interpretation is basically PTA specific. A few special values to be used in the Directory are defined in [RKF-0022] (section 'PIX Values'). The rest of the values are free for the PTAs to use. However, to give both type and ordering number of applications in the PIX value, the PTA should follow these rules: Each multiple of ten gives the application type number. Each type number can have 10 editions numbered from 0 to 9. E.g. The first contract of type 10 has number 100, the second number 101 and so on	The purpose of the PIX (Proprietary application Identifier eXtension) is to give each PTA or group of PTAs an internal number for type numbering and validation ordering of applications (= Volume A)

Data type	Definition	Size	Data type presence	Data type definition	Value interpretation		Description/comments
Place	0..16383	14	Common	Common	Fixed/ Free	0 is always the undefined place (PTA specific)	Unique identification of a place (point, stop, zone etc.) within the context of an AID designating the area of the place
PriceModificationLevel	0..63	6	Common	Common	Free	(PTA specific)	Level of price modification, i.e. reduction of price or addition to price
PurseSerialNumber	0.. 4294967295	32	Common	Common	Free	(PTA specific)	PTA specific identification of a purse (= Volume A)
PurseTransaction-Number	0..65535	16	Common	Common	Fixed	The transaction number is increased by 1 for every change of a purse. The transaction number is used cyclically	Transaction counter that counts transactions to a purse. Unique within the context of an AID and a *PurseSerialNumber* (= Volume A)
RelativeTime	0..1023	10	Common	Common	Fixed	Number of minutes	17 hours with 1 minute resolution

Data type	Definition	Size	Data type presence	Data type definition	Value interpretation		Description/comments
RestrictDay	0..255	8	Common	Common	Fixed/ Free	According to [CEN 1545-2] ('RestrictDOW'). Each day of the week is represented by a bit. The bit is 1, if the day is selected as not valid. Any combination of bits is allowed. If the value is 'abcdefgh' B, the bits represent: a: Monday b: Tuesday c: Wednesday d: Thursday e: Friday f: Saturday g: Sunday h: Special days (such as holiday), PTA specific	Defines a set of days of the week on which a ticket or contract is not valid
RestrictTimecode	0..255	8	Common	Common	Free	(PTA specific)	Identify time periods of the day when a ticket or contract is not valid. Unique within the context of an AID
RouteNumber	0..4095	12	Common	Common	Free	(PTA specific)	Route number. Unique within the context of an AID designating the owner of the route (= Volume A)
RunNumber	0..4095	12	Common	Common	Free	(PTA specific)	Run number (= Volume A)
SectorPointer	0..15	4	CL-1	CL-1	Fixed	Sector number. In most cases, 0 can be used as an undefined value	This pointer can address one of the sectors of the travel card

Data type	Definition	Size	Data type presence	Data type definition	Value interpretation		Description/comments
SectorStatus	0..3	2	CL-1	CL-1	Fixed	0: Undefined 1: Application type AT1 or AT5, 1st dynamic element contains current data 2: Application type AT1 or AT5, 2nd dynamic element contains current data 3: Application type AT2 The interpretation is further explained in [RKF-0022] (section 'TCAS: Travel Card Applications Status') The interpretation is modified from Volume A	Status value for each sector in TCAS (= Volume A)
Status	0..255	8	Common	Common	Fixed	According to [CEN 1545-1] ('Status'). Value assignment (chosen so ASCII values give "visual" information): 01 H: ("") Ok, enabled 21 H: ("!") Still disabled/suspended but action pending (refer to the related information) 3F H: ("?") Temporarily disabled/suspended (This value can be changed either to “X” or “”) 58 H: ("X") Not Ok, disabled/suspended	Code that gives information about the status of a travel card application or the travel card support layer (= Volume A)
SubscriptionOrCreditCompany	AID	12	Common	Common	Fixed	See definition of *AID*	Identification of subscription or credit company, e.g. 'SL', 'Danske Bank'

Data type	Definition	Size	Data type presence	Data type definition	Value interpretation		Description/comments
SubscriptionOrCredit-Type	0..255	8	Common	Common	Free	(PTA specific)	Types of subscription or credit, e.g. 'Subscription, 200 DKK per month', 'Credit, unlimited'
SupplementStatus	0..3	2	Common	Common	Proposed	If C means "supplement is being counted from *Supplement-StartPlace*", and A means "supplement distance is accumulated in *SupplementDistance*", the proposed values are defined: 0: (not C) and (not A) 1: C and (not A) 2: (not C) and A 3: C and A Basically the interpretation is PTA specific	Status for collecting information on supplement for a journey
						(PTA specific)	
SupplementType	0..63	6	Common	Common	Free	(PTA specific)	Supplement type specifying how to acquire and use supplement for parts of a journey, e.g. 'Business'
TimeCompact	0..65535	16	Common	Common	Fixed	According to [CEN 1545-1] ('TimeCompact', octet aligned). The encoding of the number of hours (0..23), the number of minutes (0..59) and the number 2-seconds (0..29) in the 16 b binary value is 'hhhhhmmmmmmssssss' B	Time of day with 2 second resolution (= Volume A)

Data type	Definition	Size	Data type presence	Data type definition	Value interpretation		Description/comments
TransactionNumber	0..255	8	Common	CL-1	Fixed	The transaction number is used cyclically	Transaction number of TCAS for supplying sufficient data to the back office system to handle transaction data securely and effectively. Unique within the context of a *CardSerialNumber*
ValidationLevel	0..3	2	Common	Common	Free	(PTA specific)	Allowed level of validation, e.g. only for local use
ValidationModel	0..3	2	Common	Common	Fixed	0: Undefined 1: ci/co (check-in/check-out) 2: ci-dest (destination specified at check-in) 3: RFU	Validation model
ValidationStatus	0..3	2	Common	Common	Fixed	0: Undefined 1: Open (after check-in) 2: Closed (after check-out) 3: RFU	Validation status. Intended for the ci/co validation model
ValidityDuration	0..255	8	Common	Common	Free	(PTA specific)	Specification of the length of a period of validity. The unit of duration (for example months, weeks, days, hours) will be AID and PIX dependent
VersionNumber	0..63	6	Common	Common	Fixed	According to [CEN 1545-1] ('VersionNumber', bit aligned). 0: First version 1: Second version … 63: Last version	Version of travel card application (= Volume A)

2.2 Basic Data Types

2.2.1 Miscellaneous Types

Data type	Definition	Size	Data type presence	Data type definition	Value interpretation	Description/comments
Byte	0..255	8	Common	Common	-	Synonymous with 0..255

2.2.2 Unsigned Binary Numbers

The interpretation of unsigned binary numbers is described in [RKF-0022] (section 'Rules for Coding Data Elements of Data Element Groups')

Data type	Definition	Size	Data type presence	Data type definition	Value interpretation	Description/comments
0..1		1	Common	Common	-	
0..3		2	Common	Common	-	
0..7		3	Common	Common	-	
0..15		4	Common	Common	-	
0..63		6	Common	Common	-	
0..255		8	Common	Common	-	
0..1023		10	Common	Common	-	
0..2047		11	Common	Common	-	
0..4095		12	Common	Common	-	
0..16383		14	Common	Common	-	
0..65535		16	Common	Common	-	
0..1048575		20	Common	Common	-	
0..4194303		22	Common	Common	-	

Data type	Definition	Size	Data type presence	Data type definition	Value interpretation	Description/comments
0..16777215		24	Common	Common	-	
0..1073741823		30	Common	Common	-	
0..4294967295		32	Common	Common	-	
0..17179869183		34	Common	Common	-	
0..281474976710655		48	Common	Common	-	
0..18446744073709551615		64	Common	Common	-	

2.2.3 Signed Binary Numbers

The interpretation of signed binary numbers is described in [RKF-0022] (section 'Rules for Coding Data Elements of Data Element Groups')

Data type	Definition	Size	Data type presence	Data type definition	Value interpretation	Description/comments
-8388608..8388607		24	Common	Common	Fixed	

2.2.4 BCD Numbers

The interpretation of BCD numbers is described in [RKF-0022] (section 'Rules for Coding Data Elements of Data Element Groups')

Data type	Definition	Size	Data type presence	Data type definition	Value interpretation	Description/comments
BCD(4)		16	Common	Common	Fixed	

3 DATA ELEMENT GROUPS

This chapter describes the contents of data element groups of system objects and application objects of the RKF travel card.

The description objects is divided into the layers of the RKF travel card:

1. Elementary data element groups
2. Card issuer layer
3. Travel card support layer
4. Travel card applications layer

Data element groups, whose name is prefixed by '#', are elementary data element groups (“records”) introduced to avoid repetitions of sequences of data elements. These elementary data element groups are defined in section 3.1.

The data element groups are described in tables having columns:

Data element: Names of data elements.

Data type: Specifies the data types of data elements. All data types must be defined in chapter 2.

Data type presence: Describes if it is mandatory for the data element to be a part of the actual data element group in implementation specifications of all card technologies.

Marking values:

Common: It is mandatory for the data element be a part of the actual data element group for all card technologies.

Examples: *AID* of *TCPU*, *PassengerClass* of *AdministrativeClassInformation*

CL-1: The data element as part of the actual data element group is expected to be specific for RKF Type CL-1.

Examples: *SectorStatus* of *TCAS*, *DataPointer* of *TCPU*

This marking is not relevant when using RKF Type CL-1. It is only relevant when changing the CL-1 implementation specification, and when preparing implementation specifications for additional card technologies.

Size: For each data element, the size (number of bits) of the data type is copied from chapter 2.

'Free (bits)': Number of unused bits in the last block of the data element group, if relevant.

'Sum (bits)': The total size of data element groups (number of bits) including the number of unused bits if specified.

'Sum (bytes)': The total size of data element groups (rounded up to number of bytes).

'Sum (block)': The total size of data element groups (number of 128 bit / 16 byte blocks).

Description/comments: Short description of the usage of data element of data element groups.

3.1 Elementary Data Element Groups

3.1.1 # Access Conditions

3.1.1.1 # Access Conditions (part of 'Sector Trailer')

Data element	Data type	Data element presence	Size	Description/comments
AccessCondtionsByte (1)	Byte	CL-1	8	1st byte defining access conditions
AccessCondtionsByte (2)	Byte	CL-1	8	2nd byte defining access conditions
AccessCondtionsByte (3)	Byte	CL-1	8	3rd byte defining access conditions
AccessCondtionsByte (4)	Byte	CL-1	8	Unused byte
Sum (bits)			32	
Sum (bytes)			4	

3.1.2 # Passenger Sub Group

3.1.2.1 # Passenger Sub Group (part of 'Administrative Class Information', TCCP, TCST-ci/co)

Data element	Data type	Data element presence	Size	Description/comments
PassengerType	PassengerType	Common	8	Passenger type
PassengerTotal	PassengerTotal	Common	6	Number of passengers of type *PassengerType*
Sum (bits)			14	
Sum (bytes)			2	

3.1.3 # Discount Basis Block

3.1.3.1 # Discount Basis Block (part of TCDB)

Data element	Data type	Data element presence	Size	Description/comments
DiscountCounter1	DiscountCounter8	Common	8	Low precision discount counter for the month *FirstMonth* (month M), e.g. total number of journeys
DiscountCounter2	DiscountCounter12	Common	12	High precision discount counter for the month M, e.g. total kilometers travelled
DiscountLevel (1)	DiscountLevel	Common	3	Acquired discount level for the month M-1
DiscountLevel (2)	DiscountLevel	Common	3	Acquired discount level for the month M-2
DiscountLevel (3)	DiscountLevel	Common	3	Acquired discount level for the month M-3
Sum (bits)			29	
Sum (bytes)			4	

3.2 Card Issuer Layer

3.2.1 CMI: Manufacturer Information

3.2.1.1 CMI: Manufacturer Information

Data element	Data type	Data element presence	Size	Description/comments
CardSerialNumber	CardSerialNumber	CL-1	32	Fixed serial number of the card
CardSerialNumberCheckByte	Byte	CL-1	8	The 4 bytes of *CardSerialNumber* xor'ed together
ManufacturerData (1)	Byte	CL-1	8	
ManufacturerData (2)	Byte	CL-1	8	
ManufacturerData (3)	Byte	CL-1	8	
ManufacturerData (4)	Byte	CL-1	8	
ManufacturerData (5)	Byte	CL-1	8	
ManufacturerData (6)	Byte	CL-1	8	
ManufacturerData (7)	Byte	CL-1	8	
ManufacturerData (8)	Byte	CL-1	8	
ManufacturerData (9)	Byte	CL-1	8	
ManufacturerData (10)	Byte	CL-1	8	
ManufacturerData (11)	Byte	CL-1	8	
Free (bits)			0	
Sum (bits)			128	
Sum (bytes)			16	
Sum (blocks)			1	

3.2.2 Sector Trailer

3.2.2.1 Sector Trailer

Data element	Data type	Data element presence	Size	Description/comments
AccessKeyA	AccessKey	CL-1	48	Key A giving read access to the sector (also called KEYSECXA)
AccessConditions	#AccessConditions	CL-1	32	Access conditions defining keys A and B
AccessKeyB	AccessKey	CL-1	48	Key B giving read and update access to the sector (also called KEYSECXB)
Free (bits)			0	
Sum (bits)			128	
Sum (bytes)			16	
Sum (blocks)			1	

3.3 Travel Card Support Layer

3.3.1 TCCI: Card Information

3.3.1.1 TCCI: Card Information

Data element	Data type	Data element presence	Size	Description/comments
MADInfoByte	MADInfoByte	CL-1	16	= 0 (MAD not available)
CardVersion	VersionNumber	Common	6	= 2 Version of the travel card support layer, i.e. version of the total travel card
CardProvider	AID	Common	12	The company that issued the travel card
CardValidityEndDate	DateCompact	Common	14	The travel card expiration date
CardStatus	Status	Common	8	Status of the travel card support layer, i.e. status of the total travel card
CardCurrencyUnit	CurrencyUnit	Common	16	Currency and unit used for interpretation of all money values of the travel cards
EventLogVersionNumber	VersionNumber	Common	6	= 1
MACAlgorithmIdentifier	MACAlgorithmIdentifier	CL-1	2	Identification of MAC algorithm
MACKeyIdentifier	MACKeyIdentifier	CL-1	6	Identification of key for MAC algorithm
MACAuthenticator	MACAuthenticator16	CL-1	16	16 b MAC authenticator
Free (bits)			26	
Sum (bits)			128	
Sum (bytes)			16	
Sum (blocks)			1	

3.3.2 TCAS: Applications Status

3.3.2.1 TCAS: Applications Status (A0 H)

Data element	Data type	Data element presence	Size	Description/comments
Identifier	Identifier	Common	8	= A0 H
VersionNumber	VersionNumber	Common	6	= 2
General Sector Status				
SectorStatus (sector 0)	SectorStatus	CL-1	2	Sector status value of sector 0 (TCCI)
SectorStatus (sector 1)	SectorStatus	CL-1	2	Sector status value of sector 1 (not used)
SectorStatus (sector 2)	SectorStatus	CL-1	2	Sector status value of sector 2
SectorStatus (sector 3)	SectorStatus	CL-1	2	Sector status value of sector 3
SectorStatus (sector 4)	SectorStatus	CL-1	2	Sector status value of sector 4
SectorStatus (sector 5)	SectorStatus	CL-1	2	Sector status value of sector 5
SectorStatus (sector 6)	SectorStatus	CL-1	2	Sector status value of sector 6
SectorStatus (sector 7)	SectorStatus	CL-1	2	Sector status value of sector 7
SectorStatus (sector 8)	SectorStatus	CL-1	2	Sector status value of sector 8
SectorStatus (sector 9)	SectorStatus	CL-1	2	Sector status value of sector 9
SectorStatus (sector 10)	SectorStatus	CL-1	2	Sector status value of sector 10
SectorStatus (sector 11)	SectorStatus	CL-1	2	Sector status value of sector 11
SectorStatus (sector 12)	SectorStatus	CL-1	2	Sector status value of sector 12
SectorStatus (sector 13)	SectorStatus	CL-1	2	Sector status value of sector 13
SectorStatus (sector 14)	SectorStatus	CL-1	2	Sector status value of sector 14
SectorStatus (sector 15)	SectorStatus	CL-1	2	Sector status value of sector 15
Transaction Number				
TransactionNumber	TransactionNumber	CL-1	8	Counter that counts all transactions on card
Event Log				
EventLogRecordNumber	EventLogRecordNumber	CL-1	4	Number of most recently used log record

Data element	Data type	Data element presence	Size	Description/comments
Ticket/Log Area				
TicketLogAreaSectorPointer	SectorPointer	CL-1	4	0: No ticket/log area is used >0: First sector of ticket/log area
TicketLogSectorPointer (1)	SectorPointer	CL-1	4	Sector of actual dynamic ticket
TicketLogSectorPointer (2)	SectorPointer	CL-1	4	Sector of previous dynamic ticket
TicketLogSectorPointer (3)	SectorPointer	CL-1	4	Sector of 1st ticket in log
TicketLogSectorPointer (4)	SectorPointer	CL-1	4	Sector of 2nd ticket in log
TicketLogSectorPointer (5)	SectorPointer	CL-1	4	Sector of 3rd ticket in log
TicketLogSectorPointer (6)	SectorPointer	CL-1	4	Sector of 4th ticket in log
TicketLogSectorPointer (7)	SectorPointer	CL-1	4	Sector of 5th ticket in log
TicketLogSectorPointer (8)	SectorPointer	CL-1	4	Sector of 6th ticket in log
MAC				
MACAlgorithmIdentifier	MACAlgorithmIdentifier	CL-1	2	Identification of MAC algorithm
MACKeyIdentifier	MACKeyIdentifier	CL-1	6	Identification of key for MAC algorithm
MACAuthenticator	MACAuthenticator16	CL-1	16	16 b MAC authenticator
Free (bits)			10	
Sum (bits)			128	
Sum (bytes)			16	
Sum (blocks)			1	

3.3.3 TCDI: Directory

3.3.3.1 TCDI: Directory

Data element	Data type	Data element presence	Size	Description/comments
AID (sector 1)	AID	CL-1	12	AID of application starting in sector 1
PIX (sector 1)	PIX	CL-1	12	PIX of application starting in sector 1
AID (sector 2)	AID	CL-1	12	AID of application starting in sector 2
PIX (sector 2)	PIX	CL-1	12	PIX of application starting in sector 2
AID (sector 3)	AID	CL-1	12	AID of application starting in sector 3
PIX (sector 3)	PIX	CL-1	12	PIX of application starting in sector 3
AID (sector 4)	AID	CL-1	12	
PIX (sector 4)	PIX	CL-1	12	
AID (sector 5)	AID	CL-1	12	
PIX (sector 5)	PIX	CL-1	12	
AID (sector 6)	AID	CL-1	12	
PIX (sector 6)	PIX	CL-1	12	
AID (sector 7)	AID	CL-1	12	
PIX (sector 7)	PIX	CL-1	12	
AID (sector 8)	AID	CL-1	12	
PIX (sector 8)	PIX	CL-1	12	
AID (sector 9)	AID	CL-1	12	
PIX (sector 9)	PIX	CL-1	12	
AID (sector 10)	AID	CL-1	12	
PIX (sector 10)	PIX	CL-1	12	
AID (sector 11)	AID	CL-1	12	
PIX (sector 11)	PIX	CL-1	12	
AID (sector 12)	AID	CL-1	12	

Data element	Data type	Data element presence	Size	Description/comments
PIX (sector 12)	PIX	CL-1	12	
AID (sector 13)	AID	CL-1	12	
PIX (sector 13)	PIX	CL-1	12	
AID (sector 14)	AID	CL-1	12	
PIX (sector 14)	PIX	CL-1	12	
AID (sector 15)	AID	CL-1	12	
PIX (sector 15)	PIX	CL-1	12	
Checksum (1)	Checksum	CL-1	8	Positioned in last byte of block 0
Checksum (2)	Checksum	CL-1	8	Positioned in last byte of block 1
Checksum (3)	Checksum	CL-1	8	Positioned in last byte of block 2
Free (bits)			0	
Sum (bits)			384	
Sum (bytes)			48	
Sum (blocks)			3	

3.4 Travel Card Applications Layer

3.4.1 TCPU: Purse

3.4.1.1 TCPU, Static Data (85 H)

Data element	Data type	Data element presence	Size	Description/comments
Identifier	Identifier	Common	8	= 85 H
VersionNumber	VersionNumber	Common	6	= 2
AID	AID	Common	12	Identification of the provider of the purse
PurseSerialNumber	PurseSerialNumber	Common	32	PTA specific identification of purses
StartDate	DateCompact	Common	14	Date of the initialisation transaction of the purse
DataPointer	SectorPointer	CL-1	4	Pointer to a possible PTA specific area of data. PTAs accepting each others cards by an interoperability agreement must co-ordinate their use of this possibility. If this possibility is not used, the value must be 0.
MinimumValue	MoneyAmount24	CL-1	24	Minimum value of the purse. If *Value* < *Minimum-Value*, and *AutoLoadStatus* = 1, *AutoLoadValue* will be added to *Value*. The value is interpreted using the *CardCurrencyUnit* of *TCCI: Card Information*
AutoLoadValue	MoneyAmount24	CL-1	24	Value to add to *Value* according to the rule for data element *MinimumValue*. The value is interpreted using the *CardCurrencyUnit* of *TCCI: Card Information*
Free (bits)			4	
Sum (bits)			128	
Sum (bytes)			16	
Sum (blocks)			1	

3.4.1.2 TCPU, Dynamic Data

Data element	Data type	Data element presence	Size	Description/comments
PurseTransactionNumber	PurseTransactionNumber	Common	16	The purse transaction number is increased by 1 for every change of a purse
EndDate	DateCompact	Common	14	Expiry date of the purse
Value	MoneyAmount24	Common	24	The value of the purse. This value can be positive or negative. The value is interpreted using the *CardCurrencyUnit* of *TCCI: Card Information*
Status	Status	Common	8	Application status
Deposit	MoneyAmount20Positive	CL-1	20	The deposit value of the travel card, i.e. a money amount paid by the customer, that is returned, when the card is returned. The value is interpreted using the *CardCurrencyUnit* of *TCCI: Card Information*
AutoLoadStatus	AutoLoadStatus	CL-1	2	Status of the autoload function
MACAlgorithmIdentifier	MACAlgorithmIdentifier	CL-1	2	Identification of MAC algorithm
MACKeyIdentifier	MACKeyIdentifier	CL-1	6	Identification of key for MAC algorithm
MACAuthenticator	MACAuthenticator16	CL-1	16	16 b MAC authenticator
Free (bits)			20	
Sum (bits)			128	
Sum (bytes)			16	
Sum (blocks)			1	

3.4.2 TCEL: Event Log

3.4.2.1 Event Log Record (84 H)

Data element	Data type	Data element presence	Size	Description/comments
Identifier	Identifier	Common	8	= 84 H
EventDateStamp	DateCompact	Common	14	Date of the transaction generating the log record
EventTimeStamp	TimeCompact	Common	16	Time of the transaction generating the log record
AID	AID	Common	12	AID of TCEL
Device	Device	Common	16	Identification of the device that performed the transaction
DeviceTransactionNumber	DeviceTransactionNumber	CL-1	24	Transaction number of the device that performed the transaction
EventCode	EventCode	Common	6	Event code of the log record
EventData	EventData	Common	24	Depending on the value of *EventCode*, *EventData* contains one of the following 'Event Data' data element groups
Checksum	Checksum	CL-1	8	Positioned in last byte of block
Free (bits)			0	
Sum (bits)			128	
Sum (bytes)			16	
Sum (blocks)			1	

3.4.2.2 Event Data A

Event codes:

01 H: Purchase of TCTI using TCPU

02 H: Purchase of TCCO using TCPU

03 H: Purchase of TCTI with another payment than the TCPU

04 H: Purchase of TCCO with another payment than the TCPU

16 H: Card initialised

18 H: Application object repurchased/reimbursed

1A H: Purchase of paper ticket using TCPU

Data element	Data type	Data element presence	Size	Description/comments
Pointer	SectorPointer	CL-1	4	Pointer to the issued ticket
Price	MoneyAmount20Positive	Common	20	Price of the ticket. The value is interpreted using the *CardCurrencyUnit* of *TCCI: Card Information*
Sum			24	

3.4.2.3 Event Data B

Event codes:

05 H: TCTI issued by a TCCO

Data element	Data type	Data element presence	Size	Description/comments
TicketPointer	SectorPointer	CL-1	4	Pointer to the issued ticket
ContractPointer	SectorPointer	CL-1	4	Pointer to the issuing contract
Sum			8	

3.4.2.4 Event Data C

Event codes:

06 H: Validation of TCTI / TCCO

07 H: Extension of TCTI / TCCO

09 H: TCTI removed

0A H: TCCO removed

0B H: TCPU removed

0C H: TCST-ci/co removed

0D H: TCCP removed

0E H: TCDB removed

0F H: TCRE removed

17 H: Application object created

19 H: TCCO activated

1B H: Check-in validation of TCST-ci/co

1C H: Check-out validation of TCST-ci/co

1D H: Control validation of TCTI / TCCO / TCST-ci/co

1E H: Supplement validation of TCTI / TCCO / TCST-ci/co

Data element	Data type	Data element presence	Size	Description/comments
TicketPointer	SectorPointer	CL-1	4	Pointer to the ticket
PTA specific data		CL-1	20	PTA specific
Sum			24	

3.4.2.5 Event Data D

Event codes:

08 H: Charge of the TCPU

1F H: Charge of the TCPU using autoload

Data element	Data type	Data element presence	Size	Description/comments
Amount	MoneyAmount24	Common	24	The amount that was charged to the TCPU. The value is interpreted using the *CardCurrencyUnit* of *TCCI: Card Information*
Sum			24	

3.4.3 TCTI/TCCO: Ticket/Contract

3.4.3.1 TCTI, Header Information (86 H)

Data element	Data type	Data element presence	Size	Description/comments
Identifier	Identifier	Common	8	= 86 H
VersionNumber	VersionNumber	Common	6	= 2
Sum (bits)			14	
Sum (bytes)			2	

3.4.3.2 TCCO, Header Information (87 H)

Data element	Data type	Data element presence	Size	Description/comments
Identifier	Identifier	Common	8	= 87 H
VersionNumber	VersionNumber	Common	6	= 2
Sum (bits)			14	
Sum (bytes)			2	

3.4.3.3 Dynamic Information With Transaction Number (88 H)

Data element	Data type	Data element presence	Size	Description/comments
Identifier	Identifier	Common	8	= 88 H
ContractTransactionNumber	ContractTransactionNumber	Common	12	The transaction number is increased by 1 for every change of the ticket or contract
Sum (bits)			20	
Sum (bytes)			3	

3.4.3.4 TCTI/TCCO, Mandatory Data (89 H)

Data element	Data type	Data element presence	Size	Description/comments
Identifier	Identifier	Common	8	= 89 H
AID	AID	Common	12	AID of ticket or contract
PIX	PIX	Common	12	PIX of ticket or contract
SaleDevice	Device	Common	16	Identification of the device that initialised the ticket or contract
ContractSerialNumber	ContractSerialNumber	Common	32	PTA specific identification of tickets and contracts
Status	Status	Common	8	Application status
Sum (bits)			88	
Sum (bytes)			11	

3.4.3.5 Dynamic Information Without Transaction Number (8A H)

Data element	Data type	Data element presence	Size	Description/comments
Identifier	Identifier	Common	8	= 8A H
Sum (bits)			8	
Sum (bytes)			1	

3.4.3.6 MAC Algorithm Identifiers (93 H)

Data element	Data type	Data element presence	Size	Description/comments
Identifier	Identifier	Common	8	= 93 H
MACAlgorithmIdentifier	MACAlgorithmIdentifier	CL-1	2	Identification of MAC algorithm
MACKeyIdentifier	MACKeyIdentifier	CL-1	6	Identification of key for MAC algorithm
MACAuthenticator	MACAuthenticator16	CL-1	16	16 b MAC authenticator
Sum (bits)			32	
Sum (bytes)			4	

3.4.3.7 Administrative Price Information (94 H)

Data element	Data type	Data element presence	Size	Description/comments
Identifier	Identifier	Common	8	= 94 H
Price	MoneyAmount20Positive	Common	20	Price of the TCTI or TCCO. The value is interpreted using the *CardCurrencyUnit* of *TCCI: Card Information*
Sum (bits)			28	
Sum (bytes)			4	

3.4.3.8 Issuing Contract/Purse (95 H)

Data element	Data type	Data element presence	Size	Description/comments
Identifier	Identifier	Common	8	= 95 H
Pointer	SectorPointer	CL-1	4	Pointer to issuing contract or purse
Sum (bits)			12	
Sum (bytes)			2	

3.4.3.9 TCCO, Period of Validity (96 H)

Data element	Data type	Data element presence	Size	Description/comments
Identifier	Identifier	Common	8	= 96 H
ValidityStartDate	DateCompact	Common	14	Start date of validity period
ValidityStartTime	TimeCompact	Common	16	Start time of validity period
ValidityEndDate	DateCompact	Common	14	End date of validity period
ValidityEndTime	TimeCompact	Common	16	End time of validity period
ValidityDuration	ValidityDuration	Common	8	Specification of the length of the period of validity (for example months, weeks, days, hours). Depends on the AID and the PIX
ValidityLimitDate	DateCompact	Common	14	The latest date on which first use of the contract is allowed to commence
PeriodJourneys	JourneyCounter	Common	8	Maximum number of journeys allowed in the specified period
RestrictDay	RestrictDay	Common	8	Set of days of the week on which the ticket or contract is not valid
RestrictTimecode	RestrictTimecode	Common	8	Time periods of the day when the ticket or contract is not valid
Sum (bits)			114	
Sum (bytes)			15	

3.4.3.10 TCTI, Period of Validity (9D H)

Data element	Data type	Data element presence	Size	Description/comments
Identifier	Identifier	Common	8	= 9D H
ValidityStartDate	DateCompact	Common	14	Start date of validity period
ValidityStartTime	TimeCompact	Common	16	Start time of validity period
ValidityEndDate	DateCompact	Common	14	End date of validity period
ValidityEndTime	TimeCompact	Common	16	End time of validity period
Sum (bits)			68	
Sum (bytes)			9	

3.4.3.11 Validity, Distance (97 H)

Data element	Data type	Data element presence	Size	Description/comments
Identifier	Identifier	Common	8	= 97 H
JourneyOriginAID	AID	Common	12	AID designating the area of *JourneyOriginPlace*
JourneyOriginPlace	Place	Common	14	Start place of journey
JourneyDestinationAID	AID	Common	12	AID designating the area of *JourneyDestinationPlace*
JourneyDestinationPlace	Place	Common	14	End place of journey
JourneyDistance	DistanceValue	Common	12	Number of distance units of the journey
JourneyRun	RunNumber	Common	12	Run number of journey
JourneyVia1AID	AID	Common	12	AID designating the area of *JourneyVia1Place*
JourneyVia1Place	Place	Common	14	First via place of journey
JourneyVia2AID	AID	Common	12	AID designating the area of *JourneyVia2Place*
JourneyVia2Place	Place	Common	14	Second via place of journey
JourneyInterchange	InterchangeNumber	Common	6	Number of allowed interchanges. For example it is decreased by 1 for every interchange transaction
Sum (bits)			142	

Data element	Data type	Data element presence	Size	Description/comments
Sum (bytes)			18	

3.4.3.12 Validity, Route (98 H)

Data element	Data type	Data element presence	Size	Description/comments
Identifier	Identifier	Common	8	= 98 H
JourneyRouteAID	AID	Common	12	AID designating owner of route *JourneyRouteNumber*
JourneyRouteNumber	RouteNumber	Common	12	Route number
Sum (bits)			32	
Sum (bytes)			4	

3.4.3.13 Validity, Zone (99 H)

Data element	Data type	Data element presence	Size	Description/comments
Identifier	Identifier	Common	8	= 99 H
ValidityZoneAID	AID	Common	12	AID designating the area of *ValidityZonePlace*
ValidityZonePlace	Place	Common	14	Valid zone
Sum (bits)			34	
Sum (bytes)			5	

3.4.3.14 TCCO, Issuing Information (9A H)

Data element	Data type	Data element presence	Size	Description/comments
Identifier	Identifier	Common	8	= 9A H
ValidationTotalIssuedJourneys	JourneyCounter	Common	8	Total number of journeys issued under a contract
ValidationTotalIssuedJourneyswithinPeriod	JourneyCounter	Common	8	Total number of journeys issued within the period. The period is defined by the contract PIX. If this counter equals *PeriodJourneys* then the contract can not issue new journeys until a new valid period is entered. This counter is set to zero when a new period is entered
ValidationLastDate	DateCompact	Common	14	Date for the last validation of the contract
ValidationLastTime	TimeCompact	Common	16	Time for the last validation of the contract
Sum (bits)			54	
Sum (bytes)			7	

3.4.3.15 TCTI, Issuing Information (9E H)

Data element	Data type	Data element presence	Size	Description/comments
Identifier	Identifier	Common	8	= 9E H
ValidationLastDate	DateCompact	Common	14	Date for the last validation of the ticket
ValidationLastTime	TimeCompact	Common	16	Time for the last validation of the ticket
Sum (bits)			38	
Sum (bytes)			5	

3.4.3.16 Administrative Class Information (9C H)

Data element	Data type	Data element presence	Size	Description/comments
Identifier	Identifier	Common	8	= 9C H
PassengerClass	PassengerClass	Common	2	Passenger class ('1st', '2nd', ...) for all passengers in the passenger group
PassengerSubGroup (1)	#PassengerSubGroup	Common	14	1st sub group of passengers
PassengerSubGroup (2)	#PassengerSubGroup	Common	14	2nd sub group of passengers
PassengerSubGroup (3)	#PassengerSubGroup	Common	14	3rd sub group of passengers
Sum (bits)			52	
Sum (bytes)			7	

3.4.3.17 Validation Information (9F H)

Data element	Data type	Data element presence	Size	Description/comments
Identifier	Identifier	Common	8	= 9F H
ValidationModel	ValidationModel	Common	2	Validation model ('ci/co', 'ci-dest')
ValidationStatus	ValidationStatus	Common	2	Validation Status ('Open', 'Closed')
ValidationLevel	ValidationLevel	Common	2	Allowed level of validation for this journey
Sum (bits)			14	
Sum (bytes)			2	

3.4.4 TCDB: Discount Basis

3.4.4.1 Discount Basis, Static Data (A1 H)

Data element	Data type	Data element presence	Size	Description/comments
Identifier	Identifier	Common	8	= A1 H
VersionNumber	VersionNumber	Common	6	= 1
AID	AID	Common	12	AID of TCDB
DiscountType (1)	DiscountType	Common	8	Discount type for *DiscountBasisBlock (1)*
DiscountType (2)	DiscountType	Common	8	Discount type for *DiscountBasisBlock (2)*
DiscountType (3)	DiscountType	Common	8	Discount type for *DiscountBasisBlock (3)*
Free (bits)			78	
Sum (bits)			128	
Sum (bytes)			16	
Sum (blocks)			1	

3.4.4.2 Discount Basis, Dynamic Data

Data element	Data type	Data element presence	Size	Description/comments
Status	Status	Common	8	Application status
FirstMonth	DateMonth8	Common	8	Month of the discount counters
DiscountBasisBlock (1)	#DiscountBasisBlock	Common	29	Discount basis (1)
DiscountBasisBlock (2)	#DiscountBasisBlock	Common	29	Discount basis (2)
DiscountBasisBlock (3)	#DiscountBasisBlock	Common	29	Discount basis (3)
MACAlgorithmIdentifier	MACAlgorithmIdentifier	CL-1	2	Identification of MAC algorithm
MACKeyIdentifier	MACKeyIdentifier	CL-1	6	Identification of key for MAC algorithm
MACAuthenticator	MACAuthenticator16	CL-1	16	16 b MAC authenticator
Free (bits)			1	

Data element	Data type	Data element presence	Size	Description/comments
Sum (bits)			128	
Sum (bytes)			16	
Sum (blocks)			1	

3.4.5 TCCP: Customer Profile

3.4.5.1 Customer Profile (A2 H)

Data element	Data type	Data element presence	Size	Description/comments
Identifier	Identifier	Common	8	= A2 H
VersionNumber	VersionNumber	Common	6	= 1
AID	AID	Common	12	AID of TCCP
Status	Status	Common	8	Application status
CustomerNumber	CustomerNumber	Common	34	10-digit customer number
PassengerClass	PassengerClass	Common	2	Default passenger class ('1st', '2nd', ...) when issuing tickets based on TCCP
PassengerSubGroup (1)	#PassengerSubGroup	Common	14	1st sub group of passengers (default group)
PassengerSubGroup (2)	#PassengerSubGroup	Common	14	2nd sub group of passengers (default group)
PassengerSubGroup (3)	#PassengerSubGroup	Common	14	3rd sub group of passengers (default group)
ValidationLevel	ValidationLevel	Common	2	Default allowed level of validation
Birthday	DateMonth11	Common	11	Month of customer's birthday
Language	Language	Common	4	Preferred language
DialoguePreferences	DialoguePreferences	Common	8	Preferences for dialogue with front system
SubscriptionOrCreditCompany	SubscriptionOrCreditCompany	Common	12	Identification of subscription or credit company
SubscriptionOrCreditType	SubscriptionOrCreditType	Common	8	Type of subscription or credit
MACAlgorithmIdentifier	MACAlgorithmIdentifier	CL-1	2	Identification of MAC algorithm

Data element	Data type	Data element presence	Size	Description/comments
MACKeyIdentifier	MACKeyIdentifier	CL-1	6	Identification of key for MAC algorithm
MACAuthenticator	MACAuthenticator16	CL-1	16	16 b MAC authenticator
Free (bits)			75	
Sum (bits)			256	
Sum (bytes)			32	
Sum (blocks)			2	

3.4.6 TCST: Special Ticket

3.4.6.1 TCST-ci/co (A3 H)

Data element	Data type	Data element presence	Size	Description/comments
Identifier	Identifier	Common	8	= A3 H
VersionNumber	VersionNumber	Common	6	= 1
AID	AID		12	AID of TCST-ci/co journey
PIX	PIX	Common	12	PIX of TCST-ci/co
Status	Status	Common	8	Application status
Passenger Group				
PassengerClass	PassengerClass	Common	2	Passenger class ('1st', '2nd', ...) for all passengers in the passenger group
PassengerSubGroup (1)	#PassengerSubGroup	Common	14	1st sub group of passengers
PassengerSubGroup (2)	#PassengerSubGroup	Common	14	2nd sub group of passengers
PassengerSubGroup (3)	#PassengerSubGroup	Common	14	3rd sub group of passengers
Validation				
ValidationModel	ValidationModel	Common	2	Validation model ('ci/co', 'ci-dest')
ValidationStatus	ValidationStatus	Common	2	Validation Status ('Open', 'Closed')

Data element	Data type	Data element presence	Size	Description/comments
ValidationLevel	ValidationLevel	Common	2	Allowed level of validation for this journey
Price				
Price	MoneyAmount20Positive	Common	20	Open: Maximum price ("a conto") Closed: Price of journey (Interpreted using *PriceUnit* of card)
PriceModificationLevel	PriceModificationLevel	Common	6	Level of price modification
Journey Information				
JourneyOriginAID	AID	Common	12	AID designating the area of *JourneyOriginPlace*
JourneyOriginPlace	Place	Common	14	Start place of journey
JourneyOriginDateTime	DateTime	Common	24	Start time of journey
JourneyFurthestAID	AID	Common	12	AID designating the area of *JourneyFurthestPlace*
JourneyFurthestPlace	Place	Common	14	Place of journey furthest away from *JourneyOriginPlace*
FurthestTime	RelativeTime	Common	10	Time of *JourneyFurthestPlace* (relative to *JourneyOriginDataTime*)
JourneyDestinationAID	AID	Common	12	AID designating the area of *JourneyDestinationPlace*
JourneyDestinationPlace	Place	Common	14	End place of journey
JourneyDestinationTime	RelativeTime	Common	10	End time of journey (relative to *JourneyOriginDataTime*)
Supplement				
SupplementStatus	SupplementStatus	Common	2	Supplement status
SupplementType	SupplementType	Common	6	Supplement type
SupplementOriginAID	AID	Common	12	AID designating the area of *SupplementOriginPlace*
SupplementOriginPlace	Place	Common	14	Start place of supplement count
SupplementDistance	DistanceValue	Common	12	Number of distance units for supplement calculation. Defined if *SupplementStatus* is 2 or 3
Control				
LatestControlAID	AID	Common	12	AID designating the area of *LatestControlPlace*

Data element	Data type	Data element presence	Size	Description/comments
LatestControlPlace	Place	Common	14	Place of latest control
LatestControlTime	RelativeTime	Common	10	Time of latest control (relative to *JourneyOriginDataTime*)
MAC				
MACAlgorithmIdentifier	MACAlgorithmIdentifier	CL-1	2	Identification of MAC algorithm
MACKeyIdentifier	MACKeyIdentifier	CL-1	6	Identification of key for MAC algorithm
MACAuthenticator	MACAuthenticator16	CL-1	16	16 b MAC authenticator
Free (bits)			34	
Sum (bits)			384	
Sum (bytes)			48	
Sum (blocks)			3	

3.4.7 TCRE: Reservation

Not specified.

4 BITS & BYTES

Bits (b)	2^b	Decimal digits	Bytes
1	2	0	1
2	4	0	1
3	8	0	1
4	16	1	1
5	32	1	1
6	64	1	1
7	128	2	1
8	256	2	1
9	512	2	2
10	1024	3	2
11	2048	3	2
12	4096	3	2
13	8192	3	2
14	16384	4	2
15	32768	4	2
16	65536	4	2
17	131072	5	3
18	262144	5	3
19	524288	5	3
20	1048576	6	3
21	2097152	6	3
22	4194304	6	3
23	8388608	6	3
24	16777216	7	3
25	33554432	7	4
26	67108864	7	4
27	134217728	8	4
28	268435456	8	4
29	536870912	8	4
30	1073741824	9	4
31	2147483648	9	4
32	4294967296	9	4
33	8589934592	9	5
34	17179869184	10	5
35	34359738368	10	5
36	68719476736	10	5
37	137438953472	11	5
38	274877906944	11	5
39	549755813888	11	5
40	1099511627776	12	5

Bits (b)	2^b	Decimal digits	Bytes
41	2199023255552	12	6
42	4398046511104	12	6
43	8796093022208	12	6
44	17592186044416	13	6
45	35184372088832	13	6
46	70368744177664	13	6
47	140737488355328	14	6
48	281474976710656	14	6
49	562949953421312	14	7
50	1125899906842624	15	7
51	2251799813685248	15	7
52	4503599627370496	15	7
53	9007199254740992	15	7
54	18014398509481984	16	7
55	36028797018963968	16	7
56	72057594037927936	16	7
57	144115188075855872	17	8
58	288230376151711744	17	8
59	576460752303423488	17	8
60	1152921504606846976	18	8
61	2305843009213693952	18	8
62	4611686018427387904	18	8
63	9223372036854775808	18	8
64	18446744073709551616	19	8