

Electronic Ticketing

Part 23: Interoperability Certification and Testing Regime



Foreword

This is a direct continuation of the Handbook V821 previously published by the Norwegian Public Roads Administration. The responsibility of this Handbook was transferred to the Norwegian Railway Directorate on April 1st, 2017.

Handbook V821 concerns electronic ticketing with travelcards, primarily focused on public transportation. The handbook is commissioned by the Ministry of Transportation and is financed by the Norwegian Railway Directorate and the Ministry of Transportation. The main purpose of the handbook is to make it easier for the customer to travel by public transportation. An important part of this simplification is coordination of systems for electronic ticketing on the local, regional and national levels.

The targeted audience for the handbook will be decision makers in public transportation companies and public agencies. In addition, it will address personnel working with requirement specifications and acquisition of systems for electronic ticketing.

A complete overview of the contents in Handbook V821 is given in Part 0.

This part contains the certification and test regime for Public Transport Organisations (PTO) to be connected to the Norwegian interoperable fare management network operated by interoperabilitetstjenester AS (IO AS).

This handbook is organised as follows: Chapter 1 contains terms and definitions used. Chapter 2 contains references to handbooks and standards. Chapter 3 is the introduction with emphasis on why a certification regime is needed. Chapter 4 defines the scope in terms of equipment types, interoperability communication levels (level 0 to level 4) and transactions. Chapter 5 defines the main requirements for certification testing to commence. Chapter 6 defines the different roles and parties required for the certification to commence. Chapter 7 describes the overall process of the certification. Chapter 8 describes the overall strategy for the testing part of the certification. Appendix A contains requirements to the PTO's operational organisation and systems, and is organised as a self-assessment compliance statement. Appendix B contains an overview of device types and transaction types used in testing. The test cases are available in a separate document as they may be subject to frequent changes.

The Norwegian Railway Directorate presupposes that current international standards and guidelines given in Handbook V821 Electronic Ticketing are followed by projects for electronic ticketing as instructed by the license authority, ref the Norwegian law for professional transportation (Yrkestransportloven) and the corresponding regulations for professional transportation (Yrkestransportforskriften) §30, which is elaborated by the Ministry of Transportation's circular N-1/2006, and regulations for ticketing in rail transport (Forskrift om billettering ved jernbanetransport) §4.

The Norwegian Railway Directorate, February 2018

Prosjektnummer: 600002	Ansvarlig avdeling: Marked og Samfunn Faglig ansvar: Markedskunnskap
Versjon: 1.0	Forsidefoto/illustrasjon: Statens vegvesen, Skyss, NSB, Ruter, Fjord1
ISBN: 978-82-8386-001-6	

Table of Contents

1	Terms and definitions	4
2	References	5
3	Introduction	6
	3.1 Why is a certification regime needed	6
	3.2 How to achieve it	6
4	Scope	7
	4.1 Card level interoperability	7
	4.2 Product interoperability.....	7
	4.3 Transaction interoperability	8
5	Certification requirements	9
	5.1 Agreements.....	9
	5.2 PTO self-test.....	10
	5.3 Adequate test environments	10
6	Roles and certification parties	12
7	Process for interoperability certification	15
	7.1 Apply for certificate and test slot.....	15
	7.2 Make agreements	15
	7.3 Provide test slot.....	15
	7.4 Document PTO operation (self-assessment)	16
	7.5 Perform self-test	16
	7.6 Perform Interoperability test	16
	7.7 Issue certificate	16
8	Certification testing	17
	8.1 Overall test strategy	17
	8.2 Test plan	18
	8.3 Problem reporting.....	19
	8.4 Test criteria	22
	8.5 Test categories	22
	8.6 Test activities.....	29

1 Terms and definitions

CSC	Contactless smart card
CT	Contactless ticket
Interoperability	is a property referring to the ability of diverse systems and organizations to work together (inter-operate). The term is often used in a technical systems engineering sense, or alternatively in a broad sense, taking into account social, political, and organizational factors that impact system to system performance. (Wikipedia) the ability of two or more systems or components to exchange information and to use the information that has been exchanged. (IEEE 90)
IO	Interoperability
IO AS	Interoperabilitetstjenester AS
IOS	Interoperability server, IO server
PTO	Public Transport Operator
QA	Quality Assurance
PL4	IO AS database for archiving transactions
SAT	Site Acceptance Test
TC	Test Case

2 References

Handbook V821	www.vegvesen.no/fag/Publikasjoner/Handboker
IFM standard	Public Transport – Interoperable Fare Management System (Draft international standard, ISO/DIS-24014)
IO Business Processes and Rules	Thales, 30.01.2006, Version D
IEEE 829	IEEE standard for test documentation
TR	Test Run

3 Introduction

3.1 Why is a Certification Regime Needed

A certification is a formal process that ensures the quality with respect to robustness, security and scalability of all systems connected to the interoperability network for the Norwegian public transport.

3.2 How to achieve it

To achieve a certificate, that is a permission to connect to the IO production network, the following requirements have to be fulfilled:

- Agreements between all parties (PTOs and IO AS) have to be established and signed.
- Necessary systems have to be installed and operative.
- Process for keeping registrar data at IO updated must be in operation
- A PTO self-assessment with respect to organization and systems has to be completed and approved
- A PTO self-test has to be performed with satisfactory result
- Finally, interoperability testing has to be completed in the IO environment (Test, QA and Production, depending on agreements) with satisfactory result.

A more in-depth overview over requirements for certification is described in chapter 7.

4 Scope

A PTO may have many different systems, but only a few of them are relevant in the context of interoperability testing and certification. The interoperability testing process can be divided into three sub processes, each of which focuses on different parts of electronic ticketing. It is important to remember that not all sub processes have to be a part of the certification, which ones will, will be dependent on agreements prior to certification.

Level 4	Interoperability (PTO-IO transactions)
Level 3	Service provider central computer
Level 2	Station computer (collecting data from equipments)
Level 1	Equipment (Card – equipment transactions)
Level 0	Smart card (layout and information)

Figure 4-1 Overview of levels

Certification sub processes are outlined below.

4.1 Card level interoperability

Card level interoperability revolves around the card life cycle, involves elements of product life cycle, use of Stored Value and reconstruction. This sub process refers to levels 0 and one in Table 4.1.

- Card life cycle
- Card states (initialisation, activation, blocking, disabling)
- Validity and expiry dates
- Transaction sequence numbering
- Personalization
- Card event tracking
- Product life cycle (including auto renew)
- Garbage collection
- Use of Stored Value
- Loading of Stored Value
- Use of Stored Value
- Stored Value refund
- Auto-reloading

4.2 Product interoperability

Most aspects of product interoperability will usually not be within the scope of interoperability certification. However this level of interoperability may be subject to testing because of bilateral product agreements between the different PTO and IO, and should be subject to testing when the PTO undergoing testing provides means of purchasing and using Quick Response (QR)-code based tickets on mobile devices QR-code based tickets, commonly referred to as mobile tickets, are not dependent on physical card media, but they have to adhere to strict specifications described in Handbook V821, Part 20. Therefore, it is vital to include testing of mobile tickets during certification to ensure that the specified requirements are met. The product level interoperability sub process refers to levels 0, 1 and 2 in Table 4.1. Testing on this level may include the following elements: Product interoperability test elements for products based on physical card media:

- Sale
- Sale of products across different PTOs using different payment means
- Auto-renew of subscription products across PTOs

- Validation
- Activation and/or validation of interoperable products
- Transfer time calculations
- Validity times
- Use of counters
- Non-interoperable product behavior
- Handling of non-interoperable or unknown products
- Product life cycle
- Product states (pausing, blocking, expiration)
- Product Templates and Contract Tariffs

Physical card media-independent test elements (mobile tickets):

- Sale
- Activation
- Validity/transfer time calculation
- Product life cycle
- Product Templates and Contract Tariffs
- QR-code structure and contents
- Security animation contents

4.3 Transaction interoperability

The interoperability certification regime covers fare and administrative transactions. Commercial transactions between PTOs are outside the scope. However, fare transactions may make the basis for settlement between PTOs depending on bi-lateral agreements. Testing and certification of administrative transactions are, along with the card level interoperability, a vital part of the certification regime. This certification subprocess refers to levels 1 and 4 in Table 4.1. Certifications of transaction consists of the following elements:

- Handling of unknown transactions
- Use of Extension Data and other PTO specific fields
- Stored Value transactions necessary for the apportionment and clearing process.
- Card event tracking

5 Certification requirements

5.1 Agreements

When a new PTO shall be certified and connected to the network there shall be agreements between the PTO and IO AS and, if needed, between the new PTO and other PTOs already connected to the network. This is illustrated in the figure below.

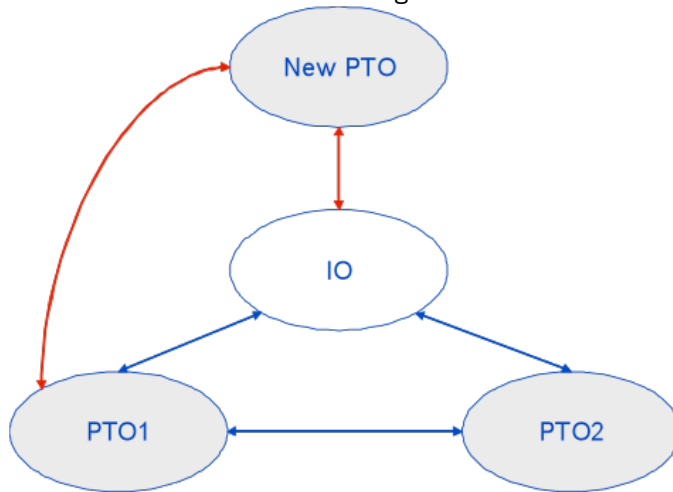


Figure 5-1: Agreement structure

5.1.1 Agreement between PTO and IO AS

Reference to Handbook V821 part 2.

The agreement should address but not be limited to the following matters:

- PTO and IO AS obligations
- Scope (products and services)
- Adherence to test windows / change windows
- Test suspension / test resumption criteria
- Defect tracking tools and tracking state flow
- Communication channels
- Test acceptance criteria
- Liability
- Intellectual Property Rights
- Confidentiality
- Adherence to IO change procedures
- IO AS should have the right to inspect the PTO systems and organization
- Commercial matters (not covered by the certification regime)
- IO AS should have the possibility to sanction in case of PTO not fulfilling the interope rability requirements (e.g. information security breaches)
- Force Majeure
- Termination

5.1.2 Agreement between PTOs

Agreements between the new PTO and other PTOs should address but not be limited to the following matters:

- Agreement on products
- Agreement on use (stored value)

- Charge to account
- Commercial matters (not covered by the certification regime)

5.2 PTO self-test

The purpose of the self-test is to test own products and available functionality on own devices. Due to limited access to transaction interoperability in the PTO's internal test environment, a limited set of functionality can be tested. Blacklists, actions lists and reconstruction (see chapter 8.5) can be tested in a limited manner, i.e. the lists and transactions have to be distributed through the PTO's own back office systems, and not via IO.

The test cases can be found in a separate test case document. Note that all test cases can be used for both self-test and interoperability tests, but have to be configured according to environment to be used. This is explained in Table 8.3 in chapter 8.5.

Prerequisites:

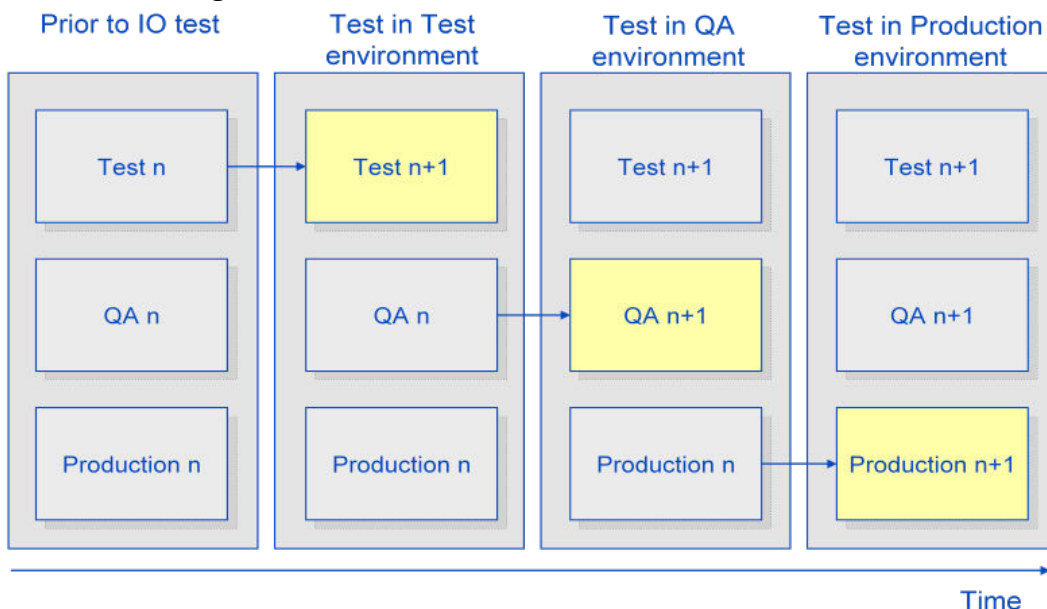
- Approved FAT
- Approved SAT

Requirements:

- Test plan for own tests of interoperable cards/products
- Run self-tests (done by PTO or by 3rd party)
- Document tests in test report to IO. Required contents of test report:
 - Test item(s) description and version(s)
 - Tests performed (which tests from the test case document have been executed)
 - Outcome of tests
 - Discrepancies (Non conformances/observations)
 - Dump of card contents
 - Signature of own approval

5.3 Adequate test environments

The certification procedure should pass three different stages (four, including PTO selftest) in order to ensure the quality of the testing performed under different circumstances. The different stages are shown in the figure below.



Figurtekst: Handling of versions in the three environments. The labels n and n+1 are the version numbers of the various environments. In the figure all three environment initially have version n and through the various steps finally end up in version n+1. (This is a simplified illustration, not taking the detection of defects into account that would lead to more iterations and versions.)

Above we have illustrated the version handling of the three environments:

1. Assume that prior to IO testing all three environments has the same version n.
2. The test environment is upgraded to version n+1 to accommodate for the changes due to the introduction of the new PTO
3. After successful test in the test environment the QA environment is upgraded to version n+1.
4. Finally, after successful test in the QA environment, the production environment is upgraded to version n+1.

For the certification to be performed it is required that the PTO being certified provides the certification authority with adequate equipment to perform the interoperability tests. Optimally all the stages should be performed in separate physical test environments with full infrastructure. However this requires extensive resources on the PTO side (two fully equipped physical test environments (Test, QA) in addition to the production environment. In most cases this will not be practically feasible. It is therefore suggested that the first stage (Test) can be executed in a distributed manner. This means that test steps can be performed at PTO internal test site and card level communication with other PTO's equipment can be made using card dumps in an agreed format. Communication between PTO and IO will be done by manually exchanging transaction files by e.g. e-mail, making the need for full network structure redundant. Requirements for test equipment and infrastructure for each test stage are as follows.

5.3.1 PTO's own test equipment

The following test equipment is required:

- Compatible contactless smart cards (CSC), and contactless tickets (CT) if applicable
- Card reader and dump device
- Test keys for communication with cards
- Necessary devices (ticket vending machines, ticketing devices and validators) to perform test
- Necessary network configuration supporting blacklist and action list distribution, in addition to transaction flow
- Necessary payment means (cash and credit cards)

5.3.2 Interoperable test equipment

Test environment

- Compatible contactless smart cards (CSC), and contactless tickets (CT) if applicable
- Card reader and dump device
- Test keys for communication with cards
- Necessary devices (ticket vending machines, ticketing devices and validators) to perform test
- Communication channel agreed on beforehand for manual exchange of card dumps and transaction files (FTP, E-mail, web portal)
- Necessary payment means (cash and credit cards)

QA environment

- Compatible contactless smart cards (CSC), and contactless tickets (CT) if applicable
- Card reader and dump device
- Test keys for communication with cards
- Necessary devices (ticket vending machines, ticketing devices and validators) to perform test
- Necessary network configuration supporting blacklist and action list distribution, in addition to transaction flow
- Connection to IO QA network and the PTOs' back office systems
- Necessary payment means (cash and credit cards)

Production environment

This is the production environment as is at time of connection of the new PTO.

The various device types are further described in Table B.1: Description of device types

6 Roles and certification parties

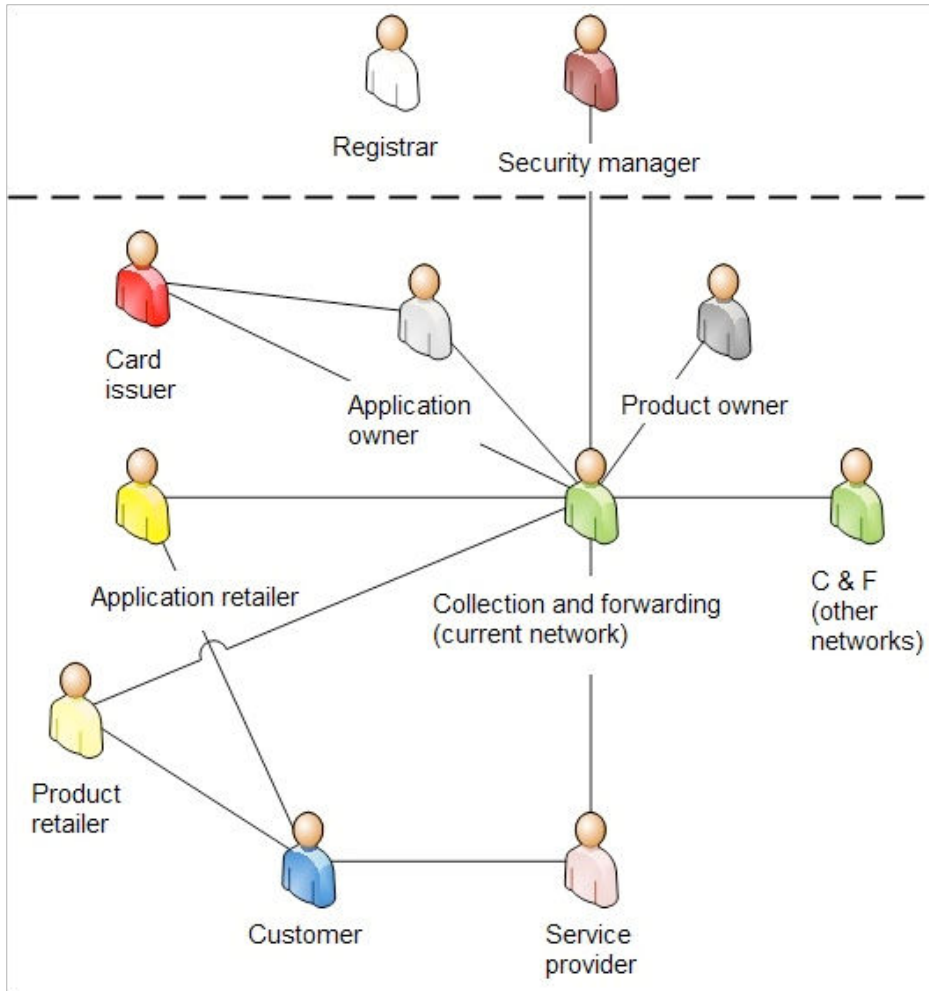


Figure 6-1: Interoperable Fare Management (IFM) system showing some of the relevant roles

Definitions of roles are provided in the table below:

ISO	Definition
Application Owner	Entity responsible for the shell definition that will include the card data definition and initialization format.
Application Retailer	Entity that carries out the initialization process on a Card on behalf of Application Owner.
Product Owner	Entity that defines and owns a Product; responsible for definition, sales, product black listing and product refund.
Product Retailer	Entity that sells products and collects payment from Customer for products, on behalf of Product Owner.

Service Operator	Entity providing Services to the Customers and accepting CSC / CT card for payment. By convention, Service Operator is assumed to be the entity with central processing capability, therefore collecting transactions on behalf of other entities.
Collecting and forwarding	Entity responsible of facilitation of data interchanges of interoperable Fare Management.
Security Manager	Entity responsible for security policy, for allowing, issuing and maintaining the security keys.
Registrar	Entity which registers: Owners (Card issuer (as Card Owner), Application Owner, ...) Service Operators Card data layouts Application(s) Product definitions inside IO Scheme.
Customer	Holds an application. Buys products in order to travel
Certification Authority	Entity which issues certificate for connection to the Interoperable Fare Management network.
ISO (2014) Extension	V821 definitions
Card Owner	Entity responsible for managing cards and associated data, owner of customer data.
Card Producer	Entity executing initial processing and branding on behalf of Card owner.
Application Retailer	Entity that sells Cards personalises them, and which receives any Card fee, deposits or initial value, on behalf of Card Issuer.
Stored Value Owner	Entity that defines usage & commercial rules and owns the customer payment details.
Load Agent	Entity reloading stored value instance and collecting payment from Customer on behalf of Stored Value Owner.
Float Manager	Entity responsible for execution of managing the float: tracking all transactions, ensuring liquidity and solvability.
Clearing Operator	Entity that is in charge of apportionment, clearing and settlement of Stored Value and product transactions according to relevant Business rules.

Below the roles are mapped to the various parties, showing which roles are assumed by IO AS and which roles are assumed by the PTOs.

	IO AS	PTO 1	PTO 2	PTO 3
Card Issuer (Owner,				

Producer, Retailer)				
Stored Value Owner		Same as Card Issuer	Same as Card Issuer	Same as Card Issuer
Load Agent				
Float Manager				
Clearing Operator				
Application Owner				
Application Retailer				
Product Owner				
Product Retailer				
Service Operator				

Collecting and Forwarding	Forwarding	Collection	Collection	Collection
Security Manager				
Registrar				
Customer Service				
Certification Authority				

7 Process for interoperability certification

The overall process for interoperability certification is illustrated in the figure below.

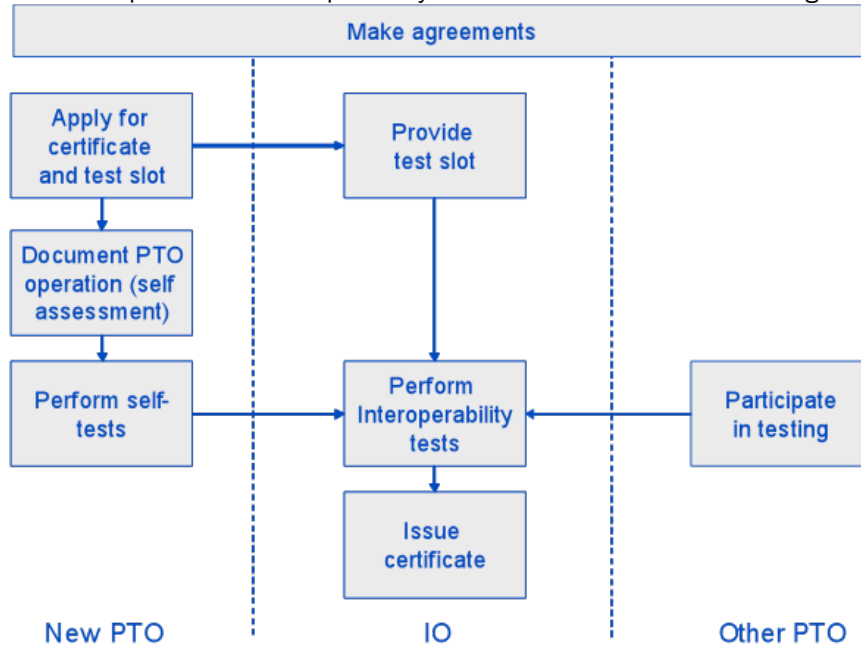


Figure 7-1: Overall certification process description

Below the various process steps are briefly explained

7.1 Apply for certificate and test slot

The process starts with a PTO intending to be connected to the interoperability network, applying for a certificate and time for testing. Testing resources, available environments and time slots will be divided depending on need between three different types of interoperable test regimes.

7.2 Make agreements

As described in chapter 5.1 agreements are needed between the new PTO and IO AS as well as between the new PTO and some of the other PTOs already connected to the network.

7.3 Provide test slot

IO AS provides a test period for the testing of the interoperability. It is IO's responsibility to plan test slots that do not interfere with planned changes to the IO network (e.g. tariff changes).

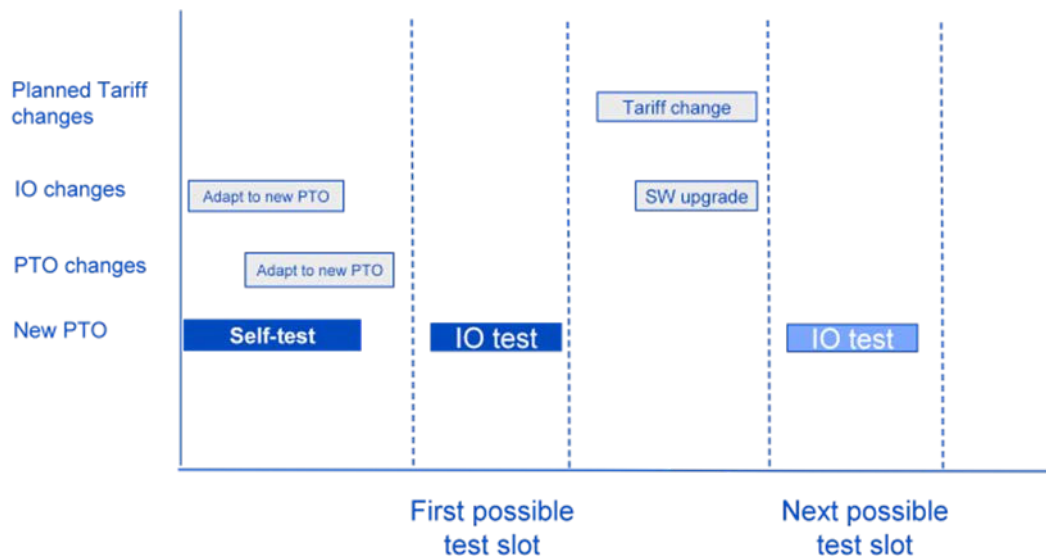


Figure 7-2: Illustration of possible test-slots for a new PTO

7.4 Document PTO operation (self-assessment)

The PTO shall perform a self-assessment of own operation by documenting compliance to the requirements stated in Appendix A. The PTO shall fill in this self-assessment and send to the certification authority to document its operational ability. Any non-compliances and the handling of these have to be agreed with IO AS.

7.5 Perform self-test

The PTO shall carry out and document own testing as described in chapter 7.2. Prerequisite for this is that the PTO systems are implemented according to the technical specifications of Handbook V821.

7.6 Perform Interoperability test

Interoperability testing in IO test, QA and production environment shall be performed and documented as described in chapter 8.1.2. The new PTO must participate in this test. Other PTOs will need to contribute with equipment and possibly also man-power in the interoperability testing. Other PTOs may need to change their software to allow the new PTO's products. This has to be addressed in the PTO-PTO agreements.

7.7 Issue certificate

After a successful IO test, a certificate will be issued from the Certificate Authority, and access to the network will be granted.

8 Certification testing

8.1 Overall test strategy

The figure below shows the main steps of the overall test strategy.

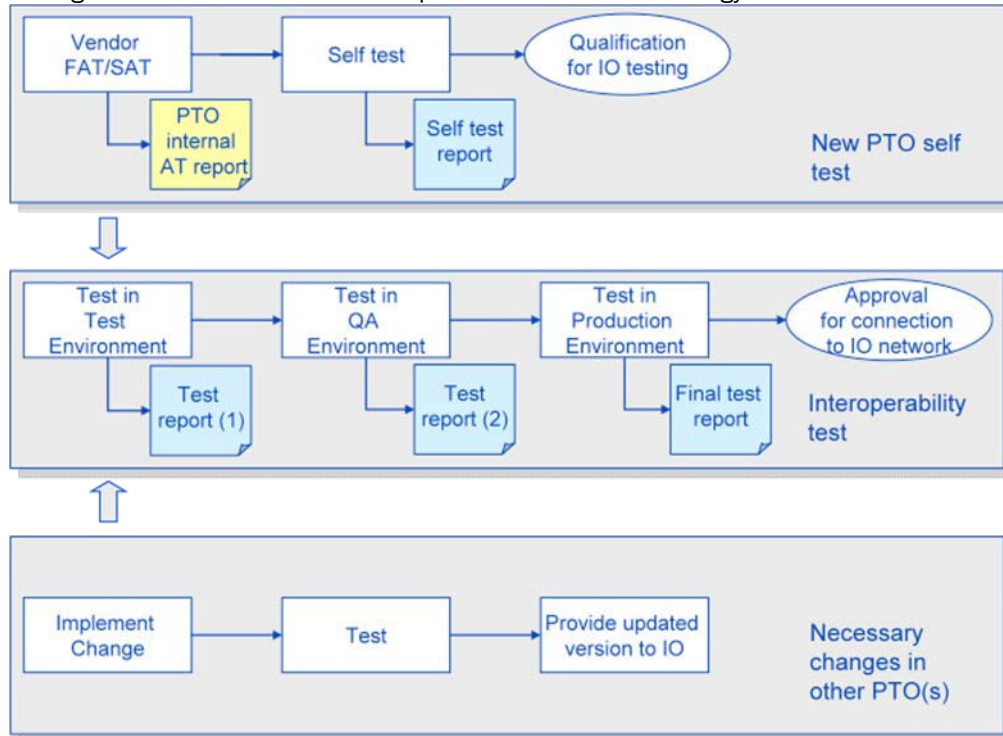


Figure 8-10: Overview of overall test approach-self-test and interoperability test.

The overall test campaign consists of two major parts:

8.1.1 New PTO's own testing (self-test)

These are tests performed by the PTOs themselves to ensure compliancy to technical specifications of Handbook V821. Refer to chapter 5.2 and Appendix A for more on self-assessment test.

8.1.2 Interoperability testing

In addition it may be necessary for other PTOs already connected to the network to implement changes in their software to interface the new PTO's products. This has to be addressed in the PTO-PTO agreement.

Interoperability testing is to test functionality together with IO AS and other relevant PTOs.

Test shall be performed in:

- Test environment with test keys
- QA environment with test keys
- Production with production keys

These environments are described in more detail in chapter 5.3

Prerequisites:

- Successful self-test

Requirements:

- Provide equipment to IO for testing
- Setup and configure interoperable environments (Test, QA, Production)
- Test plan

- Perform tests
- Document test in test report
- Test item(s) description and version(s)
- Tests performed (which tests from the test case document have been executed)
- Outcome of tests
- Discrepancies (Non conformances/observations)
- Dump of card contents
- Signature of own approval

In addition it may be necessary for other PTOs already connected to the network to implement changes in their software to interface the new PTO's products. This has to be addressed in the PTO-PTO agreement.

8.1.3 Changes

Testing of changes is not part of the initial certification regime. However, as most of the tests described for a new PTO are applicable for test of changes, this topic is treated here for completeness.

For configuration or functionality changes either initiated by IO AS or PTO the IO Change regime applies (ref. IO Change Control Procedure document).

The extent of regression testing has to be decided based on a consequence evaluation. Tests to run can be picked from the above mentioned tests. If new functionality, new, additional tests may have to be designed.

Changes may be of the following types.

- Tariff changes (change of price, introduction of new products, expiration of old products)
- IO Software changes (new functionality, enhancements or bug fixing)
- PTO Software changes (new functionality, enhancements or bug fixing)
- New devices (new hardware, servers, databases)
- Necessary changes in existing PTOs' systems to accommodate the inclusion of a new PTO

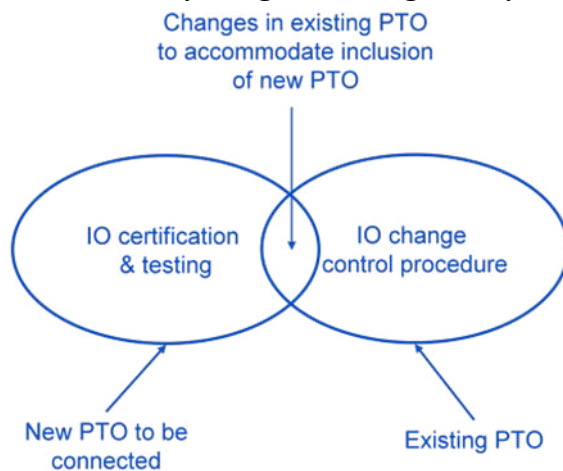


Figure 8-2: - Testing of new PTO versus the IO change control procedure.

8.2 Test plan

A test plan shall be made that describes the scope, approach, resources and schedule of the testing activities. It is recommended to write the test plan according to IEEE Std 829 (IEEE Standard for test documentation). An outline of the structure is given below.

IEE 829	Comments / reference to this document
Test plan identifier	Document id
Introduction	

Test items	Equipments and software
Features to be tested	Description of what to be tested
Features not to be tested	If relevant
Approach	Ref. test cases
Item pass/fail criteria	Ref. chapter 8.4
Suspension criteria and resumption requirements	Ref chapter 8.4.2
Test deliverables	Test report
Testing tasks	Activities to be performed
Environmental needs	Ref chapter 5.3
Responsibilities	
Staffing and training needs	If relevant
Schedule	Could be in a separate document
Risks and contingencies	What if scenarios
Approvals	Signatures

This plan should be adapted to the needs and requirements of the new PTO. (Some of the chapters may contain references as the information may be found elsewhere).

8.3 Problem reporting

All problems and unexpected behavior occurred during IO testing shall be reported using a defect tracking tool chosen and operated by IO. Such a tool should preferably be web based to ease and speed up communication between parties responsible for reporting, following up and repairing defects. It is vital for the further process that as much information as possible is collected at the current test environment, so that the problem situation can be understood by the involved parties. This includes information about test case, step, products on card, agreements, device used, tariff set, feedback from device (display text, light and sound) and zone information. Card dumps should be investigated at the test lab, and unexpected contents shall be provided in the problem report. However, as card dumps are stored, more extensive examinations can be performed by others later.

8.3.1 Reporting a new problem

A new problem report shall contain the fields, or equivalent, listed in Table 8.1. This table also shows an example problem report.

Field	Description
Product	The product, usually the name of the e-ticketing system
Component	The device the problem occurred on.
Version	The version of the test system
Severity	The severity of the problem
Priority	Priority is set according to roll-out schedule
Initial state	Depending on which defect tracking tool is used this will be the initial state of the tracking process

Assign to	The bug shall be assigned to a person in the organisation that is responsible for the device where the problem occurred
CC/Defect notification	Secondary recipients of information about the defect. Any and all relevant personnel should be added
Product group	If the bug concerns a specific product group, it shall be registered
Functionality	Functionality that the defects concerns, if possible to specify
Summary	Short description of the defect
Description	A description field shall contain the as much information about what happened during the test, this includes test case, step, products on card, agreements, device used, device feedback, tariff set and zone information. Unexpected card contents shall be described
Deadline	Expected fix date for the defect. Important for planning of retest phases and test suspension/resumption decisions.

It should be possible to attach files to the problem report. Card dumps should be stored in an agreed place.

8.3.2 Defect state flow

Figure 8.3 shows a possible defect state flow chart. It is an example from the open source defect tracking tool Bugzilla. Most tracking tools will follow a similar chart, though the exact names of the states may vary depending on the software.

Details regarding the state flow, communication between parties and other information regarding defect tracking should be agreed upon between the involved parties as stated in Chapter 5.1.1

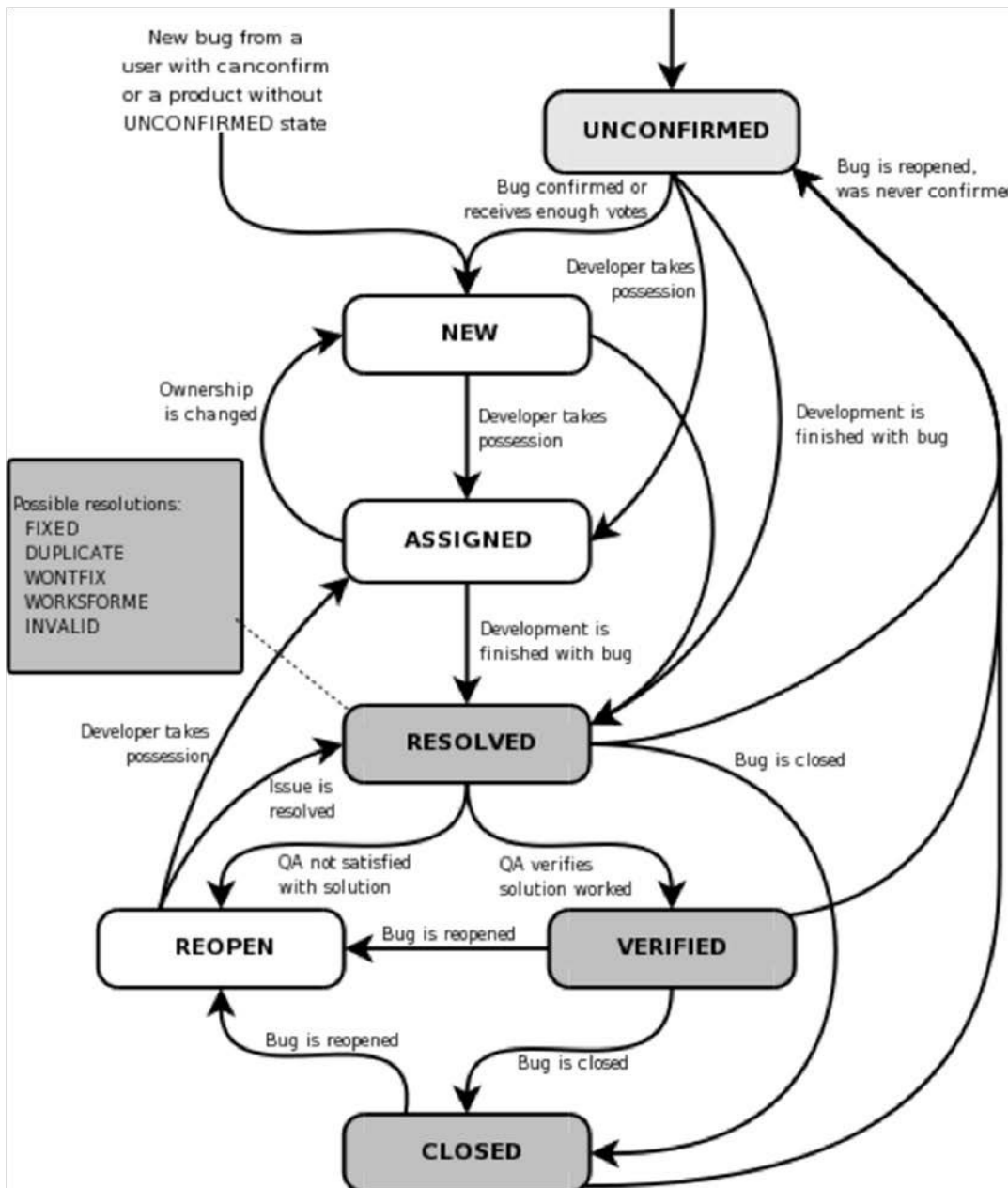


Figure 8-3: A possible life cycle of a bug (from the bugzilla guide)

8.3.3 Defect categorization

In general, discovered defects should be categorized to at least include categories shown in table.

Category	Severity	Explanation
A	Critical	Critical defects are defects causing the functional operations of the Product to terminate or have to be terminated for a critical group of users of the Product, or causes delays in the business operations of the Customer.

		The defect cannot be worked around within the Product.
B	Major	Major defects are defects that affect functional operations of the Product, but can be worked around.
C	Minor	Minor defects are defects that need no immediate action.

8.4 Test criteria

8.4.1 Test acceptance criteria

The following principles for test acceptance criteria apply:

- All agreed tests shall have been performed • There should be no critical defects (ref. Table 8.2).
- A limited number of major defects could be accepted in agreement between IO AS and PTO. The final decision on whether the defect can be accepted will be made by IO AS.
- A larger number of minor defects are acceptable.

The detailed acceptance criteria (e.g. the acceptable number of major and minor defects) should be agreed in advance between IO AS and the PTO based on the scope and complexity of the new system.

Classification of defects will be done by IO AS based on risk and consequence assessment based on consultation with the certified PTO and other relevant input.

8.4.2 Test suspension / test resumption criteria

Test suspension criteria are criteria for stopping a test before it is finished in order to wait for a new version. This could happen in case a critical defect is detected. Test resumption criteria are criteria for resuming testing after a suspension period. How this applies may depend on which test environment is used.

- Test environment
- QA environment
- Production environment

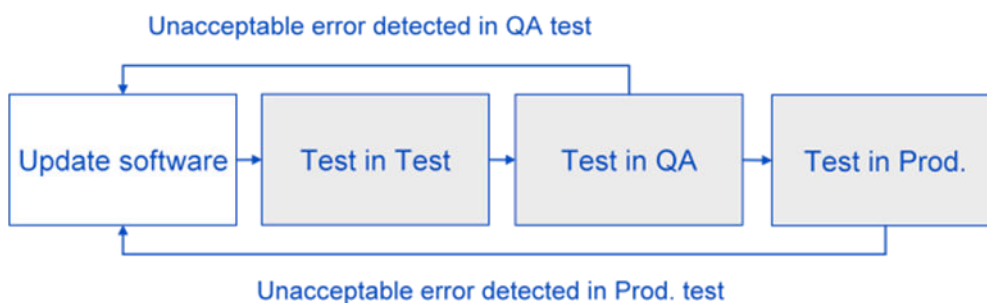


Figure 8-4: Handling of unacceptable errors discovered in QA of Production test.

8.5 Test categories

Test cases are grouped into the test categories listed in Table 8.3. Some of the categories are subject to self-test in a limited manner, due to the fact that they would need interoperable services like blacklist and action list distribution, and transaction flow.

To test blocking in a self-test, the blacklists have to be distributed via the PTO's own back office systems, without going through IO. The same applies to action lists. Once the lists have been distributed, blocking and actions can be tested on the new PTO's own devices.

Reconstruction can be tested by using privately distributed stored transactions (via PTO's own back office system), because there is no transaction flow through IO during a self-test. Since only own products and devices are used during a self-test, and no transactions are to be received from other PTOs, all transactions for a card will be stored in the PTO's own database. Therefore, a full reconstruction should be possible to perform.

Testing of mobile tickets can be performed the same way during self-tests as in an interoperable test, even though no interoperable products might be available. The structure and implementation of the QR-codes and security animations can be manually checked for validity.

Test category	Self-test	Interoperable test
Card issuing, sale and validation	Yes	Yes
Single tickets	Yes	Yes
Multi journey tickets	Yes	Yes
Period passes	Yes	Yes
Auto-renewal	Yes	Yes
Blacklisting <ul style="list-style-type: none"> • Blocking and suspension • Card blocking suspension • Product blocking and suspension 	Limited	Yes
Refunds <ul style="list-style-type: none"> • Product refunds • Stored value refunds 	Yes	Yes
Reconstruction	Limited	Yes
Stored value and auto-reloading	Yes	Yes
Prioritizing, unknown products and garbage collection	Yes	Yes
Action lists <ul style="list-style-type: none"> • Use of the last Served Order • Use of Special Event Log 	Limited	Yes
Profiles	Yes	Yes
Card keys <ul style="list-style-type: none"> • Distribution • Key security management 	Yes	Limited
Privacy laws compliance		
Card event tracking		
Mobile tickets	Yes	Yes

- | | | |
|--|--|--|
| <ul style="list-style-type: none">• Sale and activation of tickets• QR-code structure control• Secure animations | | |
|--|--|--|

The following subsections contain descriptions and purposes for each test category. The purposes are covered by test cases presented in the separate test case document. The transactions listed are the ones relevant for that category. For each transaction type, the transaction number according to Handbook V821 is given. For an overview of all transaction types, please see Table B.2 in Appendix B. The CSC Non-interoperable operation transaction (type 24) may be generated by a PTO when using the stored value since payment and ticket sale is treated as two transactions, reconstructing the card or performing auto-renew (PTO modifies a field on card that gives an increment of the transaction sequence number). However, this is PTO dependent, and has to be identified before testing.

8.5.1 Card issuing, sale and validation

Description:

This category includes card layout assessment, card issuing, personalisation of card (adding a birth date), adding profiles, sale, validation and cancellation of the latter two.

Purpose:

- verify that initial card layout (from card supplier) is correct
- verify that card are issued (enabled) correctly
- verify that products are sold correctly
- verify that validation is performed correctly (including anti-passback) and that the product has correct transfer time
- verify that cancelled products are no longer valid
- verify that cancellation of validations works correctly

Transaction:

- 2 – CSC Fare Media Sale
- 3 – CSC Fare Product Sale
- 4 – CSC tPurse Product Sale
- 18 – CSC Fare Media Activity Management
- 23 – CSC Fare Media Holder Information
- 30 – CSC Fare Product checkin
- 31 – CSC Fare Product checkout

8.5.2 Single tickets

Description:

The objectives of the single tickets category are sale and validation of single tickets on all relevant devices. Connection tickets and extension tickets are included, in addition to immediate events. Connection tickets can be sold in the end zone of an existing single ticket, where the customer only has to pay for the additional zones. Extension tickets can be sold as an extension to an existing period pass, but full price has to be paid. An immediate event is a kind of a single ticket that is sold automatically on a validation device, if there is no other product to validate and the device actually supports this feature.

Purpose:

- verify that single tickets are sold correctly
- verify that single tickets are validated correctly and given correct transfer time
- verify that the ticket is valid for transfer in end zone
- verify that connection ticket (belonging to existing single ticket) can be sold (in the end zone), if there is a validated single ticket on the card
- verify that extension ticket (belonging to existing period pass) can be sold when there is an existing period pass on the card
- verify that group tickets are specified correctly when sold, and can be validated correct number of times
- verify that immediate events are generated correctly
- verify that immediate events can be validated on relevant devices

Transactions:

- 3 – CSC Fare Product Sale
- 30 – CSC Fare Product checkin
- 31 – CSC Fare Product checkout

8.5.3 Period passes

Description:

Sale of period passes on relevant devices and validation of these tickets on all devices where the passes are valid. Sale and validation of period passes with via zones.

Purpose:

- verify that period passes are sold correctly
- verify that period passes are validated and end time set correctly

- verify that period passes with via zones are coded correctly and that the product can be validated and auto-renewed in all valid zones

Transactions:

- 3 – CSC Fare Product Sale
- 30 – CSC Fare Product checkin
- 31 – CSC Fare Product checkout

8.5.4 Multi journey tickets (punch cards)

Description:

Multi journey tickets differs from other products in the regard that they use the counters (counterPeriods, counterPeriodJourneys and counterJourneyTravels). Which counters are used depend on the product. For PTOs without multi journey tickets this test is not applicable. The tests include sale of multi journey tickets on relevant devices and several validations of these tickets on all devices where the passes are valid in order to verify the use of relevant counters. Sale and validation of multi journey tickets with via zones.

Purpose:

- verify that multi journey tickets are sold correctly
- verify that multi journey tickets are validated and end time set correctly at activation
- verify that counters are correctly increased or decreased only when starting new journeys
- verify that multi journey tickets with via zones are coded correctly and that the product can be validated in all valid zones

Transactions:

- 3 – CSC Fare Product Sale
- 30 – CSC Fare Product checkin
- 31 – CSC Fare Product checkout

8.5.5 Auto-renewal

Description:

This category contains tests on products with auto-renewal agreement.

Purpose:

- verify that an auto-renewal agreement can be established correctly
- verify that an auto-renewal agreement can be terminated correctly
- verify that product is auto-renewed correctly
- verify pausing of auto-renew
- verify that expired products with auto-renewal agreements (active or paused) are not removed when used on devices that do not know this product

Transactions:

- 15 – CSC Fare Product AutoRenew
- 20 – CSC Fare Product AutoRenew Management

8.5.6 Blacklisting and blocking

Description:

This category contains test cases on blacklisting, blocking and opening of a card or product.

Purpose:

- verify that a card or product can be added to blacklist
- verify that a card or product can be removed from blacklist
- verify that a blacklisted card or product is blocked correctly when presented on a device with blacklists distributed
- verify that a blocked card or product cannot be used or validated
- verify that a temporarily blocked card can be opened
- verify that a permanently blocked (disabled) card cannot be opened

Transactions:

- 36 – CSC Blacklist Management

8.5.7 Refund

Description:

This category contains test cases on refund of products.

Purpose:

- verify that media (card) can be refunded
- verify that refunded product is correctly deleted and that it no longer can be validated
- verify that correct amount of money is refunded
- verify that stored value can be refunded

Transactions:

- 7 – CSC Fare Media refund
- 8 - CSC Fare Product refund
- 9 - CSC tPurse Product refund

8.5.8 Reconstruction

Description:

Reconstruction of a card is one of the most complex functions of an electronic ticketing system. This feature requires that relevant transactions have been distributed correctly through the system, so that a correct card image can be build. The reconstructed card is build based on information of card image.

Purpose:

- verify that card image of the card is correct
- verify that card (including products and stored value) can be reconstructed correctly using one PTO's device
- verify that card can be reconstructed correctly using more than one PTO's device (due to products sold by different PTO's)

Transactions:

- 12 – CSC Fare Media Exchange
- 13 – CSC Fare Product Exchange
- 14 – CSC tPurse Product Exchange

8.5.9 Stored value and auto-reloading

Description:

Stored value is an electronic purse that allows the customer to store money on the card. The stored value can have an auto-reload agreement attach to it, which automatically loads more money into the card when the amount reaches less than a certain limit.

Purpose:

- verify that stored value is loaded correctly on applicable devices
- verify that auto-reload agreements can be established correctly
- verify that auto-reload agreements can be terminated correctly
- verify that stored value is auto-reloaded correctly when amount reaches low-water limit
- verify that stored value reloading can be cancelled
- verify that stored value never exceeds the maximum stored value
- verify that payment (including split payment) using stored value works correctly
- verify that stored value works correctly when updating the parameters
- verify that stored value works correctly across networks

Transactions:

- 4 – CSC tPurse Product Sale
- 11 – CSC tPurse Product reload
- 16 – CSC tPurse Product AutoLoad
- 19 – CSC tPurse management

8.5.10 Prioritizing, unknown products and garbage collection

Description:

Priority of products is an issue when the card contains two or more unused and valid products. The device will have to choose the correct product to validate, according to given rules. Unknown products are products that belong to another area or PTO co-operation, so that the product data is not known. These products have to be handled with care. Garbage collection is a feature that deletes expired products to free up space on the card.

Purpose:

- verify that correct product is chosen when validating a card with two or more unused and valid products
- verify that products are handled correctly according to contractListPreference
- verify that unknown products will be handled correctly
- verify that only expired products with no agreements or no paused agreements are garbage collected

Transactions:

- 25 – CSC garbage collection
- 30 – CSC Fare Product checkin
- 30 – CSC Fare Product checkout

8.5.11 Action lists

Description:

Action lists are used for distributing actions to the devices (validators and sales devices). An action may be a product sale, stored value reload or agreement management (i.e. autorenewal or auto-reloading). The action is typically ordered from external channels like the Internet, and is executed the next time the card is present on a device with updated action list. Private action lists are distributed to the PTO's own devices, while global action lists are distributed to all devices via IO.

Purpose:

- verify that actions are correctly generated
- verify that action lists contains correct actions and data
- verify that action lists are distributed to relevant devices
- verify that actions are correctly executed on the card

Transactions:

- 3 – CSC Fare Product Sale
- 11 – CSC tPurse Product Reload
- 16 – CSC tPurse management
- 20 – CSC Fare Product AutoRenew Management

8.5.12 Profiles

Description:

Some products require that an explicit profile is set on the card, or that the birth date on card is below or above a certain date, or both (implicit profile). For example, a student profile may be required to be able to purchase a student's ticket, or a certain age has to be reached before being able to buy a senior ticket.

Purpose:

- verify that profile data is set correctly when adding a new profile to a card
- verify that it is possible to buy profile-required products when using a card with that profile
- verify that it is not possible to buy profile-required products when the profile is not on card

Transactions:

- 23 – CSC Fare Media Holder Information

8.5.13 Card Keys

Description:

A vital part of the security in electronic ticketing is tied to the card media. To ensure that security is preserved in case of a breach of the keys present on each card it might be necessary to change the version of the keys present on breached card generation. This is done to prevent having to exchange all unbreached cards in a production environment.

Proper routines for key exchange operations must be in place.

Purpose:

- verify support for multiple key versions on equipment used in the production environment
- verify routines for exchange of key versions in case of a security breach on the card level

8.5.14 Privacy laws compliance

Description:

The electronic ticketing system including database storage of customer data, used in several service applications as well as for statistical data, is subject to privacy laws. These laws are in place to prevent unauthorized access to customer static customer information such as names and addresses as well as dynamic data like travel patterns.

Purpose:

- verify the systems compliance with current privacy laws regarding storage and handling of customer data

8.5.15 Card event tracking

Description:

Being able to track events on the card media is vital to ensure proper customer support and feedback and error correction in cases where equipment, customer service applications or personnel shows unwanted behavior. This may include errors during sale or validations of products, mistakes by customer service personnel during handling of cards etc.

Purpose:

- verify that the interaction between the card media and equipment is according to specifications
- verify the routines of customer service personnel
- track events for error correction purposes
- verify robustness of card media and equipment interaction when errors appear.

8.5.16 Mobile tickets

Description:

Mobile tickets, as mentioned in chapter 4, are not dependent on physical card media, but as all other products must adhere to set specifications, and as with other product types, the structure of the QR-codes containing the product information must be checked for validity and requirement adherence.

Purpose:

- verify that the QR-codes of the mobile tickets contain all the necessary fields with valid values according to specifications
- verify that interoperable mobile tickets are being read and recognized by control devices capable of reading QR-codes
- verify the geographical validity and correct transfer/validity times
- verify that mobile devices storing the mobile tickets have the correct implementation of the dynamic security animations

8.6 Test activities

8.6.1 Card dumps

Card dumps shall be taken after each test step, using a card reader application with an ACS or equivalent reader. Dumps shall be stored in a binary format.

By taking card dumps, the testers and others can investigate the contents of the card in the future. The files shall be given unique names, making them identifiable by test case. The following naming conventions shall be used:

```
TR<TestRun>-TC<TestCase>_<TestStep>[_rec].flx
```

The test step number shall use 2 digits (0 preceding single digit steps). The “_rec” part is only used if the card is a reconstruction of the original card for the test case.

Examples:

Test run 42, test case 618, step 4:

TR42-TC618_04.flx

Test run 42, test case 618, step 13, with a reconstructed card:

TR42-TC618_13_rec.flx

8.6.2 Transactions and transaction flow review

Every time the card is written to, a transaction is generated at the device and forwarded to the IO server (IOS). The transaction contains information about the event that was executed on the card, and other information about the state of the card. Since a feature like reconstruction of card and products is based upon information contained in the transactions, it is important that transaction contents are validated against card contents and test cases during testing. Especially dates and formatting must be checked thoroughly. An overview of the transaction flow to and from IOS is shown in Figure 8.5. Note that IOS just validates the transactions, and forwards those that are valid. Nothing is done with the content.

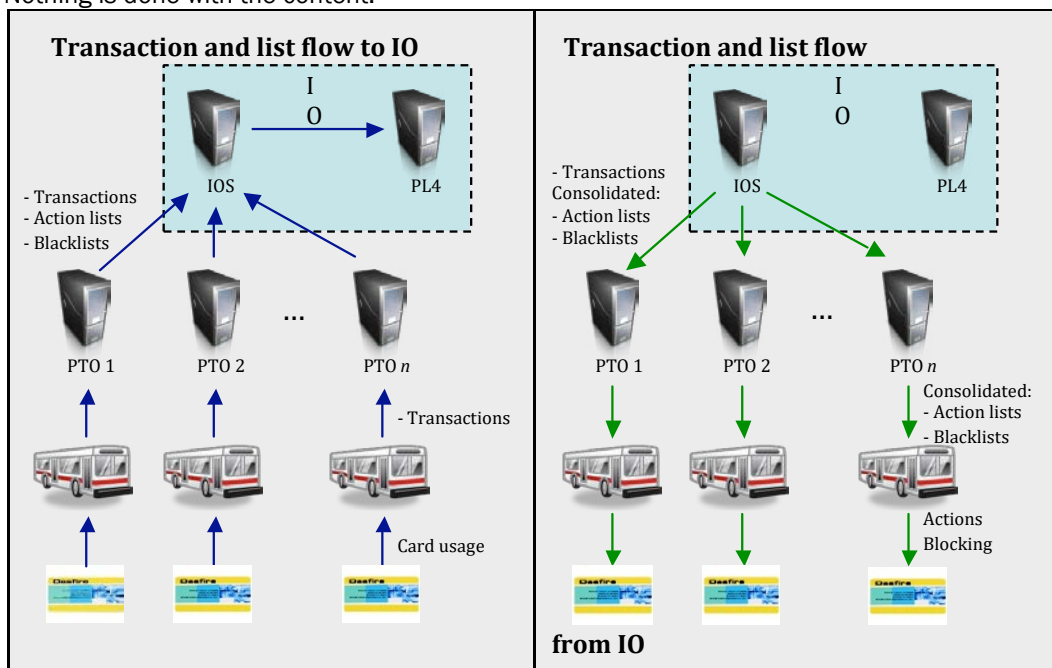


Figure 8-5: Transactions to and from IO.

All transactions are sent to the IOS via the PTOs' translators. IOS performs validation of all incoming transactions. The approved transactions are forwarded to PL4, the card owner and the product owner (see Figure 9.6 on next page). However, a transaction is not returned to a PTO that has already sent it. E.g. if a card reader device owner is the same as the product owner, the transaction is not forwarded back to this PTO – simply because the transaction already exists in the PTO's system since this is where it originated.

The transactions from each PTO are generated by different translators; therefore there is a risk of getting invalid transactions to IOS. This may be caused by different or incorrect interpretations of specifications (for example formatting, types and null/0 values) by the device software vendors or incorrect translation at one of the systems, for both generating outgoing transactions and interpreting incoming transactions.

Due to the risk of invalid transactions, the transaction flow has to be investigated and data compared thoroughly as part of the interoperability test. The transaction data for the following parts of the overall systems have to be investigated:

- service provider's translator (where the transactions was generated)
- incoming transaction to IOS
- transaction data in the PL4 database
- forwarded transactions to relevant PTO's (card owner and product owner)

The transaction data shall be compared with expected transaction data (given the test case step) and data written to card.

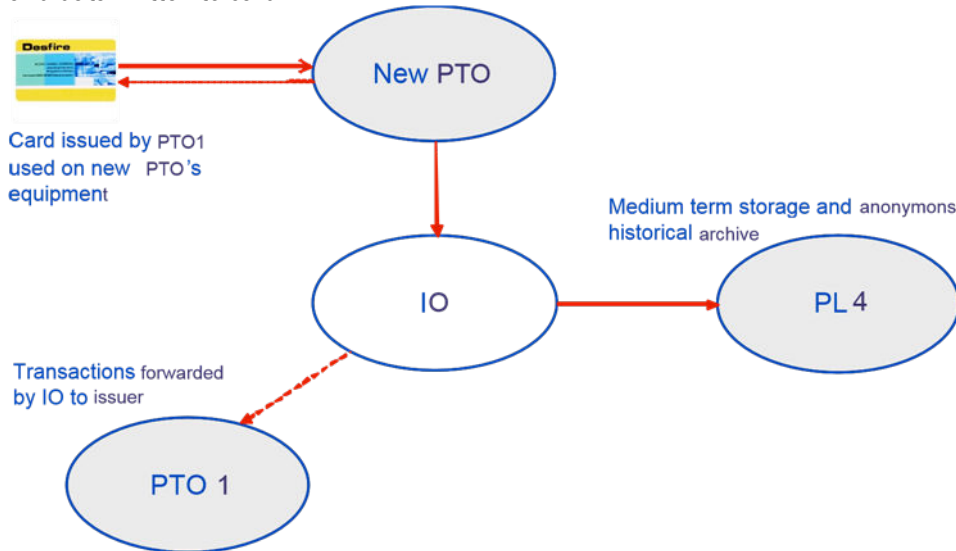


Figure 8-6: Example of a transaction involving card issued by another PTO used on new PTO's equipment.

One way to examine the transaction flow is using spreadsheets with test cases, test results and a checklist for transactions flow. The test case steps are listed along with expected transactions for each step. A checklist is used for verifying that the transactions have been received by all applicable systems (IOS, PL4 and the relevant PTOs' translators). The contents of the transactions at the different stages in the system must be compared as well.

The transaction flow review process can in a large extent be performed automatically, since it all comes down to comparing values and validating data.

8.6.3 Black lists

When a PTO wants to block (temporarily block or permanently disable) a card, the card number is put on a black list. This will typically happen when a card is lost, stolen or it has been a breach of agreement. This black list is sent from each PTO to IOS, which merges the black lists. These consolidated black lists are then distributed to the PTOs, usually once a day around midnight. The card will be blocked the next time the user attempts to use the card on a card reader device with updated black lists.

A card can either be temporarily blocked or permanently disabled. The field applicationStatus on the card indicates the state of the card. This field shall be verified against expected applicationStatus and actual value in the black lists (called reason code).

8.6.4 Action lists

Actions that are to be executed on cards that are not present are put on action lists. This will typically happen when a customer orders a product or manage an auto-renew or autoreload agreement on the Internet. The card is updated next time the card is used on devices with updated action list.

Types of actions may include:

- sale of product
- product renewal
- auto-renew management (start, termination, pausing and restarting)

- reload stored value
- auto-reload management (start, termination, pausing and restarting)
- Action lists work similarly as black lists. Each PTO sends their actions to IOS, which merges the lists and returns the consolidated action lists to the PTOs. The data of each action on the list shall be validated against the specification, and against expected contents and data written to card.

Appendix A: Requirements to PTO operational organization and systems (self-assessment)

The following table shall be used by the new PTO for self-assessment with respect to organisation and systems.

No.	= Number
Requirement	= Requirement description
Status	= Yes / No or N/A (Not applicable)
Description	Description = Explanation for compliance or non-compliance

No.	Requirement	Status	Description
1.	<p>PTO responsibilities The PTO must assign people/functions to the following roles (Fill in names of persons in description column)</p> <ul style="list-style-type: none"> • Card Issuer (Owner, Producer, Retailer) • Stored Value Owner • Non-interoperable Product Owner • Interoperable Product Owner • Data Collection 		
2.	PTO system boundaries (see Figure A.1)		
2.1	<p>PTO Security Server The PTO security server shall not be used for other purposes than interoperability. PTO shall immediately patch the security server upon request from IO AS.</p>		
2.2	<p>Physical security The security server and the PTO systems communicating with the security server shall be physically secured access to server room shall be limited. Please provide details in description column (or separate sheet).</p>		
2.3	<p>Production system segregated from test and development The production system shall be permanently segregated from test and development systems so that activities on those systems can not influence the production system in an adverse way (Describe how this is done, e.g. separated by firewalls, in descriptions column).</p>		
3	PTO users		
3.1	<p>User training Users (e.g. drivers, conductors, etc) shall have adequate training in using the peripheral equipment. Persons responsible for daily operation of the PTO servers shall have adequate competence and training.</p>		
3.2	<p>Information security training Person responsible for information security shall have adequate competence and training</p>		
4	PTO Business continuity planning		

	<p>The following should be amended to the overall PTO business continuity plan:</p> <ul style="list-style-type: none"> • The PTO shall have proper backup procedures to secure all fare data • The PTO shall have a plan on how to restore / replace faulty or damaged equipment / servers • The PTO shall regularly (once a year) train business continuity (disaster recovery) 		
5	<p>Change management PTO shall follow the IO standard change procedure (ref....) regarding new software versions, configuration changes, tariff changes, etc.</p>		
6	<p>PTO Documentation</p>		
6.1	<p>The PTO's system shall be documented and updated when changed</p>		
6.2	<p>The PTO's network topology drawing shall exist and be updated when changed</p>		
6.3	<p>The PTO shall have documented the actual configuration (configuration management of servers and network components)</p>		
7	<p>Security maintenance</p>		
7.1	<p>Security patches and virus protection Relevant security patches shall be implemented to prevent exposure of vulnerabilities that can be exploited by malicious software or agents Adequate virus protection shall exist and be updated frequently</p>		
7.2	<p>Access control</p> <ul style="list-style-type: none"> • Users leaving shall be removed from system access. • Users changing roles shall have their access updated to reflect the new role • There shall be no permanent remote access to the security server 		

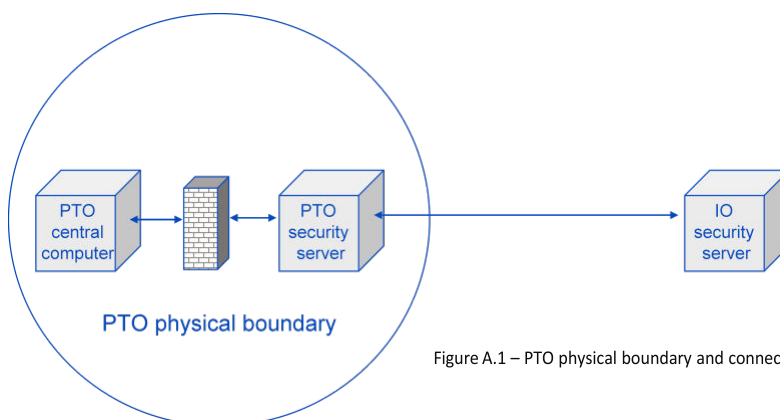


Figure A.1 – PTO physical boundary and connection to IO security server

Appendix B: Test devices and transactions

The document Interoperability Test Cases contains test cases for the categories listed in Table 8.3. The test cases are generic, i.e. they are supposed to apply to different combinations of devices. They are written in a way such that the test manager can alternate between the relevant devices, to make

the test cover as many possible combinations of devices from different vendors as possible. This is the core of interoperability testing.

There are a lot of factors that contribute to the state of a card. This includes products, card issuers, profiler, devices, agreements, stored value and more. Due to the vast number of potential combinations, it is not technically feasible to test every possible combination. Therefore, test cases must be created based on knowledge of likely usage and potential critical situations. An important factor that affect the usefulness of a test case is the degree of interoperability, i.e. that a card is used on as many different devices from different vendors as possible.

Due to the generic nature of the test cases, the device to be used in each step is specified by a device type. All devices subject for testing must be categorised into one or more device types. Then the instances of the test cases described in this appendix, has to be created by populating the test cases with relevant devices. This is performed by swapping the generic device type by actual device.

Table B.1 shows the device types used in the test cases. The transactions types that can be generated by each device are also listed. Note that not all devices cover all functionality described, due to limited or disabled features. The device types serve more like a “main” category, and carefulness has to be taken when applying the specific device in a test case. Also, a device may belong to more than one device type. For example, a ticket vending machine may both sell and validate products. And a sales device may also perform blocking of products.

Device type	Description	Potential transactions
Sales Device	A device or application that can sell products (single tickets and period passes). This can also include mobile devices for the sale of mobile tickets.	<ul style="list-style-type: none"> • CSC Fare Product sale • CT Fare Product sale • MT Fare Product sale • CSC tPurse Product Reload
Service Application	An application that can issue card, manage auto-renewal and autoreload agreements, add profile, add holder birth date, register card, block card, open/unblock card, reconstruct card, refund products/ card/stored value.	<ul style="list-style-type: none"> • CSC Fare Media sale • CSC tPurse Product sale • CSC Fare Media refund • CSC Fare Product refund • CSC tPurse Product refund • CT Fare Product refund • CSC Fare Media Exchange • CSC Fare Product Exchange • CSC tPurse Product Exchange • CSC Fare Media activity Management • CSC tPurse management • CSC Fare Product AutoRenew Management • CSC Card Management • CSC Fare Media Holder Information
Validator	A device that can validate products on the card, either automatically or by selection of user. Auto-renewal and auto-reload can be performed if enabled. Blocking and actions can be performed, but may not be available on all devices. This can also include equipment capable of reading the contents of QR-codes in mobile tickets	<ul style="list-style-type: none"> • CSC Fare Product AutoRenew • CSC tPurse Product AutoLoad • CSC Fare Product checkin • CSC Fare Product checkout • CT Fare Product checkin • CT Fare Product checkout • CSC Black list Management

Table B.2 lists possible transaction types for the electronic ticketing system, belonging to contactless smart cards (CSC), contactless ticket (CT) and paper tickets (MT).

No.	Transaction Type	Description
2	CSC Fare Media sale	Sale of Fare Media Contactless Smart Card
3	CSC Fare Product Sale	Sale of a product on Contactless Smart Card
4	CSC tPurse Product sale	Sale of tPurse Product on CSC
5	CT Fare Product sale	Sale of Fare Media and product Contactless Ticket
6	MT Fare Product sale	Sale of Paper Ticket with Non interoperable product
7	CSC Fare Media refund	Refund of Fare Media CSC
8	CSC Fare Product refund	Refund of a product on Contactless Smart Card
9	CSC tPurse Product refund	Refund of tPurse product on Contactless Smart Card
10	CT Fare Product refund	Refund of Fare product Contactless Ticket
11	CSC tPurse Product Reload	Reload of tPurse product on Contactless Smart Card
12	CSC Fare Media Exchange	Exchange of CSC Fare Media
13	CSC Fare Product Exchange	Exchange of CSC Fare Media for the product
14	CSC tPurse Product Exchange	Exchange of CSC Fare Media for the tPurse
15	CSC Fare Product AutoRenew	Automatic renew of product on CSC
16	CSC tPurse Product AutoLoad	Automatic load of tPurse product on CSC
18	CSC Fare Media activity Management	Enable or disable activity of CSC Fare media
19	CSC tPurse management	Change of parameters for CSC tPurse product
20	CSC Fare Product AutoRenew Management	Enable or disable AutoRenew on CSC Fare product
21	CSC Card Management	For future use. Retention, attachment, detachment of CSC card
22	Non AFC Product Sale	Sale of a non AFC product
23	CSC Fare Media Holder Information	Modify or add any field in Holder's information of CSC Fare media
24	CSC Non-interoperable operation	Operator modifies field on card that gives a TSN increment
25	CSC garbage collection	Card cleaning. One transaction each deleted product
30	CSC Fare Product checkin	Check in on Contactless Smart Card
31	CSC Fare Product checkout	Check out on Contactless Smart Card
32	CT Fare Product checkin	Check in on Contactless Ticket
33	CT Fare Product checkout	Check out on Contactless Ticket
36	CSC Black list Management	Opposition management with blacklist and for CSC

Table B.3: Transaction types and an overview of typical card changes. Note that for all transactions, the applicationSequenceNumber (ASN) is incremented by 1. lastServedOrder in the T_ServiceProvider file is updated when an action is executed.

No.	Transaction type	Possible card content changes
2	CSC Fare Media sale	Sale of Fare Media Contactless Smart Card T_ServiceProvider: applicationStatus set to 1
3	CSC Fare Product sale	Sale of a product on Contactless Smart Card Period passes and single tickets: T_ProductRetailer file: new entry in the IOContract list T_ServiceProvider file: new entry in the IOCounters list, with counterStatus set to 1 (unused) new entry in the ContractList list T_GeneralEventLog file: new event In addition, when product is sold by action list: T_SpecialEvent: new event in the specialEventLog[2]
4	CSC tPurse Product sale	Sale of tPurse Product on CSC T_StoredValue storedValue set to initial value
5	CT Fare Product sale	Sale of Fare Media and product Contactless Ticket Product instance: the product is written to the Product instance file 1st anti- tear event: the sale event is written to the 1st anti-tear event
6	MT Fare Product sale	Sale of Paper Ticket with Non interoperable product Not applicable
7	CSC Fare Media refund	Refund of Fare Media CSC T_ServiceProvider: applicationStatus changed
8	CSC Fare Product refund	Refund of a product on Contactless Smart Card T_ServiceProvider: contractListElement for the refunded product removed from the ContractList list
9	CSC tPurse Product refund	Refund of tPurse product on Contactless Smart Card T_StoredValue: storedValue decreased with refunded value

10	CT Fare Product refund	Refund of Fare product Contactless Ticket
11	CSC tPurse Product Reload	Reload of tPurse product on Contactless Smart Card T_StoredValue: storedValue increased with added amount T_GeneralEventLog: new event T_SVReloadLog: new event in the IOStoredValueReloadEvent list In addition, when stored value is reloaded by action list: new event in the specialEventLog[1]
12	CSC Fare Media Exchange	Exchange of CSC Fare Media Similar to transaction type 2 (CSC Fare Media Sale). Generated when a card is reconstructed. T_ServiceProvider: applicationStatus set to 1
13	CSC Fare Product Exchange	Exchange of CSC Fare Media for the product Similar to transaction type 3 (CSC Fare Product sale). Generated when a product is reconstructed to another card. Period passes and single tickets: T_ProductRetailer file: new entry in the IOContract list T_ServiceProvider file: new entry in the IOCounters list new element in the ContractList list T_GeneralEventLog file: new event The data written for the new element reflects the current status of the original card based on available transactions.
14	CSC tPurse Product Exchange	Exchange of CSC Fare Media for the tPurse Similar to transaction type 5 (CSC tPurse Product sale). Generated when the stored value is reconstructed. The value reflects the value on the original card, based on available transactions. T_StoredValue:

		<p>storedValue is set to reconstructed value</p> <p>T_GeneralEventLog: new stored value reload event</p> <p>T_SVReloadLog: new event in the IOStoredValueReloadEvent list</p>
15	CSC Fare Product AutoRenew	<p>Automatic renew of product on CSC (Same as CSC Fare Product sale)</p> <p>T_ProductRetailer file: new entry added to the IOContract list contractPlusAutoRenew structure removed for the old product and added for the new product in the IOContractPlus structure</p> <p>autorenewed to true in the IOContractPlus structure</p> <p>T_ServiceProvider file: new entry added to the ContractList list</p> <p>counterStatus set to 1 (unused) T_SpecialEvent new event in the SpecialEventLog</p> <p>T_GeneralEventLog: new event</p>
16	CSC tPurse Product AutoLoad	<p>Automatic load of tPurse product on CSC</p> <p>T_StoredValue: storedValue increased with auto-reload amount</p> <p>T_GeneralEventLog: new event</p> <p>T_SVReloadLog: new event in the IOStoredValueReloadEvent list</p>
18	CSC Fare Media activity Management	<p>Enable or disable activity of CSC Fare media</p> <p>T_ServiceProvider applicationStatus changes</p>
19	CSC tPurse management	<p>Change of parameters for CSC tPurse product</p> <p>T_CardHolder: new structure Length added to the cardholder.extension structure, with fields Ground, Amount and EndDate</p> <p>In addition, when auto-reload management is performed by action list:</p> <p>new event in the specialEventLog[2]</p>
20	CSC Fare Product AutoRenew Management	<p>Enable or disable AutoRenew on CSC Fare product</p> <p>T_ProductRetailer: Autorenew bit of ContractServices in the</p>

		IOContract structures for the affected product changed autorenewed changed autotnewLastDate changed In addition, when auto-renew management is performed by action list: new event in the specialEventLog[1]
21	CSC Card Management	For future use. Retention, attachment, detachment of CSC card This transactions is for future use.
22	Non AFC Product Sale	Sale of a non AFC product
23	CSC Fare Media Holder Information	Modify or add any field in Holder's information of CSC Fare media holderBirthDate set other T_CardHolder fields
24	CSC Non-interoperable operation	Operator modifies field on card that gives a TSN increment This transaction implies that a field on card has been changed, giving a TSN increment. It may be used when paying for products using stored value.
25	CSC garbage collection	Card cleaning. One transaction each deleted product T_ServiceProvider: contractListElement for the deleted product removed from the ContractList list
30	CSC Fare Product checkin	Check in on Contactless Smart Card First-time validation and single ticket: T_ServiceProvider file: For the affected entry in the IOCounter list: counterStatus set to 33 (validated) counterEndDate set counterEndTime set For the affected entry in the ContractList list: contractListIsUsed set to true T_GeneralEventLog: new event Validation of period pass and single ticket: T_GeneralEventLog: new event (eventJourneyInterchanges is calculated given last validation in the current journey)

31	CSC Fare Product checkout	Check out on Contactless Smart Card Similar to transaction type 30, except payServicePointInfo set to 2 (exit) in the new event in general event log
32	CT Fare Product checkin	Check in on Contactless Ticket 1st anti-tear event or 2nd anti-tear event: a new entry validation event is written to one of the log files If first validation: Product instance: OTP: otpUsed is set to TRUE OTP: ValidityEndDate and OTP: ValidityEndTime are set
33	CT Fare Product checkout	Check out on Contactless Ticket 1st anti-tear event or 2nd anti-tear event: a new exit validation event is written to one of the log files
36	CSC Black list Management	Opposition management with blacklist and for CSC T_ServiceProvider: applicationStatus changed according to type of black list management Unblocking product: T_ServiceProvider: unblockingSequenceNumber incremented by 1

TEST CASE				
ID: 1.1		Category:		Card issuing, sale and validation
Title: Investigate empty card		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Investigate card layout of an empty card from vendor	The card layout is according to specification		
Comments:				
Tested by:		Date/sign.:		Verified by:
				Date/sign.:

TEST CASE				
ID: 1.2		Category: Card issuing, sale and validation		
Title: Buy and validate single ticket		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy single ticket on SalesDevice	Ticket can be bought	3. CSC Fare Product sale	
3	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
4	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
5	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
Comments:				
Tested by:		Date/sign.:	Verified by:	Date/sign.:

TEST CASE				
ID: 1.3		Category: Card issuing, sale and validation		
Title: Buy and validate period pass		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy period pass on SalesDevice	Pass can be bought	3. CSC FareP roduct sale	
3	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
4	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
5	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
Comments:				
Tested by:		Date/sign.:	Verified by:	Date/sign.:

TEST CASE				
ID: 1.4		Category:		Card issuing, sale and validation
Title: Cancel single ticket sale		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a card on SalesDevice	Card issued	2 CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy single ticket on SalesDevice	Ticket can be bought	3. CSC Fare Product sale	
3	Cancel single ticket sale on ServiceApplication	Cancellation OK	3. CSC Fare Product sale	
4	Validate on Validator	No validation		
Comments:				
Tested by:		Date/sign.:	Verified by:	Date/sign.:

TEST CASE				
ID: 1.5		Category:		Card issuing, sale and validation
Title: Cancel period pass validation		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23.CSC Fare Media Holder Information	
2	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
3	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
4	Cancel validation on ServiceApplication	Cancellation OK	30. CSC Fare Product checkin	
5	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
6	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
Comments:				
Tested by:		Date/sign.:	Verified by:	Date/sign.:

TEST CASE							
ID: 2.1		Category:		Single tickets			
Title: Single ticket		Card number:					
Step	Action	Expected results	Expected transactions	Results			
1	Issue a card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information				
2	Buy single ticket on SalesDevice	Ticket can be bought	3. CSC Fare Product sale				
3	Validate on Validator	Validation OK	30. CSC Fare Product checkin				
4	Validate on Validator	Validation OK	30. CSC Fare Product checkin				
5	Validate on Validator	Validation OK	30. CSC Fare Product checkin				
6	Wait until single ticket is expired	N/A					
7	Validate on Validator	Validation failed	30. CSC Fare Product checkin				
8	Validate on Validator	Validation failed	30. CSC Fare Product checkin				
Comments:							
Tested by:		Date/sign.:		Verified by:		Date/sign.:	

TEST CASE				
ID: 2.2		Category:		Single tickets

Title: Connection ticket		Card number:					
Step	Action	Expected results	Expected transactions	Results			
1	Issue a card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information				
2	Buy single ticket on SalesDevice	Ticket can be bought	3. CSC Fare Product sale				
3	Validate on Validator in start zone	Validation OK	30. CSC Fare Product checkin				
4	Validate on Validator in a zone between start and end zone	No validation					
5	Validate on Validator in end zone	Validation OK	30. CSC Fare Product checkin				
6	Buy connection ticket on SalesDevice in end zone of existing ticket	Ticket can be bought and is automatically validated	3. CSC Fare Product sale 30. CSC Fare Product checkin				
7	Validate on Validator in the end zone of the new ticket	Validation OK	30. CSC Fare Product checkin				
8	Validate on Validator in the end zone of the new ticket	Validation OK	30. CSC Fare Product checkin				
Comments:							
Tested by:		Date/sign.:		Verified by:		Date/sign.:	

TEST CASE				
ID: 2.3		Category:		Single tickets
Title: Extension ticket		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
3	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
4	Buy extension ticket on SalesDevice	Ticket can be bought for extension ticket price	3. CSC Fare Product sale 30. CSC Fare Product checkin	
5	Validate on Validator in end zone of extension ticket	Validation OK	30. CSC Fare Product checkin	
6	Validate on Validator in end zone of extension ticket	Validation OK	30. CSC Fare Product checkin	
Comments:				
Tested by:		Date/sign.:		Verified by:
				Date/sign.:

TEST CASE

ID: 2.4		Category: Single tickets					
Title: Group ticket		Cardnumber:					
Step	Action	Expected results	Expected transactions	Results			
1	Issue a card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information				
2	Buy group ticket on SalesDevice for two or more passenger categories	Ticket can be bought	3. CSC Fare Product sale				
3	Validate on Validator	Validation OK. Correct number of validations if gate	30. CSC Fare Product checkin				
4	Validate on Validator	Validation OK. Correct number of validations if gate	30. CSC Fare Product checkin				
5	Validate on Validator	Validation OK. Correct number of validations if gate	30. CSC Fare Product checkin				
Comments:							
Tested by:		Date/sign.:		Verified by:		Date/sign.:	

TEST CASE

ID: 2.5		Category:		Single tickets	
Title: Immediate event		Card number:			
Step	Action	Expected results	Expected transactions	Results	
1	Issue a card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information		
2	Load stored value with NOK 100	Stored value loaded	11. CSC tPurse Product Reload		
3	Validate on Validator that can issue immediate event	Validation OK. Immediate event issued	30. CSC Fare Product checkin		
4	Validate on Validator	Validation OK	30. CSC Fare Product checkin		
5	Validate on Validator	Validation OK	30. CSC Fare Product checkin		
Comments:					
Tested by:		Date/sign.:		Verified by:	
				Date/sign.:	

ID: 3.1		Category:		Single tickets	
Title: Multiple Journey Ticket		Card number:			
Step	Action	Expected results	Expected transactions	Results	
1	Issue a card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information		
2	Buy a Multiple Journey ticket with limited journeys	Ticket can be bought. CounterPeriodJourneys is set to the amount of travels allowed for ticket	3. CSC Fare Product sale		
3	Validate on Validator	Validation OK. CounterPeriodJourneys is decreased by 1	30. CSC Fare Product checkin		
4	Repeat step 3 until CounterPeriodJourneys reaches 0	Validation OK. CounterPeriodJourneys is decreased by 1	30. CSC Fare Product checkin		
5	Validate on Validator	Validation failed			
Comments:					
Tested by:		Date/sign.:		Verified by:	
				Date/sign.:	

TEST CASE				
ID: 3.2		Category:		Single tickets
Title: Multiple Journey Ticket		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity	
			Management 23. CSC Fare Media Holder Information	
2	Buy a Multiple Journey ticket with unlimited journeys	Ticket can be bought. CounterPeriodJourneys is set to 0	3. CSC Fare Product sale	
3	Validate on Validator	Validation OK. CounterPeriodJourneys is increased by 1	30. CSC Fare Product checkin	
4	Repeat step 3 until CounterPeriodJourneys reaches a pricing or other type of threshold	Validation OK. CounterPeriodJourneys is decreased by 1	30. CSC Fare Product checkin	
5	Validate on Validator	Validation OK. Pricing or ticket behavior changes above threshold	30. CSC Fare Product checkin	
Comments:				
Tested by:		Date/sign.:		Verified by: Date/sign.:

TEST CASE				
ID: 4.1		Category:		Period passes
Title: Period pass		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
3	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
4	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
5	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
Comments:				
Tested by:		Date/sign.:		Verified by: Date/sign.:

TEST CASE							
ID: 4.2		Category:		Period passes			
Title: Period pass		Card number:					
Step	Action	Expected results	Expected transactions	Results			
1	Issue a card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information				
2	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale				
3	Validate on Validator in start zone	Validation OK	30. CSC Fare Product checkin				
4	Validate on Validator in a zone between start and end zone	Validation OK	30. CSC Fare Product checkin				
5	Validate on Validator in end zone	Validation OK	30. CSC Fare Product checkin				
6	Wait until period pass is expired	N/A					
7	Validate on Validator	No validation					
8	Validate on Validator	No validation					
Comments:							
Tested by:		Date/sign.:		Verified by:		Date/sign.:	

TEST CASE				
ID: 4.3		Category:		Contactless ticket
Title: Validate single ticket		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Buy a single ticket (contactless ticket) on SalesDevice	Card issued	5. CT Fare Product sale	
2	Validate on Validator	Validation OK	32. CT Fare Product checkin	
3	Validate on Validator	Validation OK	32. CT Fare Product checkin	
4	Validate on Validator	Validation OK	32. CT Fare Product checkin	
Comments:				
Tested by:		Date/sign.:	Verified by:	Date/sign.:

TEST CASE				
ID: 4.4		Category:		Contactless ticket
Title: Refund single ticket		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Buy a single ticket (contactless ticket) on SalesDevice	Card issued	5. CT Fare Product sale	
2	Refund single ticket on ServiceApplication	Validation OK	10. CT Fare Product refund	
Comments:				
Tested by:		Date/sign.:		Verified by:
				Date/sign.:

TEST CASE				
ID: 4.5 Category:			Auto-renewal	
Title: Auto-renewal of period pass Card number:				
Step	Action	Expected results	Expected transactions	Results
1	Issue a card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
3	Establish auto-renewal agreement on ServiceApplication	Agreement established	20. CSC Fare Product AutoRenew Management	
4	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
5	Wait until auto-renew is active	N/A		
6	Validate on Validator. This validator shall be able to autorenew the product.	Validation OK and product auto-renewed	15. CSC Fare Product AutoRenew 30. CSC Fare Product checkin	
7	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
8	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
Comments:				
Tested by:		Date/sign.:	Verified by:	Date/sign.:

TEST CASE				
ID: 5.1 Category: Auto-renewal				
Title: Auto-renewal of expired period Card number: pass				
Step	Action	Expected results	Expected transactions	Results
1	Issue a card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
3	Establish auto-renewal agreement on ServiceApplication	Agreement established	20. CSC Fare Product AutoRenew Management	
4	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
5	Wait until period pass is expired	N/A		
6	Validate on Validator. The validator shall be able to autorenew the product.	Auto-renewal and validation of new period pass	15. CSC Fare Product AutoRenew 30. CSC Fare Product checkin	
7	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
8	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
Comments:				
Tested by:		Date/sign.:	Verified by:	Date/sign.:

TEST CASE				
ID: 5.2 Category:			Auto-renewal	
Title: Terminate auto-renewal Card number: agreement				
Step	Action	Expected results	Expected transactions	Results
1	Issue a card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
3	Establish auto-renewal agreement on ServiceApplication	Agreement established	20. CSC Fare Product AutoRenew Management	
4	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
5	Terminate auto-renewal agreement on ServiceApplication	Agreement terminated	20. CSC Fare Product AutoRenew Management	
6	Wait until period pass is expired	N/A		
7	Validate on Validator. The validator shall be able to autorenew the product.	No validation and no auto-renew		
8	Validate on Validator	No validation		
Comments:				
Tested by:		Date/sign.:	Verified by:	Date/sign.:

TEST CASE							
ID: 6.1		Category:		Blacklisting and blocking			
Title: Blacklisting		Card number:					
Step	Action	Expected results	Expected transactions	Results			
1	Issue a card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information				
2	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale				
3	Validate on Validator	Validation OK	30. CSC Fare Product checkin				
4	Blacklist card on ServiceApplication	Card blacklisted					
5	Wait until blacklists have been distributed to the devices	Blacklists distributed					
6	Validate on Validator	No validation and card is blocked	36. CSC Black list Management				
7	Validate on Validator	No validation					
8	Validate on Validator	No validation					
Comments:							
Tested by:		Date/sign.:		Verified by:		Date/sign.:	

TEST CASE				
ID: 6.2		Category:		Blacklisting and blocking
Title: Blocking and opening		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
3	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
4	Blacklist card on ServiceApplication	Card blacklisted		
5	Wait until blacklists have been distributed to the devices	Blacklists distributed		
6	Validate on Validator	Card is blocked. No validation	36. CSC Black list Management	
7	Validate on Validator	No validation		
8	Open card on ServiceApplication	Card opened	36. CSC Black list Management	
9	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
10	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
11	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
Comments:				
Tested by:		Date/sign.:	Verified by:	Date/sign.:

TEST CASE				
ID: 7.1 Category:			Refund	
Title: Refund media (card) Card number:				
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Refund card on ServiceApplication	Card can be refunded	7. CSC Fare Media refund	
Comments:				
Tested by: Date/sign.:			Verified by:	Date/sign.:

TEST CASE				
ID: 7.2		Category:		Refund
Title: Refund stored value		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Load stored value NOK 200 on SalesDevice	Stored value loaded	11. CSC tPurse Product Reload	
3	Buy single ticket on SalesDevice using stored value	Ticket can be bought and stored value is deducted	3. CSC Fare Product sale	
4	Refund stored value on ServiceApplication	Refund OK	9. CSC tPurse Product refund	
Comments:				
Tested by:		Date/sign.:	Verified by:	Date/sign.:

TEST CASE				
ID: 7.3		Category:		Refund
Title: Refund single ticket		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue an anonymous card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy single ticket on SalesDevice	Ticket can be bought	3. CSC Fare Product sale	
3	Refund single ticket on SalesDevice	Refund OK. Single ticket refunded.	8. CSC Fare Product refund	
4	Validate on Validator	No validation		
5	Validate on Validator	No validation		
6	Validate on Validator	No validation		
Comments:				
Tested by:		Date/sign.:	Verified by:	Date/sign.:

TEST CASE							
ID: 7.4		Category:		Refund			
Title: Refund period pass		Card number:					
Step	Action	Expected results	Expected transactions	Results			
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information				
2	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale				
3	Validate on Validator	Validation OK	30. CSC Fare Product checkin				
4	Refund period pass on SalesDevice	Refund OK. Part of period pass refunded.	3. CSC Fare Product sale				
5	Validate on Validator	No validation					
6	Validate on Validator	No validation					
7	Validate on Validator	No validation					
Comments:							
Tested by:		Date/sign.:		Verified by:		Date/sign.:	

TEST CASE				
ID: 8.1		Category:		Reconstruction
Title: Reconstruct card with period pass		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
3	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
4	Order reconstruction on ServiceApplication	Reconstruction ordered		
5	Wait until all transactions have been distributed	N/A		
6	Reconstruct card	Reconstruction OK	12. CSC Fare Media Exchange 14. CSC tPurse Product Exchange 13. CSC Fare Product Exchange	
7	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
8	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
9	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
Comments:				
Tested by:		Date/sign.:	Verified by:	Date/sign.:

TEST CASE				
ID: 8.2		Category:		Reconstruction
Title: Reconstruct card with stored value		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Load stored value NOK 200	Stored value loaded	3. CSC Fare Product sale	
3	Order reconstruction on ServiceApplication	Reconstruction ordered		
4	Wait until all transactions have been distributed	N/A		
5	Reconstruct card	Reconstruction OK	12. CSC Fare Media Exchange 14. CSC tPurse Product Exchange	
6	Buy single ticket on SalesDevice using stored value	Ticket can be bought	3. CSC Fare Product sale	
7	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
Comments:				
Tested by:		Date/sign.:	Verified by:	Date/sign.:

TEST CASE				
ID: 8.3 Category:			Reconstruction	
Title: Reconstruct card with period pass, Card number: single ticket and stored value				
Step	Action	Expected results	Expected transactions	Results
1	Issue a card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
3	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
4	Load stored value with NOK 200	Stored value loaded	11. CSC tPurse Product Reload	
5	Buy single ticket on SalesDevice using stored value	Ticket can be bought and stored value deducted	3. CSC Fare Product sale	
6	Order reconstruction on ServiceApplication	Reconstruction ordered		
7	Wait until all transactions have been distributed	N/A		
8	Reconstruct card	Reconstruction OK. Single ticket only reconstructed if reconstructable	12. CSC Fare Media Exchange 14. CSC tPurse Product Exchange 13. CSC Fare Product Exchange 13. CSC Fare Product Exchange	
9	Validate period pass on Validator	Validation OK	30. CSC Fare Product checkin	
10	Validate single ticket on Validator	Validation OK	30. CSC Fare Product checkin	

Comments:

Tested by:

Date/sign.:

Verified by:

Date/sign.:

TEST CASE				
ID: 9.1		Category:		Stored value and auto-reload
Title: Buy single ticket using stored value		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Load stored value NOK 200 on SalesDevice	Stored value loaded	11. CSC tPurse Product Reload	
3	Buy single ticket on SalesDevice using stored value	Single ticket	3. CSC Fare Product sale	
4	Validate single ticket on Validator in end zone	Validation OK	30. CSC Fare Product checkin	
Comments:				
Tested by:		Date/sign.:		Verified by:
				Date/sign.:

TEST CASE				
ID: 9.2 Category:			Stored value and auto-reload	
Title: Buy period pass using stored value Card number:				
Step	Action	Expected results	Expected transactions	Results
1	Issue a card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Load stored value NOK 1000 on SalesDevice	Stored value loaded	11. CSC tPurse Product Reload	
3	Buy period pass on SalesDevice using stored value	Pass can be bought	3. CSC Fare Product sale	
4	Validate on Validator in start zone	Validation OK	30. CSC Fare Product checkin	
5	Validate on Validator in end zone	Validation OK	30. CSC Fare Product checkin	
Comments:				
Tested by: Date/sign.:			Verified by:	Date/sign.:

TEST CASE				
ID: 9.3		Category:		Stored value and auto-reload
Title: Split payment		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Load stored value NOK 200 on SalesDevice	Stored value loaded	11. CSC tPurse Product Reload	
3	Buy single ticket on SalesDevice using stored value and cash (split payment)	Single ticket	3. CSC Fare Product sale	
4	Validate single ticket on Validator in end zone	Validation OK	30. CSC Fare Product checkin	
Comments:				
Tested by:		Date/sign.:		Verified by:
				Date/sign.:

TEST CASE				
ID: 9.4		Category:		Stored value and auto-reload
Title: Auto-reload		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management	
			23. CSC Fare Media Holder Information	
2	Load stored value NOK 200 on SalesDevice	Stored value loaded	11. CSC tPurse Product Reload	
3	Add auto-reload agreement on ServiceApplication (LowWaterMark = NOK 200, ReloadValue = NOK 100)	Agreement is established	19. CSC tPurse management	
4	Buy single ticket on SalesDevice using stored value	Ticket can be bought	3. CSC Fare Product sale	
5	Validate on Validator in start zone	Validation OK and stored value reloaded with ReloadValue	16. CSC tPurse Product AutoLoad 30. CSC Fare Product checkin	
6	Validate on Validator in end zone	Validation OK	30. CSC Fare Product checkin	
Comments:				
Tested by:		Date/sign.:	Verified by:	Date/sign.:

TEST CASE				
ID: 9.5 Category:			Stored value and auto-reload	
Title: Terminate auto-reload agreement Card number:				
Step	Action	Expected results	Expected transactions	Results
1	Issue a card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Load stored value NOK 200 on SalesDevice	Stored value loaded	11. CSC tPurse Product Reload	
3	Add auto-reload agreement on ServiceApplication (LowWaterMark = NOK 200, ReloadValue = NOK 100)	Agreement is established	19. CSC tPurse management	
4	Buy single ticket on SalesDevice using stored value	Ticket can be bought	3. CSC Fare Product sale	
5	Validate on Validator in start zone	Validation OK and stored value reloaded with ReloadValue	16. CSC tPurse Product AutoLoad 30. CSC Fare Product checkin	
6	Terminate auto-reload agreement	Auto-reload agreement is terminated	19. CSC tPurse management	
7	Buy single ticket (price > StoredValue - LowWaterMark) on SalesDevice using stored value	Ticket can be bought	3. CSC Fare Product sale	
8	Validate on Validator in end zone	Validation OK. No auto-reload.	30. CSC Fare Product checkin	
9	Validate on Validator in end zone	Validation OK	30. CSC Fare Product checkin	

Comments:

Tested by: Date/sign.:

Verified by:

Date/sign.:

TEST CASE				
ID: 9.6		Category:		Stored value and auto-reload
Title: Double auto-reload		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale	
			18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Load stored value NOK 300 on SalesDevice	Stored value loaded	11. CSC tPurse Product Reload	
3	Add auto-reload agreement on ServiceApplication (LowWaterMark = NOK 200, ReloadValue = NOK 100)	Agreement is established	19. CSC tPurse management	
4	Buy single ticket (price > NOK 200) on SalesDevice using stored value	Ticket can be bought	3. CSC Fare Product sale	
5	Validate on Validator in start zone	Validation OK and stored value reloaded with ReloadValue	16. CSC tPurse Product AutoLoad 30. CSC Fare Product checkin	
6	Validate on Validator in end zone	Validation OK and stored value reloaded with ReloadValue	16. CSC tPurse Product AutoLoad 30. CSC Fare Product checkin	
7	Validate on Validator in end zone	Validation OK	30. CSC Fare Product checkin	
Comments:				
Tested by: Date/sign.:		Verified by:		Date/sign.:

TEST CASE				
ID: 9.7		Category:		Stored value and auto-reload
Title: Auto-reload performed twice		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale	
			18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Load stored value NOK 200 on SalesDevice	Stored value loaded	11. CSC tPurse Product Reload	
3	Add auto-reload agreement on ServiceApplication (LowWaterMark = NOK 200, ReloadValue = NOK 100)	Agreement is established	19. CSC tPurse management	
4	Buy single ticket on SalesDevice using stored value	Ticket can be bought	3. CSC Fare Product sale	
5	Validate on Validator in start zone	Validation OK and stored value reloaded with ReloadValue	16. CSC tPurse Product AutoLoad 30. CSC Fare Product checkin	
6	Validate on Validator in end zone	Validation OK	30. CSC Fare Product checkin	
7	Buy single ticket (price > StoredValue - LowWaterMark) on SalesDevice using stored value	Ticket can be bought	30. CSC Fare Product checkin	
8	Validate on Validator in end zone	Validation OK and stored value reloaded with ReloadValue	16. CSC tPurse Product AutoLoad 30. CSC Fare Product checkin	
9	Validate on Validator in end zone	Validation OK	30. CSC Fare Product checkin	

Comments:

Tested by:

Date/sign.:

Verified by:

Date/sign.:

TEST CASE				
ID: 9.8		Category:		Stored value and auto-reload
Title: Cancel reload of stored value		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Load stored value with NOK 200 on SalesDevice	Stored value loaded	11. CSC tPurse Product Reload	
3	Cancel reload of stored value	Cancellation OK	11. CSC tPurse Product Reload	
Comments:				
Tested by:		Date/sign.:	Verified by:	Date/sign.:

TEST CASE				
ID: 9.9		Category:		Stored value and auto-reload
Title: Cancel single ticket sale using stored value		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Load stored value with NOK 200 on SalesDevice	Stored value loaded	11. CSC tPurse Product Reload	
3	Buy single ticket on SalesDevice using stored value	Single ticket	3. CSC Fare Product sale	
4	Cancel single ticket sale	Cancellation OK	3. CSC Fare Product sale	
5	Validate single ticket on Validator in end zone	No validation		
Comments:				
Tested by:		Date/sign.:		Verified by:
				Date/sign.:

TEST CASE

ID: 9.10		Category:		Stored value and auto-reload	
Title: Use of Stored Value across NetworkIDs		Card number:			
Step	Action	Expected results	Expected transactions	Results	
1	Issue a personal card on SalesDevice operating within a given NetworkID	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information		
2	Load stored value with NOK 200 on SalesDevice (same Network as step 1)	Stored value loaded	11. CSC tPurse Product Reload		
3	Buy a (non-interoperable) period pass, multiple journey ticket or	Single ticket	3. CSC Fare Product sale		
	single ticket on SalesDevice using stored value (NetworkID different from step 1)				
4	Validate on Validator within same NetworkID as step 3	Validation OK	30. CSC Fare Product checkin		
5	Validate on validator within same NetworkID as step 1	No validation			
Comments:					
Tested by:		Date/sign.:		Verified by:	
				Date/sign.:	

TEST CASE				
ID: 10.1		Category:		Prioritising, unknown products and garbage collection
Title: Prioritising between single ticket, period pass and immediate event		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Load stored value NOK 200	Stored value loaded	11. CSC tPurse Product Reload	
3	Buy single ticket on SalesDevice	Ticket can be bought	3. CSC Fare Product sale	
4	Buy period pass on SalesDevice, valid in same area as single ticket	Pass can be bought	3. CSC Fare Product sale	
5	Validate on Validator in a zone where both products are valid, and immediate event is possible, if applicable	Validation of period pass OK	30. CSC Fare Product checkin	
Comments:				
Tested by:		Date/sign.:		Verified by:
				Date/sign.:

TEST CASE					
ID: 10.2 Category:			Prioritising, unknown products and garbage collection		
Title: Prioritising between period passes Card number:					
Step	Action	Expected results	Expected transactions	Results	
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information		
2	Load stored value NOK 200	Stored value loaded	11. CSC tPurse Product Reload		
3	Buy 7-day period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale		
4	Buy 30-day period pass on SalesDevice, with at least one overlapping zone with the 7-day period pass	Pass can be bought	3. CSC Fare Product sale		
5	Validate on Validator in an overlapping zone	Validation of 7-day period pass OK	30. CSC Fare Product checkin		
Comments:					
Tested by:		Date/sign.:		Verified by:	

TEST CASE				
ID: 10.3		Category:		Prioritising, unknown products and garbage collection
Title: Unused unknown product		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy single ticket that is unknown for the new PTO on SalesDevice	Ticket can be bought	3. CSC Fare Product sale	
3	Validate on the new PTO's Validator	No validation and product is not garbage collected		
Comments:				
Tested by:		Date/sign.:		Verified by: Date/sign.:

TEST CASE				
ID: 10.4		Category:		Prioritising, unknown products and garbage collection
Title: Valid unknown product		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy single ticket that is unknown for the new PTO on SalesDevice	Ticket can be bought	3. CSC Fare Product sale	
3	Validate in a valid zone on Validator	Validation OK	30. CSC Fare Product checkin	
4	Validate on the new PTO's Validator	No validation and product is not garbage collected		
Comments:				
Tested by:		Date/sign.:	Verified by: Date/sign.:	

TEST CASE				
ID: 10.5		Category:		Prioritising, unknown products and garbage collection
Title: Garbage collection of single ticket		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy single ticket on SalesDevice	Ticket can be bought	3. CSC Fare Product sale	
3	Wait until single ticket is expired	N/A		
4	Validate on Validator	No validation and single ticket is garbage collected.	25. CSC garbage collection transaction	
Comments:				
Tested by:		Date/sign.:	Verified by: Date/sign.:	

TEST CASE				
ID: 10.6		Category:		Prioritising, unknown products and garbage collection
Title: Garbage collection of period pass		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy period pass on SalesDevice	Ticket can be bought	3. CSC Fare Product sale	
3	Wait until period pass is expired	N/A		
4	Validate on Validator	No validation and period pass is garbage collected		
Comments:				
Tested by:		Date/sign.:		Verified by:
				Date/sign.:

TEST CASE							
ID: 10.7 Category:			Prioritising, unknown products and garbage collection				
Title: Period pass with auto-renewal Card number: agreement							
Step	Action	Expected results	Expected transactions	Results			
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information				
2	Buy period pass on SalesDevice	Ticket can be bought	3. CSC Fare Product sale				
3	Establish auto-renewal agreement on ServiceApplication	Agreement established	20. CSC Fare Product AutoRenew Management				
4	Validate on Validator	Validation OK	30. CSC Fare Product checkin				
5	Wait until period pass is expired	N/A					
6	Validate on Validator where product is unknown	No validation and period pass is not garbage collected					
Comments:							
Tested by:		Date/sign.:		Verified by:		Date/sign.:	

TEST CASE				
ID: 10.8		Category:		Prioritising, unknown products and garbage collection
Title: Card with unknown product		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy a non interoperable period pass, multiple journey ticket or a single ticket on SalesDevice belonging to PTO that is the Product Owner	Ticket can be bought	3. CSC Fare Product sale	
3	Validate on validator belonging to a PTO that is the Product Owner	Activation/Validation OK	30. CSC Fare Product checkin	
4	Validate on validator belonging to a PTO that is not the Product Owner	Card is ignored or the validator shows an unknown product		
Comments:				
Tested by:		Date/sign.:		Verified by:
				Date/sign.:

TEST CASE				
ID: 10.9		Category:		Prioritising, unknown products and garbage collection
Title: Garbage collection of unknown products		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy a non-interoperable period pass, multiple journey ticket or a single ticket on SalesDevice belonging to PTO that is the Product Owner	Ticket can be bought	3. CSC Fare Product sale	
3	Repeat step 2 until the card is full of unused products	Ticket can be bought	3. CSC Fare Product sale	
4	Validate on Validator belonging to a PTO that is the Product Owner. One of the unused products will be prioritized. Let the validated product expire.	Activation/Validation	30. CSC Fare Product checkin	
5	Buy a new period pass, multiple journey ticket or single ticket Salesdevice belonging to a PTO that is not the Product Owner of	The expired ticket is garbage collected and new ticket can be bought.	25. CSC garbage collection transaction 3. CSC Fare Product sale	
	the expired ticket.			

Comments:

Tested by:

Date/sign.:

Verified by:

Date/sign.:

TEST CASE				
ID: 10.10 Category:			Prioritising, unknown products and garbage collection	
Title: Garbage collection of unknown Card number: auto-renewable products				
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy a non-interoperable period pass on SalesDevice belonging to PTO that is the Product Owner	Ticket can be bought	3. CSC Fare Product sale	
3	Establish auto-renewal agreement on ServiceApplication	Agreement established	20. CSC Fare Product AutoRenew Management	
4	Validate on Validator belonging to a PTO that is the Product Owner.	Activation/Validation	30. CSC Fare Product checkin	
5	Buy a non-interoperable single ticket on SalesDevice belonging to PTO that is the Product Owner. Repeat until card is full. Let the	Ticket can be bought	3. CSC Fare Product sale	
	auto-renewable period pass expire			
6	Buy a new period pass, multiple journey ticket or single ticket on Salesdevice belonging to a PTO that is not the Product Owner of the expired ticket.	The expired ticket is not garbage collected and no new tickets can be bought.		

Comments:

Tested by:

Date/sign.:

Verified by:

Date/sign.:

TEST CASE				
ID: 11.1		Category:		Action lists
Title: Sell product using action lists		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Add action sell product on ServiceApplication	Action is added		
3	Wait until action lists have been distributed	N/A		
4	Validate on Validator	Product added. Validation OK	3. CSC Fare Product sale 30. CSC Fare Product checkin	
5	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
6	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
Comments:				
Tested by:		Date/sign.:		Verified by: Date/sign.:

TEST CASE				
ID: 11.2 Category:			Action lists	
Title: Renew product using action lists Card number:				
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
3	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
4	Add action renew existing product on ServiceApplication	Action is added		
5	Wait until action lists have been distributed and existing product is expired	N/A		
6	Validate on Validator	Product renewed. Validation OK	15. CSC Fare Product AutoRenew 30. CSC Fare Product checkin	
7	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
8	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
Comments:				
Tested by:		Date/sign.:	Verified by:	Date/sign.:

TEST CASE				
ID: 11.3 Category:			Action lists	
Title: Suspend auto-renewal agreement Card number: using action lists				
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
3	Establish auto-renewal agreement on ServiceApplication	Agreement is established	20. CSC Fare Product AutoRenew Management	
4	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
5	Add action suspend auto-renewal agreement on ServiceApplication	Action is added		
6	Wait until auto-renew is active, period pass still valid and action lists have been distributed	N/A		
7	Validate on Validator	Validation OK. No auto-renew. Auto-renew agreement suspended.	20. CSC Fare Product AutoRenew Management 30. CSC Fare Product checkin	
8	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
9	Validate on Validator	Validation OK	30. CSC Fare Product checkin	

Comments:

Tested by:

Date/sign.:

Verified by:

Date/sign.:

TEST CASE				
ID: 11.4 Category:			Action lists	
Title: Suspend and restart auto-renewal Card number: agreement using action lists				
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
3	Establish auto-renewal agreement on ServiceApplication	Agreement is established	20. CSC Fare Product AutoRenew Management	
4	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
5	Add action suspend auto-renewal agreement on ServiceApplication	Action is added		
6	Wait until auto-renew is active, period pass still valid and action lists have been distributed	N/A		
7	Validate on Validator	Validation OK. No auto-renew. Auto-renew agreement suspended.	20. CSC Fare Product AutoRenew Management 30. CSC Fare Product checkin	
8	Validate on Validator	Validation OK. No auto-renew.	30. CSC Fare Product checkin	
9	Add action restart agreement auto-renew on ServiceApplication	Action is added to action list		
10	Wait until actions lists have been distributed and period pass is expired	N/A		

11	Validate on Validator	Auto-renew agreement restarted. Period pass auto-renewed and validated.	20. CSC Fare Product AutoRenew Management 15. CSC Fare Product AutoRenew 30. CSC Fare Product checkin	
12	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
13	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
Comments:				
Tested by:		Date/sign.:	Verified by:	Date/sign.:

TEST CASE				
ID: 11.5		Category:	Action lists	
Title: Suspend and terminate autorenewal agreement using action lists		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale	
			18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
3	Establish auto-renewal agreement on ServiceApplication	Agreement is established	20. CSC Fare Product AutoRenew Management	
4	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
5	Add action suspend auto-renewal agreement on ServiceApplication	Action is added		
6	Wait until auto-renew is active, period pass still valid and action lists have been distributed	N/A		
7	Validate on Validator	Auto-renew agreement suspended. No autorenew. Validation OK.	20. CSC Fare Product AutoRenew Management 30. CSC Fare Product checkin	
8	Validate on Validator	Validation OK. No auto-renew.	30. CSC Fare Product checkin	
9	Add action terminate agreement auto-renew on ServiceApplication	Action is added to action list		
10	Wait until actions lists have been distributed and period pass is expired	N/A		

11	Validate on Validator	Auto-renew agreement terminated. No autorenew. Validation OK.	20. CSC Fare Product AutoRenew Management 30. CSC Fare Product checkin	
12	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
13	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
Comments:				
<p>Tested by: _____ Date/sign.: _____ Verified by: _____ Date/sign.: _____</p>				

TEST CASE				
ID: 11.6 Category:			Action lists	
Title: Terminate auto-renewal Card number: agreement using action lists				
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
3	Establish auto-renewal agreement on ServiceApplication	Agreement is established	20. CSC Fare Product AutoRenew Management	
4	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
5	Add action terminate autorenewal agreement on ServiceApplication	Action is added		
6	Wait until auto-renewal is active, period pass still valid and action lists have been distributed	N/A		
7	Validate on Validator	Validation OK. No auto-renew. Auto-renew agreement terminated.	20. CSC Fare Product AutoRenew Management 30. CSC Fare Product checkin	
8	Validate on Validator	Validation OK. No auto-renew.	30. CSC Fare Product checkin	
9	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
Comments:				

Tested by:	Date/sign.:	Verified by:	Date/sign.:

TEST CASE				
ID: 11.7 Category:			Action lists	
Title: Establish, suspend and restart Card number: auto-renewal agreement using action lists				
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
3	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
4	Add action establish auto-renewal agreement on ServiceApplication	Action is added		
5	Wait until action lists have been distributed	N/A		
6	Validate on Validator	Auto-renew agreement is established. Validation OK.	20. CSC Fare Product AutoRenew Management 30. CSC Fare Product checkin	
7	Add action suspend auto-renewal agreement on action list	Action is added		
8	Wait until auto-renew is active, period pass still valid and action lists have been distributed	N/A		
9	Validate on Validator	Validation OK. No auto-renew. Auto-renew agreement suspended.	20. CSC Fare Product AutoRenew Management 30. CSC Fare Product checkin	

10	Add action restart agreement auto-renew on action list	Action is added		
11	Wait until action lists have been distributed	N/A		
12	Validate on Validator	Auto-renew agreement restarted. Product auto-renew. Validation OK.	20. CSC Fare Product AutoRenew Management 15. CSC Fare Product AutoRenew 30. CSC Fare Product checkin	
13	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
14	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
Comments:				
<p>Tested by: _____ Date/sign.: _____ Verified by: _____ Date/sign.: _____</p>				

TEST CASE				
ID: 11.8		Category:		Action lists
Title: Suspend, restart and terminate auto-renewal agreement using action lists		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale	
			4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
3	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
4	Establish auto-renewal agreement on ServiceApplication	Agreement is established	20. CSC Fare Product AutoRenew Management	
5	Validate on Validator	Auto-renew agreement is established. Validation OK.	30. CSC Fare Product checkin	
6	Add action suspend auto-renewal agreement on ServiceApplication	Action is added		
7	Wait until auto-renew is active, period pass still valid and action lists have been distributed	N/A		
8	Validate on Validator	Auto-renew agreement suspended. No autorenew. Validation OK.	20. CSC Fare Product AutoRenew Management 30. CSC Fare Product checkin	
9	Add action restart auto-renewal agreement on action list	Action is added		

10	Wait until action lists have been distributed	N/A		
11	Validate on Validator	Auto-renew agreement restarted. Product auto-renewed. Validation OK.	20. CSC Fare Product AutoRenew Management 15. CSC Fare Product AutoRenew 30. CSC Fare Product checkin	
12	Add action terminate autorenewal agreement (of the recently auto-renewed product) on ServiceApplication	Action is added		
13	Wait until action lists have been distributed	N/A		
14	Validate on Validator	Auto-renew agreement terminated. Validation OK.	20. CSC Fare Product AutoRenew Management 30. CSC Fare Product checkin	
15	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
16	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
Comments:				
<p>Tested by: _____ Date/sign.: _____ Verified by: _____ Date/sign.: _____</p>				

TEST CASE				
ID: 11.9		Category:		Action lists
Title: Reload stored value using action lists		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
3	Load stored value NOK 100 on SalesDevice	Stored value loaded	11. CSC tPurse Product Reload	
4	Validate on Validator	Validation OK.	30. CSC Fare Product checkin	
5	Add action reload stored value NOK 200 on ServiceApplication	Action is added		
6	Wait until action lists have been distributed	N/A		
7	Validate on Validator	Stored value reloaded. Validation OK.	11. CSC tPurse Product Reload 30. CSC Fare Product checkin	
8	Validate on Validator	Validation OK.	30. CSC Fare Product checkin	
Comments:				
Tested by:		Date/sign.:		Verified by: Date/sign.:

TEST CASE				
ID: 11.10		Category:		Action lists
Title: Suspend auto-reload agreement using action lists		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Load stored value NOK 200 on SalesDevice	Stored value loaded	11. CSC tPurse Product Reload	
3	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
4	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
5	Establish auto-reload agreement on ServiceApplication (LowWaterMark = NOK 200, ReloadValue = NOK 100)	Agreement is established	19. CSC tPurse management	
6	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
7	Add action suspend auto-reload agreement on ServiceApplication	Action is added		
8	Wait until action lists have been distributed	N/A		
9	Validate on Validator	Validation OK. Auto-reload agreement suspended.	19. CSC tPurse management 30. CSC Fare Product checkin	
10	Buy single ticket on SalesDevice using stored value	Ticket can be bought and stored value deducted	3. CSC Fare Product sale	
11	Validate on Validator	Validation OK. No auto-reload.	30. CSC Fare Product checkin	
12	Validate on Validator	Validation OK	30. CSC Fare Product checkin	

Comments:

Tested by:

Date/sign.:

Verified by:

Date/sign.:

TEST CASE				
ID: 11.11		Category:	Action lists	
Title: Suspend and restart auto-reload agreement using action lists		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Load stored value NOK 200 on SalesDevice	Stored value loaded	11. CSC tPurse Product Reload	
3	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
4	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
5	Establish auto-reload agreement on ServiceApplication (LowWaterMark = NOK 200, ReloadValue = NOK 100)	Agreement is established	19. CSC tPurse management	
6	Add action suspend auto-reload agreement on ServiceApplication	Action is added		
7	Wait until action lists have been distributed	N/A		
8	Validate on Validator	Validation OK. Auto-reload agreement suspended.	19. CSC tPurse management 30. CSC Fare Product checkin	
9	Buy single ticket on SalesDevice using stored value	Ticket can be bought and stored value deducted	3. CSC Fare Product sale	
10	Validate on Validator	Validation OK. No auto-reload.	30. CSC Fare Product checkin	
11	Add action restart auto-reload agreement on ServiceApplication	Action is added		

12	Wait until action lists have been distributed	N/A		
13	Validate on Validator	Auto-reload agreement restarted. Auto-reload performed. Validation OK.	19. CSC tPurse management 16. CSC tPurse Product AutoLoad 30. CSC Fare Product checkin	
14	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
Comments:				
Tested by:		Date/sign.:	Verified by:	Date/sign.:

TEST CASE				
ID: 11.12		Category:		Action lists
Title: Suspend and terminate auto-reload agreement using action lists		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Load stored value NOK 200 on SalesDevice	Stored value loaded	11. CSC tPurse Product Reload	
3	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
4	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
5	Establish auto-reload agreement on ServiceApplication (LowWaterMark = NOK 200, ReloadValue = NOK 100)	Agreement is established	19. CSC tPurse management	
6	Add action suspend auto-reload agreement on ServiceApplication	Action is added		
7	Wait until action lists have been distributed	N/A		
8	Validate on Validator	Validation OK. Auto-reload agreement suspended.	19. CSC tPurse management 30. CSC Fare Product checkin	
9	Buy single ticket on SalesDevice using stored value	Ticket can be bought and stored value deducted	3. CSC Fare Product sale	
10	Validate on Validator	Validation OK. No auto-reload.	30. CSC Fare Product checkin	

11	Add action terminate auto-reload agreement on ServiceApplication	Action is added		
12	Wait until action lists have been distributed	N/A		
13	Validate on Validator	Auto-reload agreement terminated. No autoreload. Validation OK.	19. CSC tPurse management 30. CSC Fare Product checkin	
14	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
Comments:				
<p>Tested by: _____ Date/sign.: _____ Verified by: _____ Date/sign.: _____</p>				

TEST CASE				
ID: 11.13		Category:		Action lists
Title: Terminate auto-reload agreement using action lists		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Load stored value NOK 200 on SalesDevice	Stored value loaded	11. CSC tPurse Product Reload	
3	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
4	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
5	Establish auto-reload agreement on ServiceApplication (LowWaterMark = NOK 200, ReloadValue = NOK 100)	Agreement is established	19. CSC tPurse management	
6	Validate on Validator	Ticket can be bought	30. CSC Fare Product checkin	
7	Add action terminate auto-reload agreement on ServiceApplication	Action is added		
8	Wait until action lists have been distributed	N/A		
9	Validate on Validator	Validation OK. Auto-reload agreement terminated.	19. CSC tPurse management 30. CSC Fare Product checkin	
10	Buy single ticket on SalesDevice using stored value	Ticket can be bought and stored value deducted	3. CSC Fare Product sale	
11	Validate on Validator	Validation OK. No auto-reload.	30. CSC Fare Product checkin	
12	Validate on Validator	Validation OK	30. CSC Fare Product checkin	

Comments:

Tested by:

Date/sign.:

Verified by:

Date/sign.:

TEST CASE				
ID: 11.14		Category:	Action lists	
Title: Suspend, restart and terminate auto-reload agreement using action lists		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale	
			18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Load stored value NOK 200 on SalesDevice	Stored value loaded	11. CSC tPurse Product Reload	
3	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
4	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
5	Establish auto-reload agreement on ServiceApplication (LowWaterMark = NOK 200, ReloadValue = NOK 100)	Agreement is established	19. CSC tPurse management	
6	Add action suspend auto-reload agreement on ServiceApplication	Action is added		
7	Wait until action lists have been distributed	N/A		
8	Validate on Validator	Validation OK. Auto-reload agreement suspended.	19. CSC tPurse management 30. CSC Fare Product checkin	
9	Buy single ticket on SalesDevice using stored value	Ticket can be bought and stored value deducted	3. CSC Fare Product sale	
10	Validate on Validator	Validation OK. No auto-reload.	30. CSC Fare Product checkin	

11	Add action restart auto-reload agreement on ServiceApplication	Action is added		
12	Wait until action lists have been distributed	N/A		
13	Validate on Validator	Auto-reload agreement restarted. Auto-reload performed. Validation OK.	19. CSC tPurse management 16. CSC tPurse Product AutoLoad 30. CSC Fare Product checkin	
14	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
15	Add action terminate auto-reload agreement on ServiceApplication	Action is added		
16	Wait until action lists have been distributed	N/A		
17	Validate on Validator	Auto-reload agreement restarted. Auto-reload performed. Validation OK.	19. CSC tPurse management 30. CSC Fare Product checkin	
18	Buy single ticket on SalesDevice using stored value, such that new stored value is below LowWaterMark	Ticket can be bought and stored value deducted	3. CSC Fare Product sale	
19	Validate on Validator	Validation OK. No auto-reload.	30. CSC Fare Product checkin	
Comments:				
Tested by: _____ Date/sign.: _____ Verified by: _____ Date/sign.: _____				

TEST CASE				
ID: 11.15		Category:	Action lists	
Title: Establish, suspend and terminate auto-reload agreement using action lists		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Load stored value NOK 200 on SalesDevice	Stored value loaded	11. CSC tPurse Product Reload	
3	Buy period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
4	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
5	Add action establish auto-reload agreement on ServiceApplication (LowWaterMark = NOK 200, ReloadValue = NOK 100)	Agreement is established		
6	Wait until action lists have been distributed	N/A		
7	Validate on Validator	Validation OK. Auto-reload agreement established.	19. CSC tPurse management 30. CSC Fare Product checkin	
8	Buy single ticket on SalesDevice using stored value	Ticket can be bought and stored value deducted	3. CSC Fare Product sale	
9	Validate on Validator	Stored valued auto-reloaded. Validation OK.	16. CSC tPurse Product AutoLoad 30. CSC Fare Product checkin	
10	Add action suspend auto-reload agreement on ServiceApplication	Action is added		

11	Wait until action lists have been distributed	N/A		
12	Validate on Validator	Auto-reload agreement suspended. Validation OK.	19. CSC tPurse management 30. CSC Fare Product checkin	
13	Buy single ticket on SalesDevice using stored value, such that new stored value is below LowWaterMark	Ticket can be bought	3. CSC Fare Product sale	
14	Validate on Validator	Validation OK. No auto-reload	30. CSC Fare Product checkin	
15	Add action restart auto-reload agreement on ServiceApplication	Action is added		
16	Wait until action lists have been distributed	N/A		
17	Validate on Validator	Auto-reload agreement restarted. Auto-reload performed. Validation OK.	19. CSC tPurse management 16. CSC tPurse Product AutoLoad 30. CSC Fare Product checkin	
18	Validate on Validator	Validation OK. No auto-reload.	30. CSC Fare Product checkin	
Comments:				
Tested by: _____ Date/sign.: _____ Verified by: _____ Date/sign.: _____				

TEST CASE				
ID: 12.1		Category:		Profiles
Title: Buy period pass that requires implicit profile		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card with profile on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy period pass that requires implicit profile on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
3	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
Comments:				
Tested by:		Date/sign.:		Verified by:
				Date/sign.:

TEST CASE				
ID: 12.2		Category:		Profiles
Title: Try to Buy period pass that requires implicit profile		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy period pass that requires implicit profile on SalesDevice	Pass cannot be bought		
Comments:				
Tested by:		Date/sign.:		Verified by:
				Date/sign.:

TEST CASE				
ID: 12.3		Category:		Profiles
Title: Buy period pass that requires explicit profile		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card (see step 2 for birth date) on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder	
			Information	
2	Buy period pass that requires explicit profile on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
3	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
Comments:				
Tested by:		Date/sign.:		Verified by:
				Date/sign.:

TEST CASE				
ID: 12.3		Category:		Profiles
Title: Buy period pass that requires explicit profile		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card (see step 2 for birth date) on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder	
			Information	
2	Buy period pass that requires explicit profile on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
3	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
Comments:				
Tested by:		Date/sign.:		Verified by: Date/sign.:

TEST CASE				
ID: 12.4		Category:		Profiles
Title: Try to Buy period pass that requires explicit profile		Card number:		
Step	Action	Expected results	Expected transactions	Results

1	Issue a personal card (adult birth date) on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy period pass that requires an explicit profile that do not match card holders birth date on SalesDevice	Pass cannot be bought		
Comments:				
Tested by:	Date/sign.:	Verified by:	Date/sign.:	

TEST CASE				
ID: 13.1 Category:			Profiles	
Title: Use two different card key Card number: versions in the same environment				
Step	Action	Expected results	Expected transactions	Results
1	Initialize card with cardKeyVersion 1 (Card A)	Card initialized CI_Header.cardKeyVersion is 1		
2	Initialize card with cardKeyVersion 2 (Card B)	Card initialized CI_Header.cardKeyVersion is 2		
3	Distribute cardKeyVersion 2 to relevant SalesDevices, Validators and Service Applications in the environment	Equipment now operates with both cardKeyVersion 1 and 2		
4	Issue a personalized card based on card A	Card is issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
5	Load Stored Value to card A on ServiceApplication or SalesDevice	StoredValue is uploaded	11. CSC tPurse Product Reload	
6	Buy a product using Stored Value on ServiceApplication or	Product is purchased	3. CSC Fare Product sale	
	SalesDevice on Card A			

7	Validate on Validator or SalesDevice	Product is Activated/Validated	30. CSC Fare Product checkin	
8	Issue a personalized card based on card B	Card is issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
9	Load Stored Value to card A on ServiceApplication or SalesDevice	StoredValue is uploaded	11. CSC tPurse Product Reload	
10	Buy a product using Stored Value on ServiceApplication or SalesDevice on Card A	Product is purchased	3. CSC Fare Product sale	
11	Validate on Validator or SalesDevice	Product is Activated/Validated	30. CSC Fare Product checkin	
Comments:				
<p>Tested by: _____ Date/sign.: _____ Verified by: _____ Date/sign.: _____</p>				

TEST CASE				
ID: 15.1		Category:		Profiles
Title: Verify correct behavior of equipment in case erroneous event update		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy a product on SalesDevice	Product is bought	3. CSC Fare Product sale	
3	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
4	Manipulate the card event log to corrupt the data of last present event	Fields in the event log have been changed		
5	Validate on Validator	Validation OK. Equipment is able to ignore corrupted data.	30. CSC Fare Product checkin	
Comments:				
Tested by: Date/sign.: Verified by: Date/sign.:				

TEST CASE				
ID: 16.1		Category: PL4 web services		
Title: Create and update customer data		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Create a new customer on ServiceApplication	Data inserted into PL4 using CreateOrUpdateCustomer (create) and CreateOrUpdateCustomerCompanyRelationship (create)		
2	Issue a personal card to this customer on SalesDevice	Data inserted into PL4 using CreateOrUpdateCustomerEcardRelation (create)	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
3	Verify the customer data, customer-company data and relation between the customer and Flexus card in PL4	Data in PL4 and ServiceApplication is consistent		
4	Search for customer data on ServiceApplication. One search per field: customerId, surName, firstName, address, postalCode, birthDate, email, internalCustomerId, phoneNumber, cardNumber, maxSearchResults. firstName, surName and address can be matched by substring, all other fields require exact match.	"The customer can be found using any of the existing customer field data		

5	Update all customer data (birthDate, surName, firstName, address, postalCode, city, phone, gender, email) on ServiceApplication	Data updated in PL4 using CreateOrUpdateCustomer (update)					
6	Verify data in PL4	Data in PL4 and ServiceApplication is consistent					
7	Update customer ecard relation by changing start date and end date on ServiceApplication	Data updated in PL4 using CreateOrUpdateCustomerEcardRelation (update)					
8	Verify data in PL4	Data in PL4 and ServiceApplication is consistent					
Comments:							
Tested by:		Date/sign.:		Verified by:		Date/sign.:	

TEST CASE				
ID: 16.2		Category:		PL4 web services
Title: Use card transactions, blacklist and reconstruction web services		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Issue a personal card on SalesDevice	Card issued	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
2	Buy a period pass on SalesDevice	Pass can be bought	3. CSC Fare Product sale	
3	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
4	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
5	Validate on Validator	Validation OK	30. CSC Fare Product checkin	
6	Blacklist card on ServiceApplication	Card blacklisted using CreateOrUpdateBlockingRequest (create)		
7	Add reconstruction request on ServiceApplication	Card added to reconstruction list using CreateOrUpdateReconstructionRequest (create)		
8	Wait until all transactions have been inserted into PL4			
9	List card transactions on ServiceApplication	Card transactions is listed using GetCardTransactions		
10	Verify transactions in PL4	Data in PL4 and ServiceApplication is consistent		
11	List blocking requests on ServiceApplication	Blocking request can be listed using FindBlockingRequests		

12	Compare blocking requests in PL4 with the list in ServiceApplication	Data in PL4 and ServiceApplication is consistent		
13	List reconstruction requests in ServiceApplication	Reconstruction requests can be listed using FindReconstructionRequests		
14	Verify reconstruction requests in PL4 and ServiceApplication	Data in PL4 and ServiceApplication is consistent. Reconstruction request is created.		
15	Reconstruct card on ServiceApplication	Reconstruction OK. Reconstruction request updated using CreateOrUpdateReconstructionRequest (update)	12. CSC Fare Media Exchange 14. CSC tPurse Product Exchange 13. CSC Fare Product Exchange	
16	Verify reconstruction requests in PL4 and ServiceApplication	Data in PL4 and ServiceApplication is consistent. Reconstruction request is updated.		
17	Wait until all transactions have been distributed	Wait		
18	List card image in ServiceApplication	Card image can be listed in ServiceApplication using GetCardImage		
19	Verify card image in PL4	Data in PL4 and ServiceApplication is consistent		
Comments:				
Tested by:		Date/sign.:	Verified by:	Date/sign.:

TEST CASE				
ID: 17.1		Category: PL4 web services		
Title: Create and update customer data		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Create a new customer on ServiceApplication	Data inserted into PL4 using CreateOrUpdateCustomer (create) and CreateOrUpdateCustomerCompanyRelationship (create)		
2	Issue a personal card to this customer on SalesDevice	Data inserted into PL4 using CreateOrUpdateCustomerEcardRelation (create)	2. CSC Fare Media sale 4. CSC tPurse Product sale 18. CSC Fare Media activity Management 23. CSC Fare Media Holder Information	
Comments:				
Tested by: Date/sign.:		Verified by:		Date/sign.:

TEST CASE				
ID: 18.1 Category:			Mobile tickets	
Title: Register mobile ticket payment Card number: means				
Step	Action	Expected results	Expected transactions	Results
1	Regsiter a credit card or other valid payment means on mobile device	Mobile ticket payment means registered Mobile tickets can now be bought on mobile device		
Comments:				
Tested by: Date/sign.:			Verified by:	Date/sign.:

TEST CASE				
ID: 18.2 Category:			Mobile tickets	
Title: Mobile single ticket Card number:				
Step	Action	Expected results	Expected transactions	Results
1	Buy a mobile single ticket on mobile device using registered payment means	Mobile single ticket sold Payment means deducted, with optional receipt for purchase received Optional validity/transfer time shown in device user interface		
2	Visually check generated QR-code	The QR-code generated during step 1 can be viewed in the mobile device user interface		
3	Visually check security animation	The correct security animation for the gived day/date can be viewed in the user interface		
Comments:				
Tested by:		Date/sign.:	Verified by:	Date/sign.:

TEST CASE				
ID: 18.3 Category:			Mobile tickets	
Title: Mobile period pass Card number:				
Step	Action	Expected results	Expected transactions	Results
1	Buy a mobile period pass on mobile device using registered payment means	Mobile single ticket sold Payment means deducted, with optional receipt for purchase received Optional validity/transfer time shown in device user interface		
2	Visually check generated QR-code	The QR-code generated during step 1 can be viewed in the mobile device user interface		
3	Visually check security animation	The correct security animation for the gived day/date can be viewed in the user interface		
Comments:				
Tested by:		Date/sign.:	Verified by:	Date/sign.:

TEST CASE				
ID: 18.4		Category: Mobile tickets		
Title: Mobile ticket validity		Card number:		
Step	Action	Expected results	Expected transactions	Results
1	Buy a mobile period pass or single ticket on mobile device using registered payment means	Mobile single ticket sold Payment means deducted, with optional receipt for purchase received Optional validity/transfer time shown in device user interface		
2	Check QR-code on a control device in a valid zone	The QR-code can be scanned using a QR-code capable control device. Control device user interface gives visual feedback on the validity of the scanned ticket. Usually a green light		
3	Check contents of QR-code on a validator	The QR-code can be scanned using a QR-code capable control device. Control Device user interface translates the information in the QRcode and presents information regarding validity time and zones		
4	Check QR-code on a validator in an invalid zone	The QR-code can be scanned using a QR-code capable control device. Control device user interface gives visual feedback on the validity of the scanned ticket. Usually a red light		
5	Check QR-code on a validator outside of validity time	The QR-code can be scanned using a QR-code capable control device. Control device user interface gives visual feedback on the validity of the scanned ticket. Usually a red light		
Comments:				

Tested by:

Date/sign.:

Verified by:

Date/sign.:

TEST CASE				
ID: 18.5 Category:			Mobile tickets	
Title: QR-code structure Card number:				
Step	Action	Expected results	Expected transactions	Results
1	Buy a mobile period pass or single ticket on mobile device using registered payment means	Mobile single ticket sold Payment means deducted, with optional receipt for purchase received Optional validity/transfer time shown in device user interface		
2	Copy generated QR-code from mobile device	QR-code can be copied using screen capture. Image is saved in a *.png-file		
3	Translate copied QR-code through a test tool capable of decoding QR-codes	QR-code is decoded and it's contents can be read in plain text		
4	Visually verify the decoded QRcode	The plain text contents of the QR-coded can be read and the fields it contains can be checked for validity against the requirements specified in Handbook V821part 20.		
Comments:				
Tested by:		Date/sign.:	Verified by:	Date/sign.: