

GREATER CAIRO METRO UPGRADE LINE 1&2

LINE 1 & 2 SSS - System Specification

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1. INTRODUCTION

1.1 IDENTIFICATION

This document belongs to the Greater Cairo Metro Upgrade Lines 1 & 2 project. This is the System Specification (System wide SSS document).

1.1.1 POSITION OF THIS DOCUMENT IN THE ENGINEERING PROCESS

Chorus 2.0 is the Thales reference system. It is a single set of management processes that defines how Thales works : our rules, practices and methods of operating.

Thanks to this common business language that fosters teamwork (One Team, One Thales) Thales improves its collective efficiency.

Chorus 2.0 is broken down into a number of enterprise process, the one of interest in this context being DDQS : Design, Develop, and Qualify the Solution.

The purpose of DDQS is to conduct the development of the solution to achieve customer satisfaction of the delivered product or service in consistency with all stakeholders needs. The figure below gives a general view of the DDQS process. Note that this process is tailored according to the project requirements.

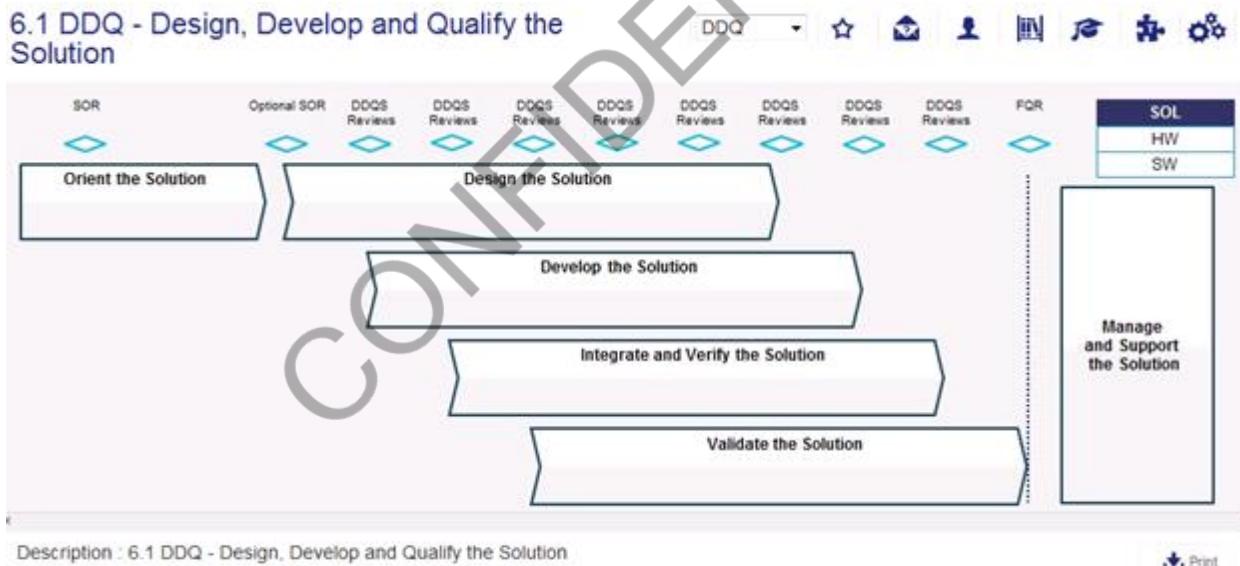


Figure 1 : DDQS process

The DDQS process is inspired by the following standards : ISO/IEC 15288, ANSI/EIA-632, INCOSE (THALES is a member of the International Council for Systems Engineering and participates in the establishment of its work products)

The present document belongs to the 'Orient the Solution' phase, the objective of which is to create a level of understanding about customer's needs and through life cycle concerns so that a solution and a development strategy, mutually agreed, can be proposed.

1.1.2 POSITION OF THIS DOCUMENT IN THE SET OF DELIVERABLES

The following figure gives an overview of the project documents (refer to CDRL for details).

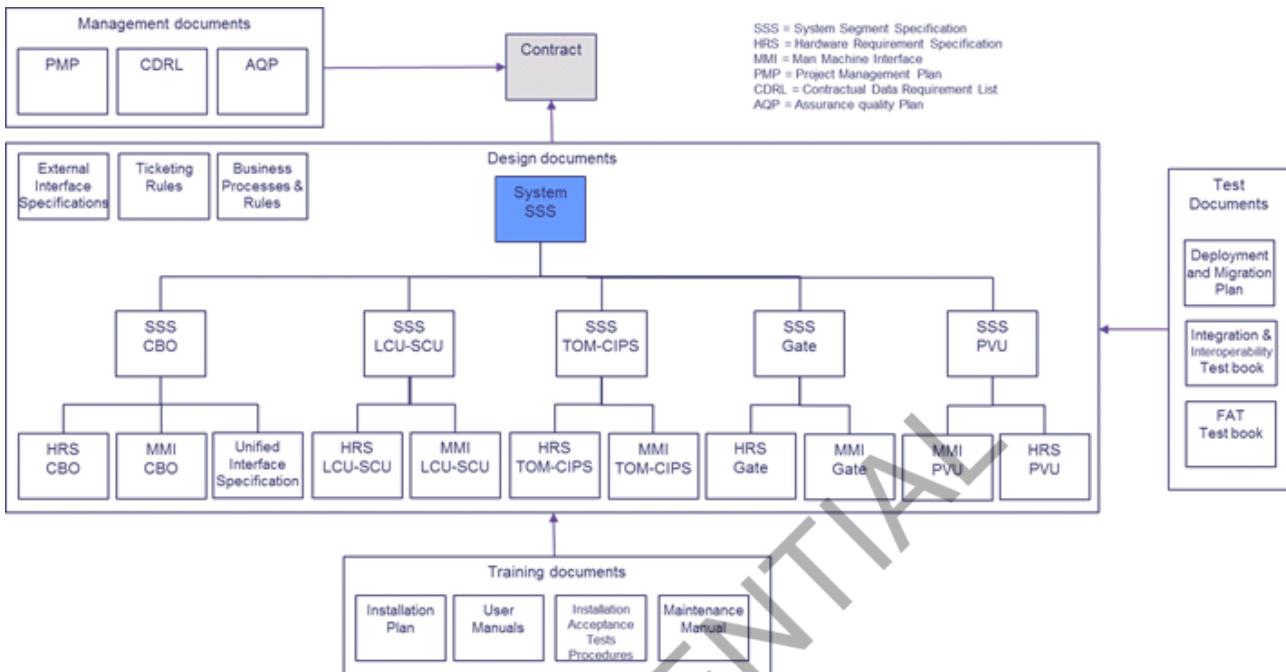


Figure 2 : Project documents

The technical information available in the documents is illustrated in the table below.

Information	Document
Operational concepts	System SSS
Business rules	Business processes & Rules
Detailed functional analysis	Sub-system SSS – Requirement chapter
Non-functional requirements	Sub-system SSS – Requirement chapter
Detailed organic analysis	Sub-system SSS – Architecture chapter (logical architecture)
Software technical architecture	Sub-system SSS – Architecture chapter (technical architecture)
Testing	FAT test books
Integration	Integration and interoperability test book
Error messages	User manuals, vendor documentation
Data base	User manuals, vendor documentation
Operating system	Vendor documentation
MMI	User manuals
Networking	Installation plan, user manuals, maintenance manuals
Hardware and IT	HRS
Hardware tools	User manuals, maintenance manuals

Note: the traceability between the project technical documents and the contract requirements is established based on the sub-system SSS and HRS.

The principle is illustrated in the figure below.

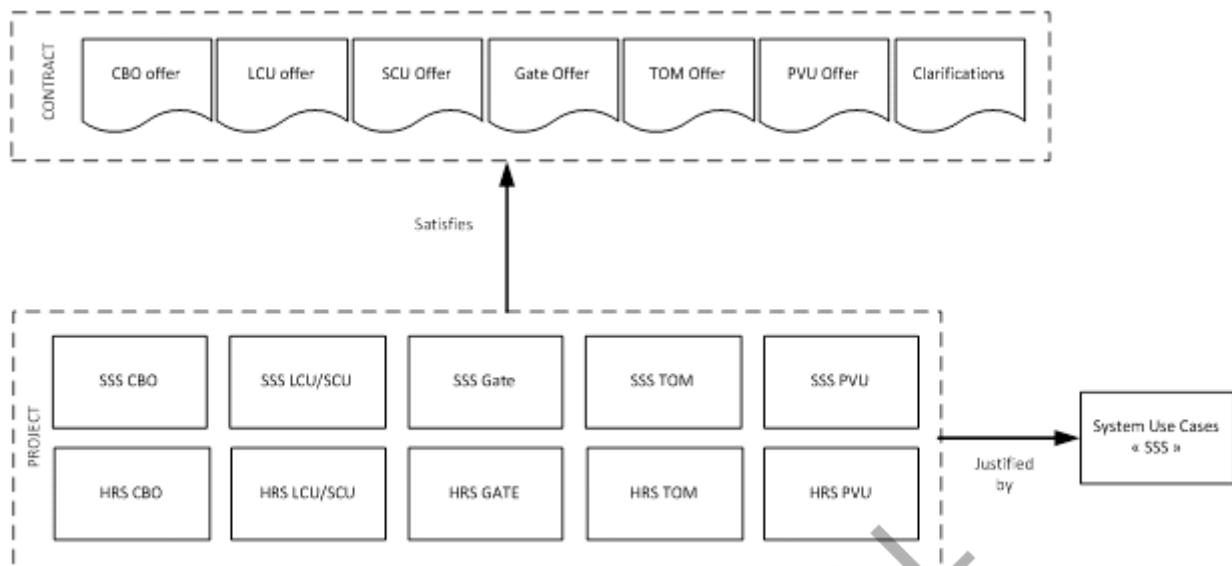


Figure 3 : Traceability principle

Note. Line 3 Phase 3 references when applicable have been discussed during the review of the specifications of each subsystem and incorporated in those specifications when applicable.

1.1.3 CASE TOOLS

The Case tools uses for the project are listed below:

Activity	Tools
Design and project management	Thales Engineering Factory (SAS private cloud for engineering Tools) IBM Doors (requirement management) Microsoft Office
	Thales Team On Line (electronic document management)
	Thales Capella modeling tool, Eclipse project)
Project Management	Planning: Microsoft Project
	Issues and agile management : Jira
Development	IDE : Eclipse, IntelliJ, Visual Studio Unit test: Junit tool, Mocha UI test framework, Code coverage tool : Jacoco Integration tests : Jenkins Code quality : Sonar Configuration management : GIT API documentation : Javadoc, swagger Product versions storage : Nexus

1.2 DOCUMENT OVERVIEW

Background

A contract has been signed between The National Authority for Tunnels (NAT) and Thales Communications a Security SAS (TCS) for the upgrade of the AFC system for metro lines 1 & 2 (850 gates project).

The project includes the delivery of front-end equipment, Automatic Gates and Ticket Office Machines (TOM) as well as Station Control Units (SCU) ad Line Control Units (LCU) for the 2 lines. The objective is the replacement of the old magnetic devices by dual (magnetic / contactless) devices compatible with the dual devices of line 3 and the contactless devices of lines 1&2.

A new equipment type, the Portable Verifying Unit (PVU), dedicated to the roving inspectors will also be delivered.

In addition, Thales will provide a Central Back Office (CBO) that will house the central AFC functions. This 'level 4' system will manage the 3 lines and be connected to Thales and 3rd party systems (LCU, SCU and equipment).

Purpose of the document

This document participates in the global design of the solution as the "System of Systems" specification.

Its purposes are to focus on the business requirements, to capture the needs and expectations and especially to make clear the role of each sub-system in the global solution. It will be used as the input for the sub-system specifications.

The functional impact on the existing solutions (TOM, Automatic Gate, SCU, LCU) is expected to be very low. However, this analysis is required in the perspective of the design of the CBO in order to get global solution that meets the business needs.

This document focuses on the operational point of view (i.e. usage of the system from the users and end-users perspective) and is composed of End to End (E2E) use cases. The purpose of the E2E use cases is to make clear the participation of each sub-systems in the system functions in order to ensure a consistent system design.

Note that this document is managed in a Doors® database. The Doors® capabilities will be used for the traceability to the contract documents and the sub-system specifications.

Document structure

This document is structured as follows:

Chapter 1 (introduction, this chapter) starts by highlighting the purpose and the structure of the document. It then gives an overview of the system architecture with a highlight on interoperability.

Chapter 2 (References) lists the associated documents and their link with the present document.

Chapter 3 (End to End use cases), the main part of the document, contains the description of system wide use cases grouped per functional areas.

Chapter 4 (Deployment and migration strategy), gives an overview of the foreseen transition plan from the existing system to the new system.

1.3 SYSTEM OVERVIEW

1.3.1 ARCHITECTURE OVERVIEW

The purpose of this section is to give a general overview of the system in order especially to identify the sub-systems and components that will participate in the use cases. More detailed descriptions of the architecture will be provided in the detailed design documents.

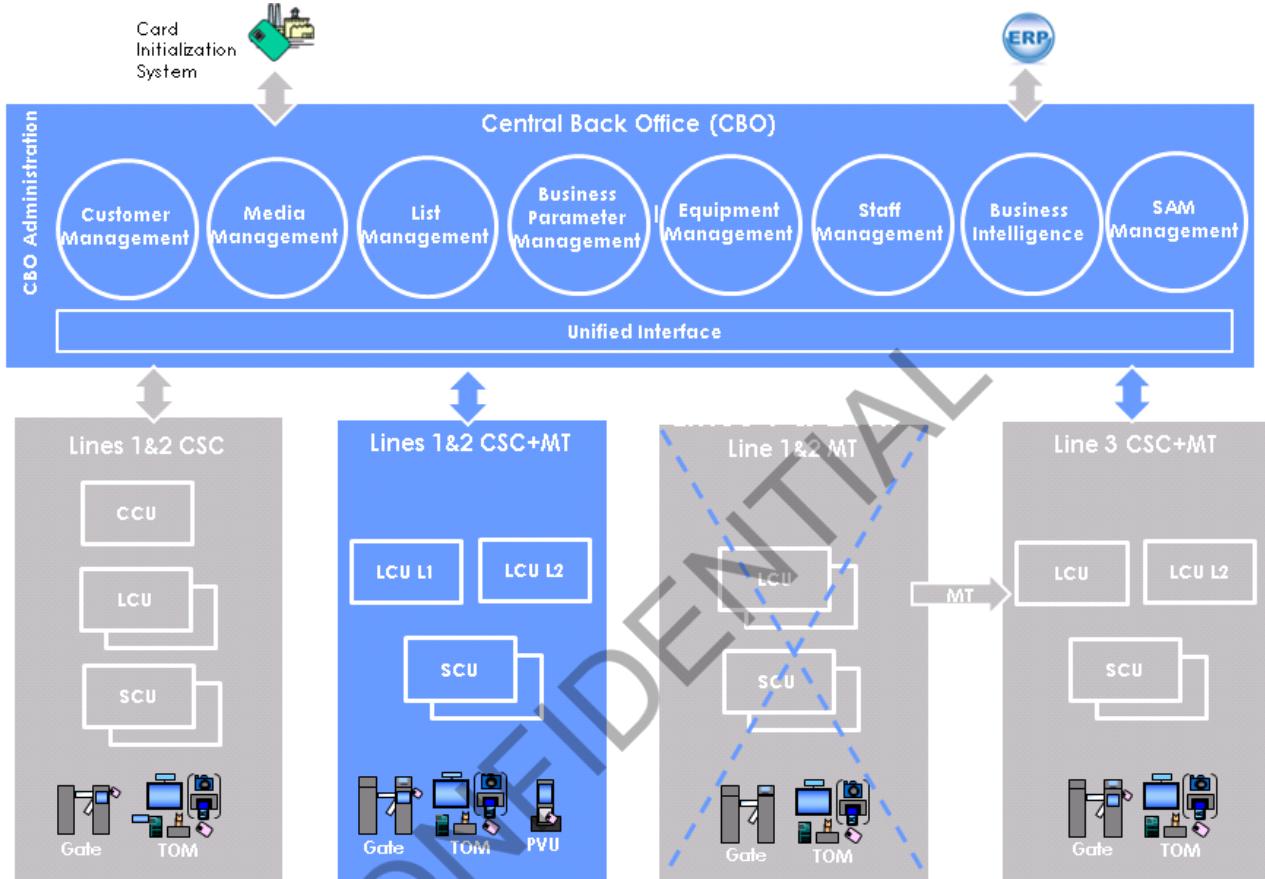


Figure 4 : System architecture overview

Note: the blue elements are part of the present 850 gates projects whereas the grey ones are existing components.

The lines 1 & 2 CSC is the contact-less only system deployed on lines 1 & 2 and including TOMs and Gates. It is provided by a 3rd party. The CCU that is managing the contact-less central functions is kept for compatibility here

The line 1 & 2 MT is the magnetic only solution provided years ago by Thales. It is connected to the line 3 LCU that does the magnetic data consolidation. It will be progressively phased out with the upgrade of the gates. However a number of gates will remain in place even when all new dual gates will be installed.

The Line 3 CSC + MT is the line 3 ticketing system deployed by Thales and including TOMs and gates. The line 3 LCU acts also as magnetic data central system by consolidating the data received from the old line 1 & 2 MT systems.

The line 1 & 2 CSC + MT is part of the current offer and consists in the replacement of existing magnetic gates by dual gates (magnetic and contact-less). Portable Verification Units (PVU) dedicated to roving inspectors are also in scope.

Note: in the following of the document the generic term TOM is used for the TOM-CIPS equipment, the difference between TOM-CIPS being limited to the fact that the CIPS (Card Initialization and Personalization System) is fitted with a CSC printer and a camera.

The Central Back Office (CBO) that is part of the 850 gates project, houses the central AFC functions. It manages the 3 lines and is connected to the Thales and 3rd party systems. It offers the following 'level 4' functions

The Unified Interface allows the connection of existing and future vendor systems to the CBO offering a true interoperable system. The interface will be published as a standard for the Cairo AFC system. In the scope of the 850 gates project, the unified interface will comply with the existing CCU interface in order to allow the early installation of the new Line 1&2 systems as well as a smooth migration of all the subsystems (line 1 & 2, line 3) to the CBO.

The Customer Management is the repository of the customer records. It manages the registration and update of customers. It provides an on line access to the TOMs

The Media Management is the central repository of the media accepted in the system and the fare data owned by a traveller and linked to a media. This comprises the following functionalities: central repository, media binding to customer, life cycle management, usage control and tracking, travel history management. It manages also the interface with the Card Initialization System (CIS).

The List Management includes the insertion and clear of items in/from the restricted lists, the maintenance of lists and the generation and distribution of lists to the LCUs.

The Business Parameter Management covers the management of business parameters related to the AFC. The parameters in scope are: the transportation network topology, the fare parameters including the definition of products and associated pricing rules, the time base parameters (calendars, definition of periods). The parameters are distributed to the LCU

The Equipment Management is focused on the inventory of the front-end equipment. It is interfaced with the LCUs.

The Staff Management is dedicated to the management of the work force including the front office agents: identity and access right management, update and revocation. It is interfaced with the LCUs.

The Business Intelligence is populated with the event data files uploaded from the equipment via the LCUs and also other business data. It offers a reporting solution. It is interfaced with the ECM ERP.

The SAM Management is in charge of managing the AV2 SAMs used in the TOMs and containing the cryptographic keys required for the vending operations

1.3.2 TRAVEL MEDIA AND FARE PRODUCTS

The travel media will remain unchanged. A brief reminder is proposed below.

The magnetic Tickets (MT) includes single tickets and season passes. They cannot be blacklisted or reconstructed.

The CSC is a Mifare™ DESFire available in 2 flavours: anonymous (CSC-A) or personalized (CSC-P). Season passes can be loaded on the card. There is also a T-purse (transport T-purse).

Refer to ticketing rules and business process and rules documents for details.

1.3.3 INTEROPERABILITY

1.3.3.1 General

The major objective of interoperability in fare systems is to allow the customer to use a unique media when travelling across different transportation networks. The customer experience is enhanced during the travel (a single media, seamless transfer, ...) as well as at the customer service (any point of sale can provide the service, global programs, ...).

The benefits for the operators include the enhancement of the system operations as well as the capability to use various vendors for the AFC equipment.

Interoperability requires the definition of the overall system architecture and especially the clear definition of the interfaces between the components of interest. The security scheme is also critical point.

The minimum level of interoperability is the sharing of the media between the transportation networks. More sophisticated interoperable schemes offer the sharing of fares and other data (customers, lists, ...)

1.3.3.2 Interoperability needs in Cairo metro

Foreword: this section gives a brief overview of interoperability needs in Cairo as understood by Thales.

The first objective is the interoperability between different lines (current and future). The requirement is that regardless of the vendor that provides the fare system for a dedicated line, it can be integrated in the global scheme. In addition, and this is the case for line 1&2, the equipment on a given line could be provided by different vendors.

Another strong requirement is to have a global operation of the metro including overall management of customers, media, lists, parameters and especially business intelligence.

There is also a vision of integrating other transport services in the global scheme.

1.3.3.3 Solution compliance with interoperability needs

The following figure illustrates the interoperability model put in place for Cairo metro.

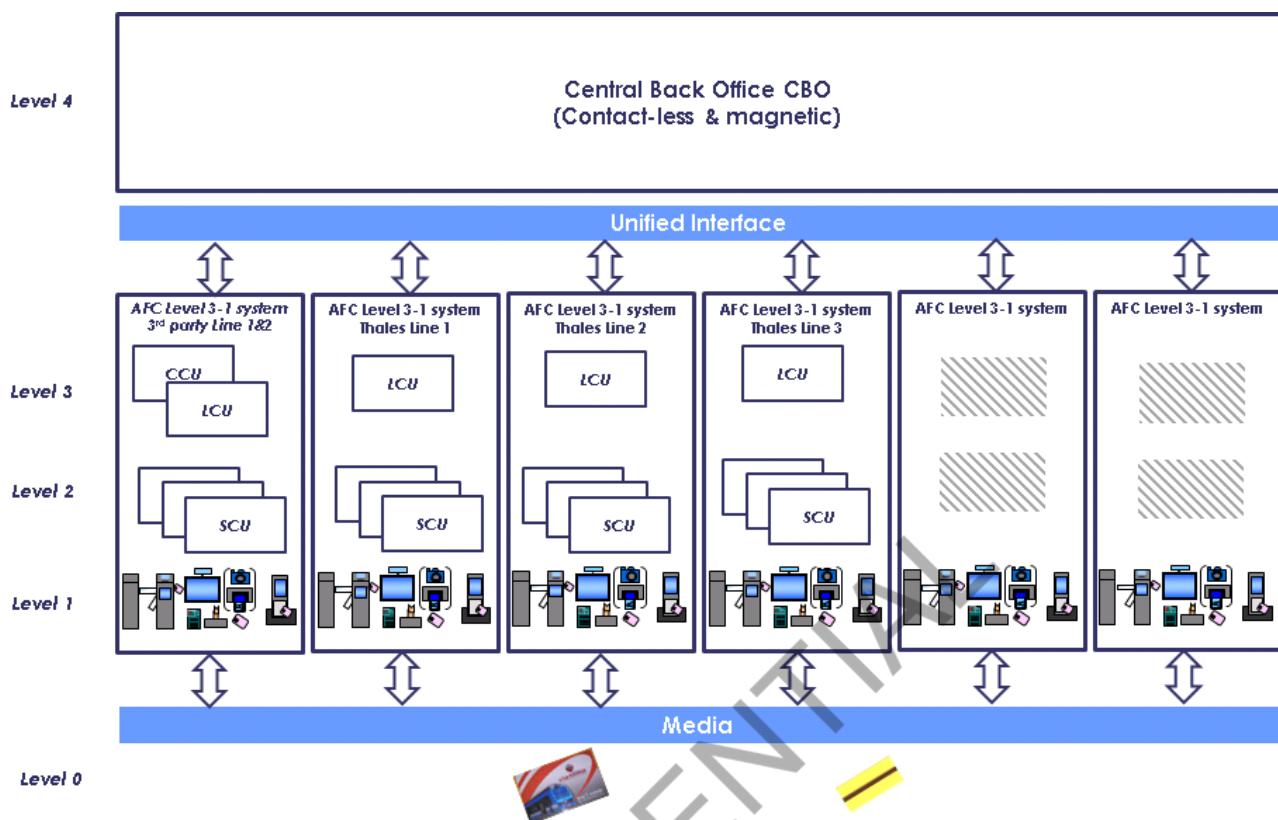


Figure 5 : Overview of interoperability

Note: the 'levels' mentioned on the left side are commonly used for describing AFC systems:

- Level 0 is the media.
- Level 1 is the front-end equipment.
- Level 2 is the local concentrator managing the communication with the equipment as well as local functions.
- Level 3 is a departmental back-office ensuring the operation of a subset of the AFC (line, transport service, retail network, ...).
- Level 4 is the Central Back Office (CBO) system. The AFC system has one and only one CBO system. The CBO system connects the different Level 3-1 systems and implements the global functions that ensure the interoperability such as the media and customer management.

The interoperability of the system architecture is based on the **blue interfaces**:

- The Media.
- The Unified Interface to the CBO.

The unified interface defines the standard of communication between the Level 3-1 systems and the Level 4. The reference of this standard is the unified interface specification.

The Media interface defines the standard of communication between the Level 1 and the Level 0. The reference of this standard is especially defined by the fare media layout and the associated security specification.

Based in this any vendor can provide a Level 3 to 1 system and join the interoperable scheme assuming it complies with the media and unified interfaces.

The present document contains end to end use cases, most of them traversing all the 5 levels (from 0 to 4). The scope that is addressed is the one of the Greater Cairo Metro Upgrade Lines 1 & 2 project. Such use cases are applicable to any vendor. However and subset of the use cases (without interaction with the CBO) are Thales specific. They are identified as so in the document.

Note: section 3.6 contains some examples of interoperable use cases related to the integration of other transport services (section 3.6.1) and other vendors (section 3.6.2). A case study of the integration of new equipment types (TVM) is also provided (section 3.6.3).

Note: the CBO can manage integrated fare in interoperability model. This is provided the payment of the operators in done the indirect way through frame agreement. The direct way (automatic apportionment) would require a CCHS which is out of the present scope of the CBO.

Note: Thales has provided a memo describing the possible future interface to an external CCHS.

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2. DOCUMENTS

Refer to CDRL.

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3. END TO END USE CASES

3.1 INTRODUCTION

3.1.1 GENERAL

The general purpose of use cases is the decomposition of business problems into discrete items

The objective of the proposed E2E use cases is to make clear the participation of each sub-systems in the AFC system functions in order to ensure a consistent system design.

The use cases are written in natural language in order to facilitate the understanding. The technical architecture (e.g. detailed description of the interfaces) is left to the detailed specifications except when such details are required within the context of a specific use case.

The use cases are grouped per functional domains. The following breakdown is used:

- **Customer service** : sale and after sale services managed by the Commercial Agents at the front office.
- **Usage of the metro** : usage of the gates and also the enforcement processes.
- **AFC operation** : ticketing related operations performed at the back-office and including the management of blacklists, parameters, the reporting, the management of the card database.
- **System administration** : support activities (not directly related to the AFC business) including the management of staff, the equipment, the security and the administration

The following figure illustrates the breakdown of the use cases into the functional domains and highlights the main impacts compared to the existing system (items in green). Note that the functions and processes that remain unchanged will be briefly described whereas the new items and processes will be detailed



Figure 6 : Use case breakdown illustration

A common template is used for the use cases. A detailed description of this template is proposed hereafter.

As introduced in section 1.3.3 related to interoperability, most of the use cases are applicable to any vendor. However some of them (typically related to LCU/SCU) are specific to Thales. Such use cases are identified as so in the document with a tag '[Thales]' in the title. Note that there is no such tag in the use cases the scope of which is restricted to the CBO.

Note : section 3.6 contains some examples of interoperable use cases.

3.1.2 USE CASE TEMPLATE

ID	UC-xxx - Identifier of the use case
Title	The use case title.
Goal	The objective of the use case. This includes the background, a general overview of the components participating in the use case. An indication of the magnitude of the impact of the 850 gates project is also given (in a number of cases, there will be only limited impacts on the existing use case)

Actors	<p>Human actors participating in the use case</p> <ul style="list-style-type: none"> • The End-Customer (traveller) • The TOM Commercial Agent. • The TOM mass production agent (for MT). • The Enforcement Officer using the PVU • The Supervisor Agent. He has extended user rights at the TOM and PVU. • The Central Data Management Officer managing the CBO production data. • The Data Management Officer managing the line production data. • The Security Officer in charge of the AFC security • The Customer Service Officer in charge of managing the customers at the CBO (e.g. check of customer records, claim management) • The Stock Management Agent in charge of the media stocks. • The Business User using the reports and the Business Analyst in charge of designing the reports.. • The Station Agent operating the SCU (or SCU agent). • The LCU Agent operating the LCU. • The System Administrator • The Maintenance Agent in charge of installation and maintenance of the equipment.
Technical Scope	<p>An identification of the technical components participating in the use case. TOM, Gate, SCU, LCU refer to any type of such component (i.e. any line, any provider) unless otherwise specified</p>
Pre-condition(s)	List the initial state of the system prior use case execution
Post-condition(s)	List the final state of the system after the execution of the use case
Assumption(s)	If any, the assumptions taken
Synoptic	If needed a diagram to ease the use case understanding
Main Success Scenario	<p>Nominal</p> <p>...</p> <p>Alternative 1</p> <p>...</p>

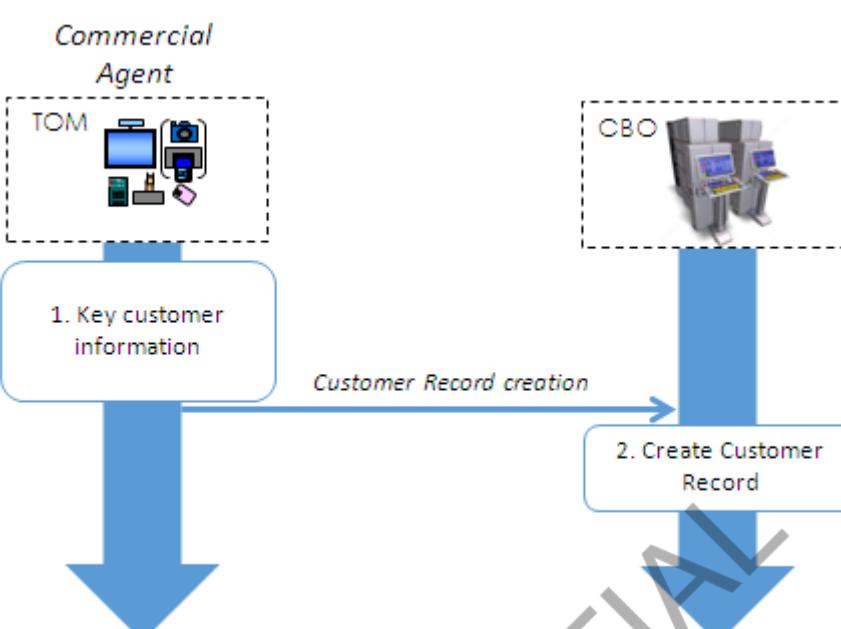
3.2 CUSTOMER SERVICE

3.2.1 CUSTOMER MANAGEMENT

3.2.1.1 UC-CM01 - Creation of a customer record at the TOM

Note. Customer records can also be imported per batches at the CBO. The purpose is the population of the CBO database with records defined in external systems. The present use case addresses the creation of a customer record at the front office.

ID	UC-CM01
Title	Creation of a customer record at the TOM
Goal	<p>The commercial agent registers the information of a new customer.</p> <p>The objective is that the process will not change from the Commercial Agent and End-Customer perspective compared to the existing solution. The objective is also that no change will be required on the existing TOMs.</p> <p>The main change resides in the fact that the customer record is held in the CBO.</p>
Actors	End-Customer, Commercial Agent
Technical Scope	<ul style="list-style-type: none"> • TOM • CBO (Customer Management)
Pre-condition(s)	<ul style="list-style-type: none"> • The TOM is configured for accessing the CBO Web Service Interface. • The shift is open on the TOM
Post-condition(s)	<ul style="list-style-type: none"> • The Commercial Agent registered the customer information
Assumption(s)	-

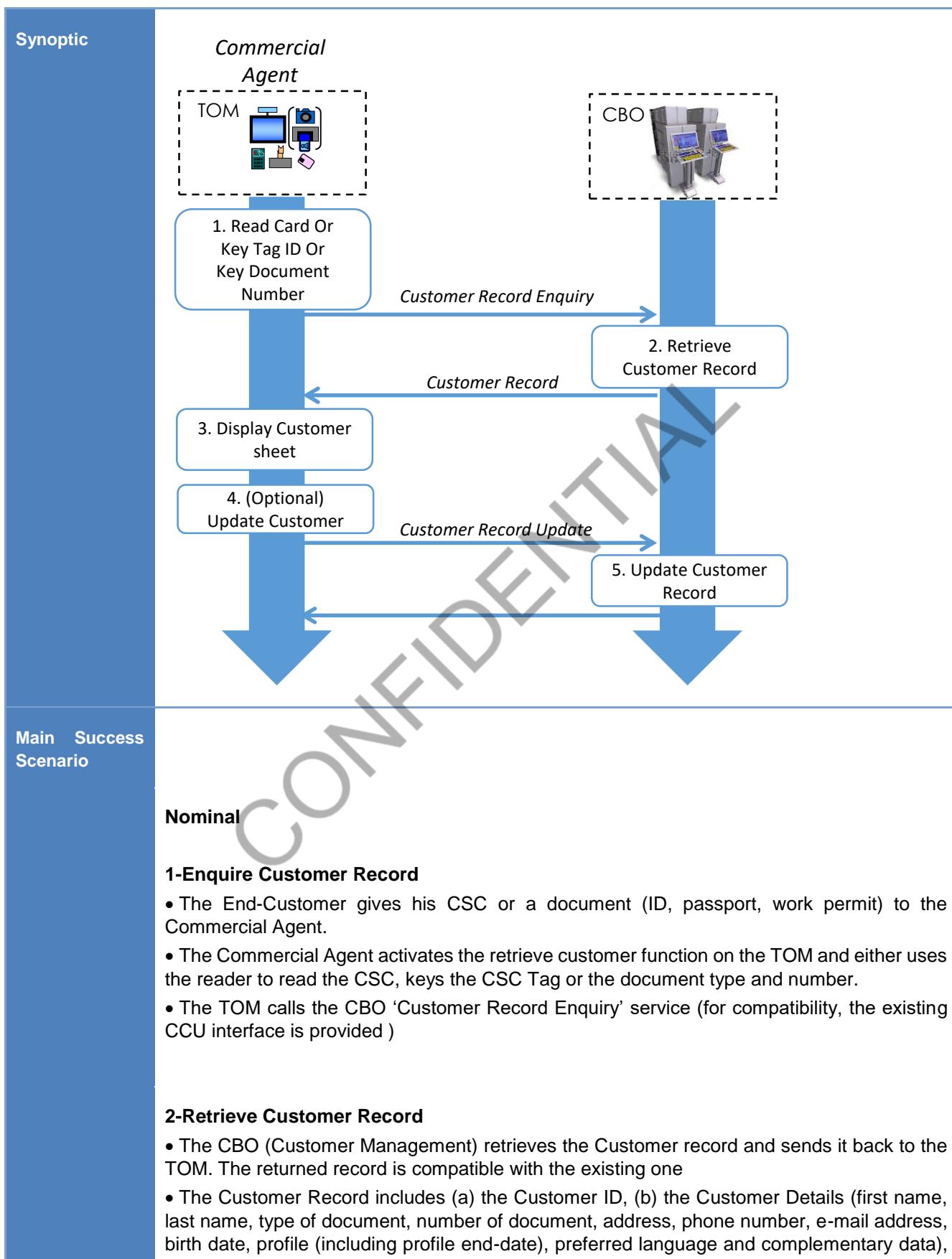
Synoptic	 <pre> graph TD subgraph Commercial_Agent [Commercial Agent] direction TB A[TOM] -- "1. Key customer information" --> B[Customer Record creation] end subgraph CBO [CBO] direction TB B -- "2. Create Customer Record" --> C[Create Customer Record] end </pre>
Main Success Scenario	<p>Nominal</p> <p>1- Key customer information</p> <ul style="list-style-type: none"> The End-Customer gives his personal information (ID, passport, work permit) to the Commercial Agent. The Commercial Agent keys information on TOM : <ul style="list-style-type: none"> mandatory fields are FirstName, LastName, Document type, Document number, birth date, profile optional fields are Address, City, Zip code, Phone number, Email, Preferred language and complementary data The Commercial Agent keys validates the customer creation The TOM calls the CBO 'Customer record creation' service (for compatibility, the existing CCU interface is provided) <p>2- Create customer record</p> <ul style="list-style-type: none"> The CBO creates the Customer record
Alternatives	<p>2.A The customer is already registered</p>

- The CBO returns an error code (for compatibility, the existing CCU response code is used)

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3.2.1.2 UC-CM02 - Check/update of a customer record at the TOM

ID	UC-CM02
Title	Check/update of a customer record at the TOM
Goal	<p>The Commercial Agent checks and possibly updates a customer record.</p> <p>The objective is that the process for checking and updating a customer record will not change from the Commercial Agent and End-Customer perspective compared to the existing solution. The objective is also that no change will be required on the existing TOMs.</p> <p>The main change resides in the fact that the customer record is held in the CBO.</p>
Actors	End-Customer, Commercial Agent
Technical Scope	<ul style="list-style-type: none"> • TOM • CBO (Customer Management)
Pre-condition(s)	<ul style="list-style-type: none"> • The TOM is configured for accessing the CBO Web Service Interface. • The shift is open on the TOM
Post-condition(s)	<ul style="list-style-type: none"> • The Commercial Agent can check the customer sheet. • Optionally, the Commercial Agent updates the Customer Record.
Assumption(s)	The customer text attributes (e.g. name) are stored in either english or arabic language



(c) the list of attached cards (type, card ID and Tag) and (d) the list of customer claims (id, text, state, creation date, last update, last update date)

3- Display Customer Sheet

- The TOM displays the Customer Record.

4- (Optional). The Commercial Agent updates the customer record

- When the Commercial Agent validates the update, the TOM calls the CBO 'Customer Record Update' service (for compatibility, the existing CCU interface is provided)

5- (Optional). The CBO updates the customer record

- The CBO updates the Customer record and sends an acknowledgment to the TOM.

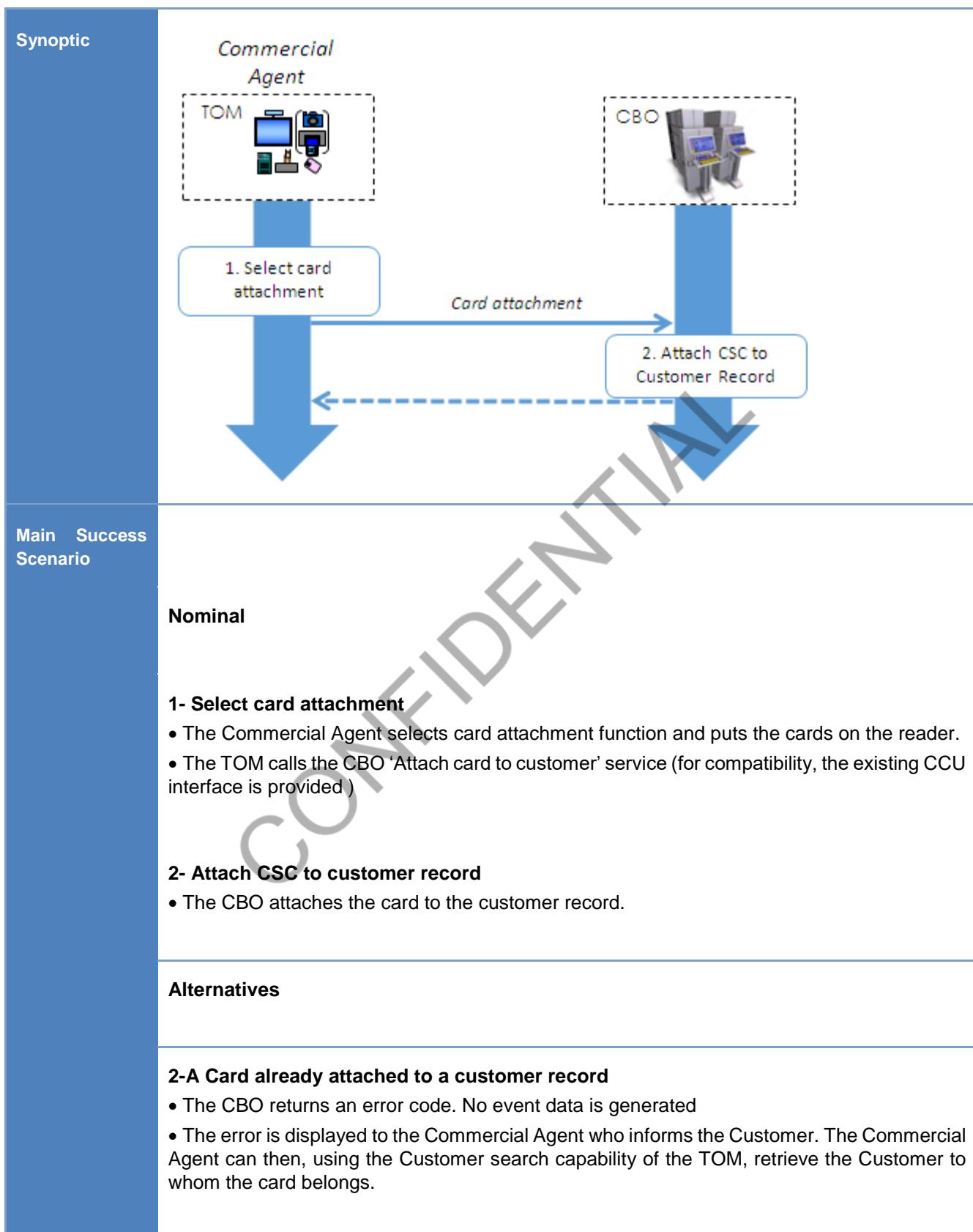
Alternative A

2.A- The Customer Record is not found

- The CBO returns an error code (for compatibility, the existing CCU response code is used)

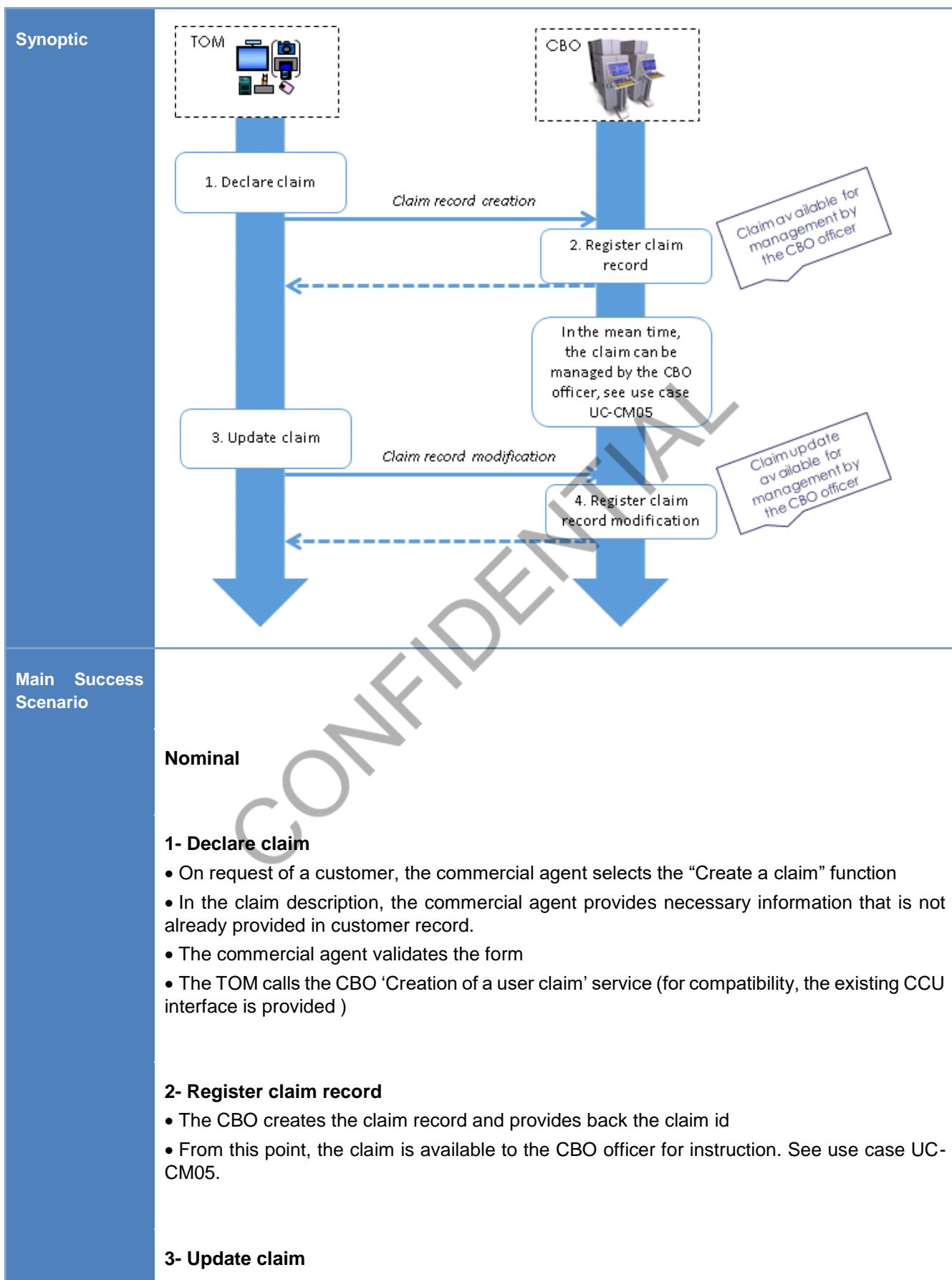
3.2.1.3 UC-CM03 - Attachment of a CSC-A to a customer at the TOM

ID	UC-CM03
Title	Attachment of a CSC-A to a customer at the TOM
Goal	<p>The customer is previously registered in the CBO.</p> <p>The Commercial Agent attaches an anonymous card to the customer (this card has been previously sold to the customer).</p> <p>The objective is that the process will not change from the Commercial Agent and End-Customer perspective compared to the existing solution. The objective is also that no change will be required on the existing TOMs.</p> <p>The main change resides in the fact that the customer record is held in the CBO.</p>
Actors	End-Customer, Commercial Agent
Technical Scope	<ul style="list-style-type: none"> • TOM • CBO
Pre-condition(s)	<ul style="list-style-type: none"> • The TOM is configured for accessing the CBO Web Service Interface. • The Customer is previously registered and customer record is displayed on the TOM • The customer owns a CSC-A (Anonymous CSC)
Post-condition(s)	<ul style="list-style-type: none"> • The CSC is attached to the customer.
Assumption(s)	NA



3.2.1.4 UC-CM04 - Creation/update of a claim at the TOM

ID	UC-CM04
Title	Creation/update of a claim at the TOM
Goal	<p>The commercial agent registers or updates a claim on request of the customer. The claim is instructed at the CBO. However, at any time the claim can be reviewed and updated at the TOM.</p> <p>The raising of a claim requires that the customer record is created. In case the customer is not yet registered at the time he wants to raise a claim, he has to register first.</p> <p>Note that the claim status cannot be changed at the TOM, this is restricted to the CBO officer.</p>
Actors	End-Customer, Commercial Agent
Technical Scope	<ul style="list-style-type: none"> • TOM • CBO
Pre-condition(s)	<ul style="list-style-type: none"> • The TOM is configured for accessing the CBO Web Service Interface. • The Customer is previously registered and customer record is displayed on the TOM
Post-condition(s)	<ul style="list-style-type: none"> • Claim information is registered
Assumption(s)	NA



- Later, the customer can come back to the sale office and ask for information on the claim.
- The commercial agent can review the claim status and inform the customer.
- The claim text is displayed in several lines with the TOM agent comments and the CBO operator comments.
- The commercial agent can modify the claim description adding if needed additional information from the customer.
- The commercial agent validates the form
- The TOM calls the CBO 'Update of a user claim' service (for compatibility, the existing CCU interface is provided)

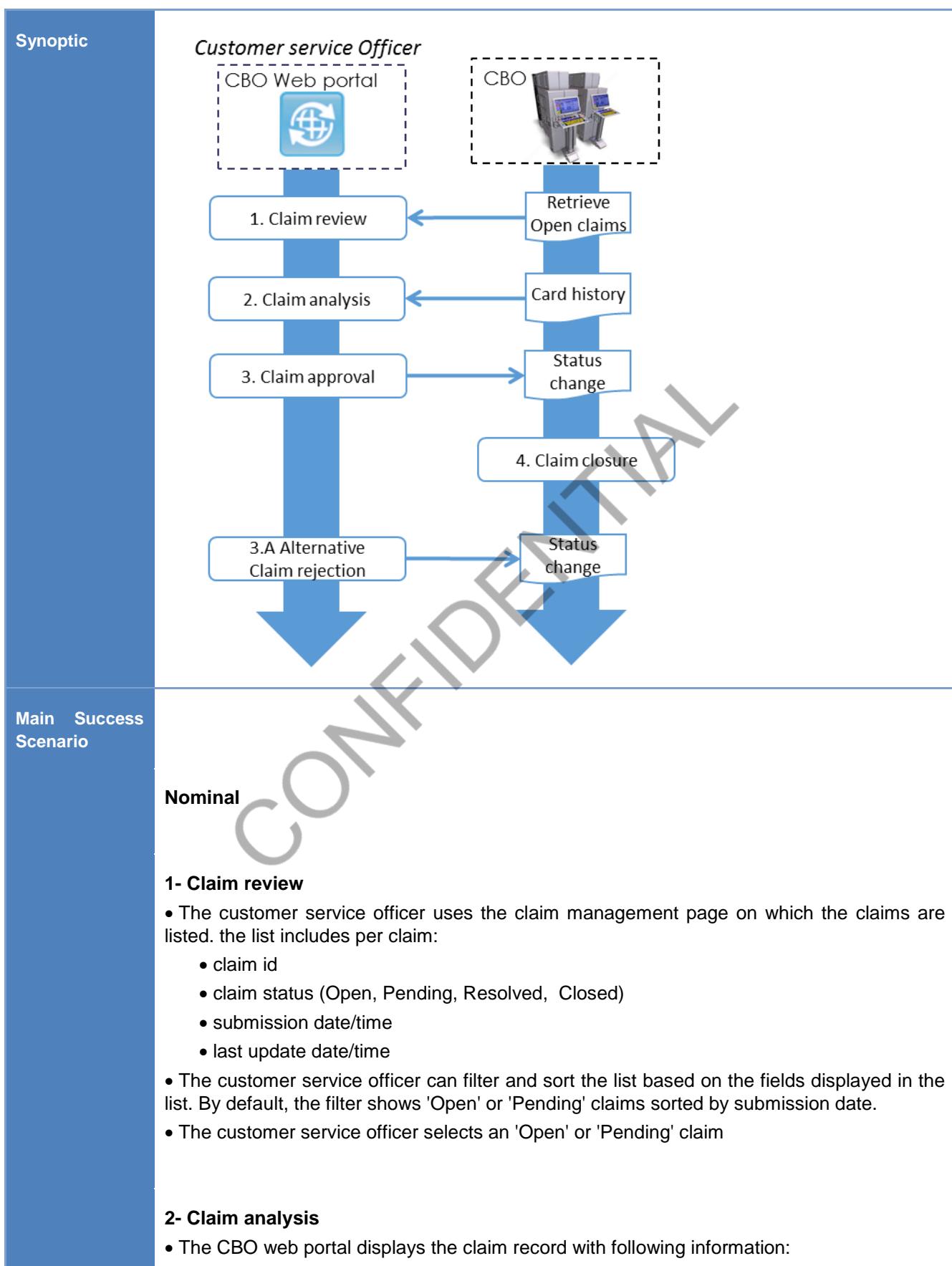
4- Register claim record modification

- The CBO registers the claim record modification.
- The update is available to the CBO officer.

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3.2.1.5 UC-CM05 - Management of customer claims at the CBO

ID	UC-CM05
Title	Management of customer claims at the CBO
Goal	<p>The customer service officer processes a claim previously registered or updated at the TOM.</p> <p>The starting point is that the customer is disputing a charge; he registered the claim at TOM. Once the claim is registered, it is the responsibility of the customer service officer, (at the back-office) to accept or reject the claim. In case of acceptance, he is also responsible for defining the amount that will be paid back (correction of fare, compensation for the inconvenience, general compensation in case of traffic disruption ...).</p> <p>Note that at any time during the different steps of the claim management described hereafter, the claim can be updated at the TOM by the commercial agent in the presence of the customer (see UC-CM04). However, the status of the claim cannot be changed at the TOM. The customer service office at the CBO can also interact with the customer (phone, e-mail).</p> <p>Note that the closure of a claim is not permitted until a certain time after resolution or rejection so that the customer can get informed of the outcome.</p> <p>The processing of the payment is outside the scope of the system.</p>
Actors	Customer service officer
Technical Scope	<ul style="list-style-type: none"> • CBO web portal • CBO (Customer Management)
Pre-condition(s)	<ul style="list-style-type: none"> • A Claim has been registered • Customer service officer is logged on the CBO web portal and is granted adequate access rights
Post-condition(s)	<ul style="list-style-type: none"> • Claim is approved or rejected by customer service officer
Assumption(s)	NA



- The customer reference (fields coming from the customer record including name and possibly other fields such as e-mail, phone)
- The date/time of submission
- The description field that includes the initial text from the customer and possibly the modifications already keyed by the customer service officer or the commercial agent.
- The customer service officer is assumed to have a log of traffic disruptions and incident reports (such log is outside of the scope of the system delivery). If the claim matches such a case, he may make immediately the decision to approve the claim.
- Otherwise, the customer service officer displays the customer record and consults attached card history (travels and operations) in order to analyse the claim. The customer service officer is assumed to be aware of the travel rules.
- If the customer service officer cannot decide, he may contact the customer (e.g. phone, e-mail). This is managed outside of the system. In such a case, he may update the claim status to 'Pending'.
- The customer service officer can also add an answer to the claim that will be available to the commercial agent the next time the customer will go to the TOM.

3- Claim approval

- The customer service officer updates the claim status to 'Resolved'
- The claim approval is registered

4 Claim closure

- The closure of the claim is not permitted before a certain time (parameter) after resolution. This is managed automatically by the system.

Alternatives

3-A Claim rejection

- The customer service officer updates the claim status to 'Rejected'
- As per the approval, the closure is managed automatically by the system.

3.2.1.6 UC-CM06 - Check of customer records at the CBO

ID	UC-CM06
Title	Check of customer records at the CBO
Goal	The customer service officer checks a customer record and consults the customer information, the media attached, the travel and operation history and the claims associated to the customer.
Actors	Customer service officer
Technical Scope	<ul style="list-style-type: none"> • CBO web portal • CBO
Pre-condition(s)	<ul style="list-style-type: none"> • Customer service officer is logged on the CBO web portal and is granted adequate access rights
Post-condition(s)	<ul style="list-style-type: none"> • The customer service officer has access to the customer records
Assumption(s)	NA
Synoptic	<pre> graph TD subgraph "Customer service Officer" direction TB A[CBO Web portal] --> B[1. Search customer record] end subgraph "CBO" direction TB B --> C[Retrieve customer records] C --> D[2. Consult customer information] C --> E[3. Consult attached media information] C --> F[4. Consult claims associated to customer] D --> G[Customer] E --> H[Card history] F --> I[Claims] end </pre>

Main Success Scenario

Nominal

1- Search customer record

- The customer service officer can search customer record with following criteria:
 - First name
 - Last name
 - Zip code
 - Email
- The customer service officer selects one customer record in the search result list.

2- Consult customer information

- The customer officer consultsthe customer information:
 - FirstName, LastName, Document type, Document number, birth date, profile
 - Address, City, Zip code, Phone number, Email, Preferred langage and complementary data

3- Consult attached media information

- The customer service officer selects a media attached to the customer. He can consult:
 - CardType, Serial number, Card status, end of validity, T-purse status, T-purse value, implicit profile, explicit profile
 - list of products on the card (product name, end of validity, product status, product counters)
 - Travel and operation history based on events generated by front end devicesn

4- Consult claims associated to the customer

- The customer service officer can consult the claims associated with the customer including : claim id, claim description, claim status.

3.2.2 SALES

3.2.2.1 UC-SA01 - Issuing of a CSC-P at the TOM

ID	UC-SA01
Title	Issuing of a CSC-P at the TOM
Goal	<p>The Commercial Agent issues a new personalized media (CSC-P), which is corresponding to an existing customer.</p> <p>The objective is that the process for issuing a CSC-P will not change from the Commercial Agent and End-Customer perspective compared to the existing solution. The objective is also that no change will be required on the existing TOMs. The main change resides in the fact that the media record is held in the CBO.</p>
Actors	<ul style="list-style-type: none"> • End-Customer, Commercial Agent
Technical Scope	<ul style="list-style-type: none"> • TOM • LCU, SCU • CBO
Pre-condition(s)	<ul style="list-style-type: none"> • The customer is already registered in the CBO • The TOM is configured for accessing the CBO Web Service Interface. Especially, the required credentials (certificate) have been registered. (See security in administration section) • The shift is open on the CIPS
Post-condition(s)	<ul style="list-style-type: none"> • The Commercial Agent issued a CSC-P and checked the personalized media attached customer sheet.
Assumption(s)	none

Synoptic	<pre> graph TD CIPS[CIPS] --> 1[1. Print picture] 1 --> 2[2. Perform electrical personalization] 2 --> 3[3. Generate event] 3 --> 4[4. Process the event] 3 --> SCU[SCU] 3 --> LCU[LCU] 3 --> CBO[CBO] </pre>
Main Success Scenario	Nominal <ul style="list-style-type: none"> 1-Print picture <ul style="list-style-type: none"> • The commercial agent clicks on the new CSC-P function on the customer record. • He takes a picture of the end-customer and prints it on a new anonymous card 2-Perform electrical personalization and payment <ul style="list-style-type: none"> • The commercial agent puts the card on the reader and electrical personalization is performed using the customer record information. • The end-customer pays for the purchase 3- Generate events <ul style="list-style-type: none"> • The TOM generates events that are forwarded to the CBO: <ul style="list-style-type: none"> • Accounting operation • Personalization 4- Process the events and attach the card <ul style="list-style-type: none"> • Accounting operation event: used to populate card history and update card image • Personalization event: used to attach the card to the customer record

3.2.2.2 UC-SA02 - Issuing of a MT at the TOM

ID	UC-SA02
Title	Issuing of a MT at the TOM
Goal	<p>The Commercial Agent issues a new magnetic ticket (possibly several tickets of the same type)</p> <p>The objective is that the process will not change from the Commercial Agent and End-Customer perspective compared to the existing solution. The objective is also that no change will be required on the existing TOM. The main change resides in the fact that the sale event will be stored by CBO for reporting.</p> <p>Note: for the old magnetic only TOM that will remain on line 1 and 2, the available events will be transferred to the CBO via the line 3 LCU. The existing format will remain unchanged.</p>
Actors	• End-Customer, Commercial Agent
Technical Scope	• TOM • LCU, SCU • CBO
Pre-condition(s)	• Commercial agent is logged on TOM
Post-condition(s)	• The Commercial Agents issues MTs
Assumption(s)	none
Synoptic	<pre> graph TD subgraph CA [Commercial Agent] direction TB A[TOM] -- "1. Sell Magnetic ticket" --> B[Generate event] B --> C[SCU] C --> D[LCU] D --> E[CBO] end </pre>
Main Success Scenario	

Nominal**1-Sell magnetic ticket**

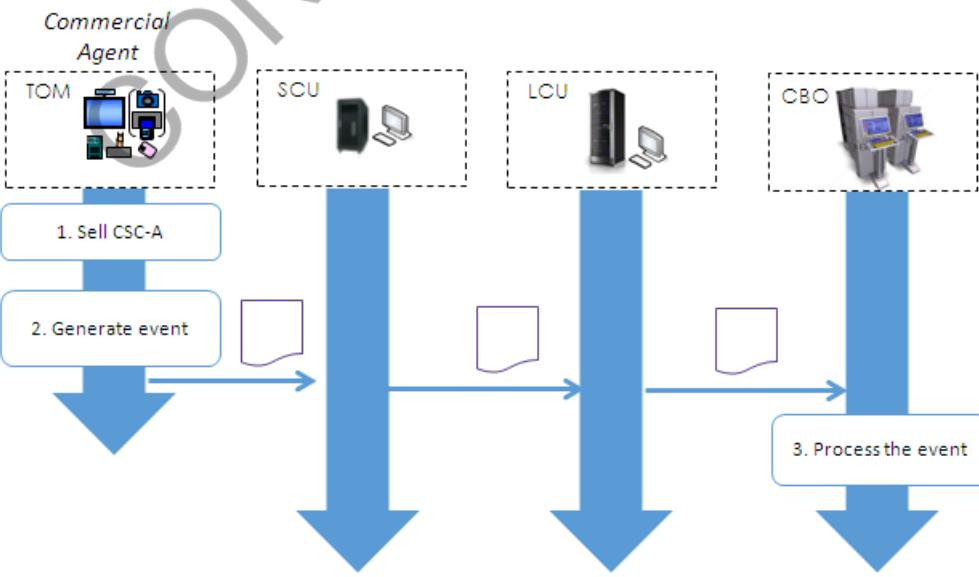
- The commercial agent selects the tickets to sold (single ride, season ticket, ..)
- Payment is performed at TOM
- The magnetic ticket is/are produced

2-Generate event

- The TOM generates a sale transaction that will be reported to the SCU and then to the LCU and CBO

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3.2.2.3 UC-SA03 - Issuing of a CSC-A at the TOM

ID	UC-SA03
Title	Issuing of a CSC-A at the TOM
Goal	<p>The Commercial Agent issues a new anonymous media (CSC-A). The objective is that the process will not change from the Commercial Agent and End-Customer perspective compared to the existing solution. The objective is also that no change will be required on the existing TOM. The main change resides in the fact that the event is processed by CBO.</p>
Actors	<ul style="list-style-type: none"> End-Customer, Commercial Agent
Technical Scope	<ul style="list-style-type: none"> TOM LCU, SCU CBO
Pre-condition(s)	<ul style="list-style-type: none"> Commercial agent is logged on TOM
Post-condition(s)	<ul style="list-style-type: none"> The Commercial Agent issued a CSC-A
Assumption(s)	None
Synoptic	 <pre> graph TD CA[TOM] -- "1. Sell CSC-A" --> GE[2. Generate event] GE --> CBO[3. Process the event] GE --> LCU[3. Process the event] GE --> SCU[3. Process the event] </pre>
Main Success Scenario	

Nominal

1-Sell CSC-A

- The commercial agent chooses to sell a CSC-A.
- Payment is performed

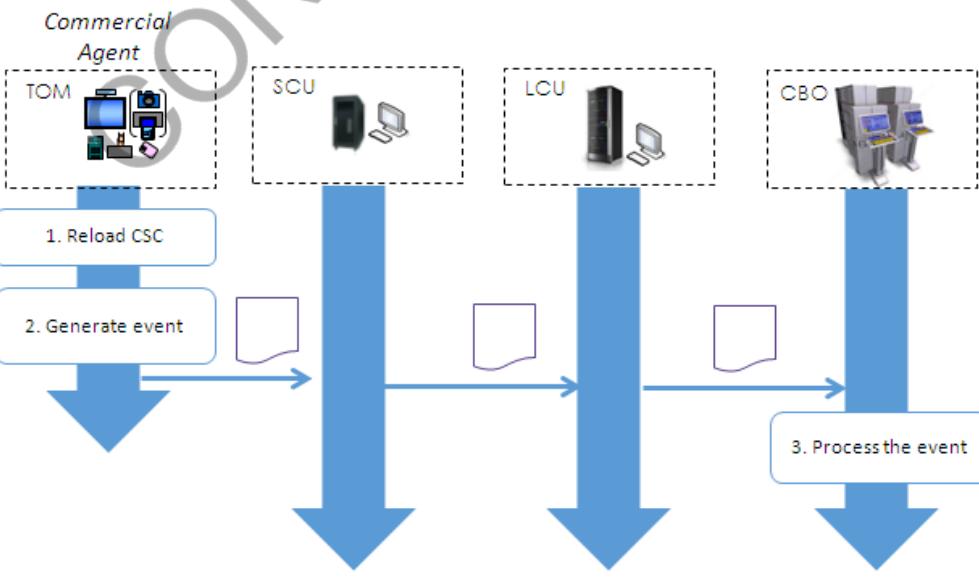
2-Generate event

- The TOM generates a transaction for the sale operation that is forwarded to the CBO via the SCU and the LCU

3-Process the event

- CBO processes the event "accounting operation" (for compatibility, the existing CCU interface is provided):
 - Card image is updated and in particular the card status
 - Transaction is taken into account for reporting

3.2.2.4 UC-SA04 - Reloading of an existing CSC at the TOM

ID	UC-SA04
Title	Reloading of an existing CSC at the TOM
Goal	<p>The Commercial Agent reload a CSC (T-purse reload or product purchase)</p> <p>The objective is that the process will not change from the Commercial Agent and End-Customer perspective compared to the existing solution. The objective is also that no change will be required on the existing TOM. The main change resides in the fact that the event is processed by CBO.</p>
Actors	<ul style="list-style-type: none"> • End-Customer, Commercial Agent
Technical Scope	<ul style="list-style-type: none"> • TOM • LCU, SCU • CBO
Pre-condition(s)	<ul style="list-style-type: none"> • Commercial agent is logged on TOM
Post-condition(s)	<ul style="list-style-type: none"> • The Commercial Agent reloaded the CSC
Assumption(s)	None
Synoptic	 <pre> graph TD CA[Commercial Agent] --> R1[1. Reload CSC] CA --> G[2. Generate event] R1 --> P[3. Process the event] G --> P P --> CBO[CBO] </pre>
Main Success Scenario	

Nominal

1-Reload CSC

- The commercial agent chooses to reload the T-purse or to sell or renew a fare product.
- Payment is performed
- CSC is written

2-Generate event

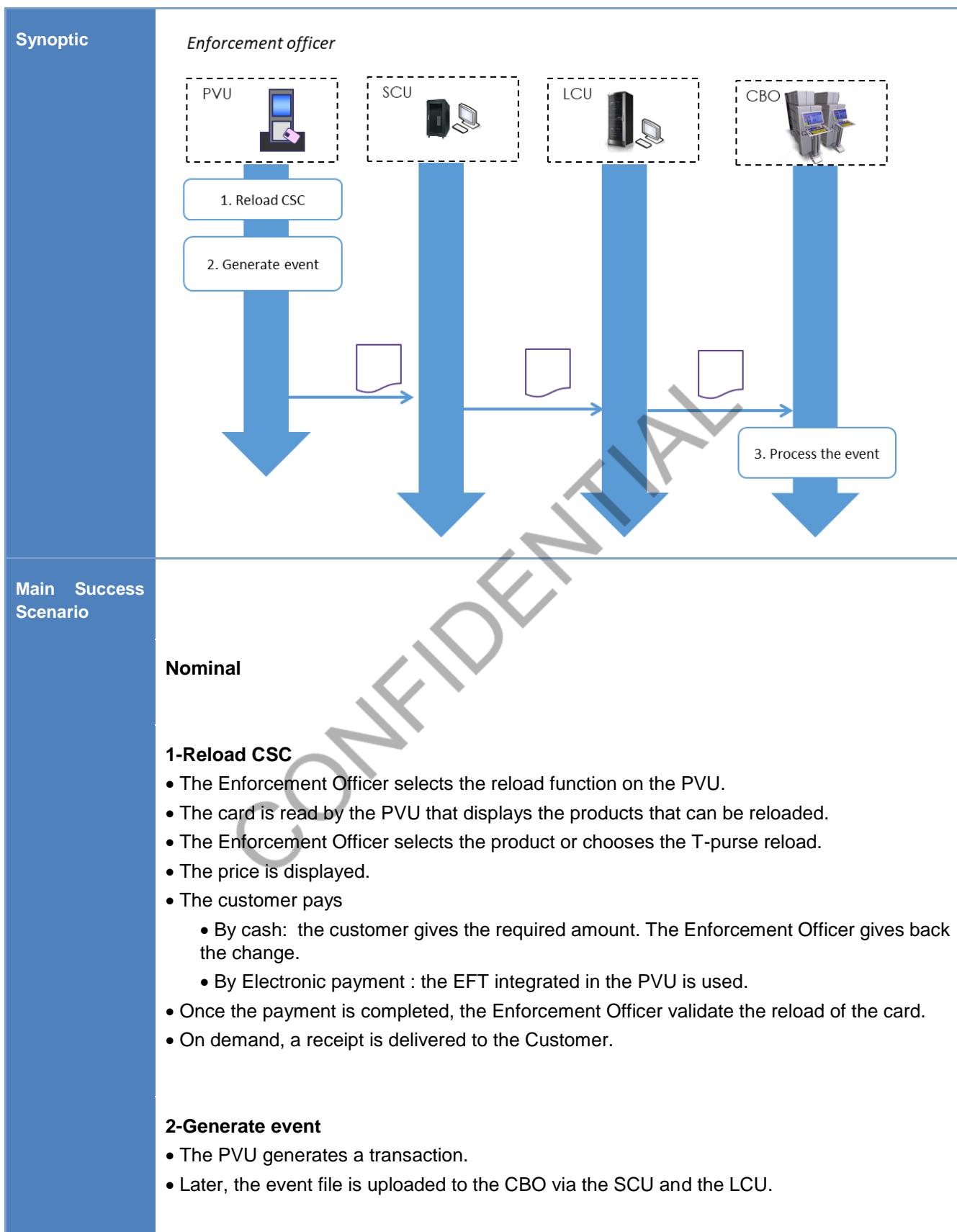
- The TOM generates a transaction for the sale operation that is forwarded to the CBO via the SCU and the LCU.

3-Process the event

- CBO processes the event "accounting operation" (for compatibility, the existing CCU interface is provided):
 - Card image is updated and in particular the card products and T-purse
 - Transaction is taken into account for reporting

3.2.2.5 UC-SA05 - Reloading of an existing CSC with the PVU

ID	UC-SA05
Title	Reloading of an existing CSC with the PVU
Goal	The Enforcement Officer reloads a CSC (T-purse reload or product renew).
Actors	<ul style="list-style-type: none"> • End-Customer, Enforcement officer
Technical Scope	<ul style="list-style-type: none"> • PVU • CBO
Pre-condition(s)	<ul style="list-style-type: none"> • Enforcement officer is logged on PVU
Post-condition(s)	<ul style="list-style-type: none"> • The Enforcement officer reloaded the CSC
Assumption(s)	<p>Sale limitation The enforcement officer is authorized to renew products and reload T-purse but not to sell new product on the card.</p> <p>Sale parameters Sale parameters are recovered from legacy fare parameters that shall be downloaded by the PVU equipment.</p>



3-Process the event

- CBO processes the event "accounting operation" (for compatibility, the existing CCU interface is provided):

- Card image is updated and in particular the card products and T-purse
- Transaction is taken into account for reporting

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3.2.2.6 UC-SA06 - MT mass production

ID	UC-SA06
Title	MT mass production
Goal	<p>The objective is the mass production of magnetic tickets (MT).</p> <p>A TOM equipment is used for this purpose, the difference with a standard TOM being the magnetic ticket dispenser where the exit tray is replaced by a stacker. There is no PID, since no customer interaction. There is nevertheless a receipt printer for the shift receipt and also a reader so that the TOM can be used for analysing CSC when not in production.</p> <p>The unused functions (apart from mass production and CSC analysis) are not accessible.</p> <p>The issuing events are stored at the CBO.</p> <p>Note: the mass production is restricted to single tickets.</p> <p>Note: the way tickets are retailed (directly retailed to the end-customer or delivered to another stakeholder in charge of the retail) is outside of the scope of this use case.</p>
Actors	<ul style="list-style-type: none"> Mass production agent
Technical Scope	<ul style="list-style-type: none"> TOM (mass production) LCU, SCU CBO
Pre-condition(s)	NA
Post-condition(s)	<ul style="list-style-type: none"> The mass production agent ends his shift. The batches of MT are correctly produced.
Assumption(s)	none

Synoptic	<p><i>Mass production agent</i></p> <p>The diagram illustrates the workflow for a mass production agent across four components: TOM, SCU, LCU, and CBO. The process is divided into five main steps:</p> <ol style="list-style-type: none"> 1. Open shift 2. Issues a batch of SR MT 3. Generate event 4. Retrieves the batch of tickets 5. Close shift <p>Interactions between the components are shown as blue arrows. Step 3 (Generate event) has arrows pointing to all four components. Step 4 (Retrieves the batch of tickets) has arrows pointing from all four components. Step 5 (Close shift) has a single downward arrow.</p>
Main Success Scenario	<p>Nominal</p> <p>1-Open shift</p> <ul style="list-style-type: none"> • The mass production agent logs on the TOM. • The shift opening is identical to the one of the commercial agent. • The unavailable functions are inhibited. <p>2-Issue a batch of MT</p> <ul style="list-style-type: none"> • The mass production agent selects the number of zones, the discount and the entry station. • The number of tickets to be issued is 100 (cannot be changed) • The agent validates • The MT dispenser issues the desired quantity that is received in the stacker. <p>3-Generate event</p>

- The TOM generates issuing transactions that will be reported to the SCU and then to the LCU and CBO

4-Retrieves the batch of tickets

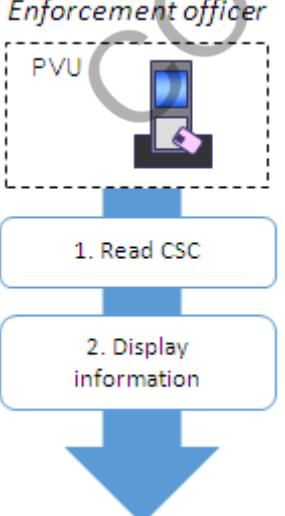
- The mass production agent retrieves the batch of tickets from the stacker..
- After the production, the TOM goes back to the initial screen and the agent has just to hit the enter key in order to produce a new batch.

5- Close shift

- The mass production agent closes the production shift
- He gets a shift receipt with the summary of the production.

3.2.3 AFTER SALE SERVICES

3.2.3.1 UC-AS01 - Providing of information on a CSC with the PVU

ID	UC-AS01
Title	Providing of information on a CSC with the PVU
Goal	The Enforcement Officer provides information on a CSC.
Actors	<ul style="list-style-type: none"> • End-Customer, Enforcement officer
Technical Scope	<ul style="list-style-type: none"> • PVU
Pre-condition(s)	<ul style="list-style-type: none"> • Enforcement officer is logged on PVU
Post-condition(s)	<ul style="list-style-type: none"> • The Enforcement officer provided information on the CSC
Assumption(s)	<p>Information source</p> <p>The card information relies on data stored onto the card. The web services for consulting the card information are not used. NB: These web services are used only at TOM when consulting a customer record or for card reconstruction.</p>
Synoptic	<p><i>Enforcement officer</i></p>  <pre> graph TD EO[Enforcement officer] --- PVU[PVU] PVU --> R1[1. Read CSC] R1 --> R2[2. Display information] R2 --> Arrow(()) </pre>
Main Success Scenario	

Nominal**1- Read CSC**

- The customer gives his card to the Enforcement Officer
- The enforcement officer puts the CSC on the reader.
- The device reads card information

2-Display information

- The device displays last event information, card information, product information, T-purse information.
- The Enforcement officer informs the Customer.

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3.2.3.2 UC-AS02 - Providing of information on a MT at the TOM

ID	UC-AS02
Title	Providing of information on a MT at the TOM
Goal	The Commercial Agent provides information on a Magnetic Ticket based on information printed on the ticket.
Actors	<ul style="list-style-type: none"> • End-Customer, Commercial Agent
Technical Scope	<ul style="list-style-type: none"> • PVU • CBO
Pre-condition(s)	<ul style="list-style-type: none"> • Commercial Agent is logged on TOM
Post-condition(s)	<ul style="list-style-type: none"> • The Commercial Agent provided information on the Magnetic Ticket.
Assumption(s)	None
Synoptic	 <pre> graph TD CA[Commercial Agent] --- R1[1. Read MT] R1 --- R2[2. Provide information] R2 --> Arrow(()) style Arrow fill:none,stroke:none </pre>
Main Success Scenario	Nominal

1- Read MT

- The commercial agent reads the information written on the Magnetic Ticket.

2-Provide information

- The commercial agent provides information to the customer.

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3.2.3.3 UC-AS03 - Exchange of a MT at the TOM

ID	UC-AS03
Title	Exchange of a MT at the TOM
Goal	<p>At the TOM, the Commercial Agent exchanges a MT.</p> <p>The objective is that the process will not change from the Commercial Agent and End-Customer perspective compared to the existing solution. The objective is also that no change will be required on the existing TOM.</p> <p>The main change resides in the fact that the event is stored by CBO.</p>
Actors	• End-Customer, Commercial Agent
Technical Scope	• TOM • LCU, SCU • CBO
Pre-condition(s)	• Commercial Agent is logged on TOM
Post-condition(s)	• The Commercial Agent exchanged a MT
Assumption(s)	None
Synoptic	<pre> graph TD subgraph TOM [TOM] 1[1. Read MT printed information] --> 2[2. Replace MT] 2 --> 3[3. Generate event] 3 --> SCU[SCU] 3 --> LCU[LCU] 3 --> CBO[CBO] CBO --> 4[4. Store the event] end </pre>

Main Success Scenario

Nominal

1- Read MT printed information

- The commercial agent reads information printed on the ticket and decides if the ticket can be replaced.

2- Replace MT

- A new magnetic ticket is produced

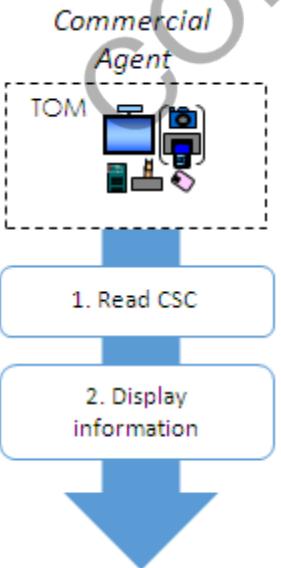
3-Generate event

- The TOM generates a transaction for the MT reconstruction that is forwarded to the CBO via the SCU and the LCU

4-Store the event

- CBO stores the event for reporting.

3.2.3.4 UC-AS04 - Providing of information on a CSC at the TOM (CSC is placed on the reader)

ID	UC-AS04
Title	Providing of information on a CSC at the TOM (CSC is placed on the reader)
Goal	<p>The Commercial Agent provides information on a CSC.</p> <p>The objective is that the process will not change from the Commercial Agent and End-Customer perspective compared to the existing solution. The objective is also that no change will be required on the existing TOM.</p>
Actors	• End-Customer, Commercial Agent
Technical Scope	• TOM • CBO
Pre-condition(s)	• Commercial Agent is logged on TOM
Post-condition(s)	• The Commercial Agent provided information on the CSC
Assumption(s)	<p>Information source</p> <p>The card information relies on data stored onto the card. The web services for consulting the card information are not used. NB: These web services are used only when consulting a customer record or during card reconstruction.</p>
Synoptic	 <pre> graph TD CA[Commercial Agent] --- TOM[TOM] subgraph TOM [TOM] direction TB 1[1. Read CSC] 2[2. Display information] 1 --> 2 end 2 --> Down[] </pre>
Main Success Scenario	

Nominal**1- Read CSC**

- The Commercial Agent puts the CSC on the reader.
- The device reads card information

2-Display information

- The device displays card information.

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3.2.3.5 UC-AS06 - Refund of a transport product or a CSC at the TOM

ID	UC-AS06
Title	Refund of a transport product or a CSC at the TOM
Goal	<p>At the TOM, the Commercial Agent refunds a transport product or a CSC</p> <p>The objective is that the process will not change from the Commercial Agent and End-Customer perspective compared to the existing solution. The objective is also that no change will be required on the existing TOM. The main change resides in the fact that the event is processed by CBO.</p>
Actors	• End-Customer, Commercial Agent
Technical Scope	• TOM • CBO
Pre-condition(s)	• Commercial Agent is logged on TOM
Post-condition(s)	• The Commercial Agent refunded a transport product or a CSC
Assumption(s)	None
Synoptic	<pre> graph TD CA[Commercial Agent] --> S1[1. Read CSC] CA --> S2[2. Refund] CA --> S3[3. Generate event] CA --> S4[4. Process the event] S1 --> S2 S2 --> S3 S3 --> S4 </pre>
Main Success Scenario	

Nominal

1- Read CSC

- The device reads the CSC content

2- Refund

- The Commercial Agent selects a fare product or card refund.
- The Commercial proceeds to the pay-back.

3- Generate Event

- The TOM generates transactions for the refund

4-Process the event

- CBO processes the event "accounting operation" (for compatibility, the existing CCU interface is provided): Pass Refund, T-purse Refund ,Card Refund
 - Card image is updated and in particular the card products and T-purse and card status
 - Transaction is taken into account for reporting

3.2.3.6 UC-AS07 - Cancellation of a transport product or a CSC at the TOM

ID	UC-AS07
Title	Cancellation of a transport product or a CSC at the TOM
Goal	<p>At the TOM, the commercial agent started a sale with several purchases and cancels the sale session.</p> <p>The objective is that the process will not change from the Commercial Agent and End-Customer perspective compared to the existing solution. The objective is also that no change will be required on the existing TOM. The main change resides in the fact that the event is processed by CBO.</p>
Actors	• End-Customer, Commercial Agent
Technical Scope	• TOM • SCU, LCU • CBO
Pre-condition(s)	• Commercial Agent is logged on TOM
Post-condition(s)	• The Commercial Agent cancelled a transport product or CSC
Assumption(s)	None
Synoptic	<pre> graph TD subgraph Commercial_Agent [Commercial Agent] direction TB A1[1. Proceed to sale operation in a multi-sale session] --> A2[2. Generate event] A2 --> A3[4. Cancel the sale] A3 --> A4[5. Generate event] A4 --> A5[3. Process the event] A5 --> A6[6. Process the event] end subgraph SCU [] end subgraph LCU [] end subgraph CBO [CBO] direction TB C1[3. Process the event] --> C2[6. Process the event] end A1 --- B1[] A2 --- B2[] A3 --- B3[] A4 --- B4[] A5 --- B5[] A6 --- B6[] B1 --- C1 B2 --- C1 B3 --- C2 B4 --- C2 </pre> <p>The diagram illustrates the process flow. On the left, the 'Commercial Agent' section shows a sequence of steps: 1. Proceed to sale operation in a multi-sale session, 2. Generate event, 4. Cancel the sale, 5. Generate event, and 3. Process the event. This sequence is connected to three parallel vertical arrows pointing downwards. The first arrow connects step 1 to step 2, and step 2 to step 3. The second arrow connects step 4 to step 5, and step 5 to step 6. The third arrow connects step 3 to step 4, and step 4 to step 5. To the right of these arrows are dashed boxes representing other systems: 'SCU', 'LCU', and 'CBO'. The 'CBO' box contains a sequence of steps: 3. Process the event and 6. Process the event, connected by a downward arrow. Horizontal lines connect the 'Commercial Agent' steps to their corresponding positions on the arrows, indicating the flow of data between the systems.</p>

Main Success Scenario

Nominal

1- Proceed to sale operation in a multi-sale session

- The Commercial Agent performs a sale operation (product, CSC or T-purse) and starts adding a new sale operation.
- The sale operation is finalized with electrical writing on CSC

2- Generate event

- TOM generates a transaction for the sale operation.

3- Process the event

- CBO processes the event "accounting operation" (for compatibility, the existing CCU interface is provided):
 - Card image is updated and in particular the card products and T-purse
 - Transaction is taken into account for reporting

4-Cancel the sale

- The Commercial Agent cancels the sale.

5- Generate event

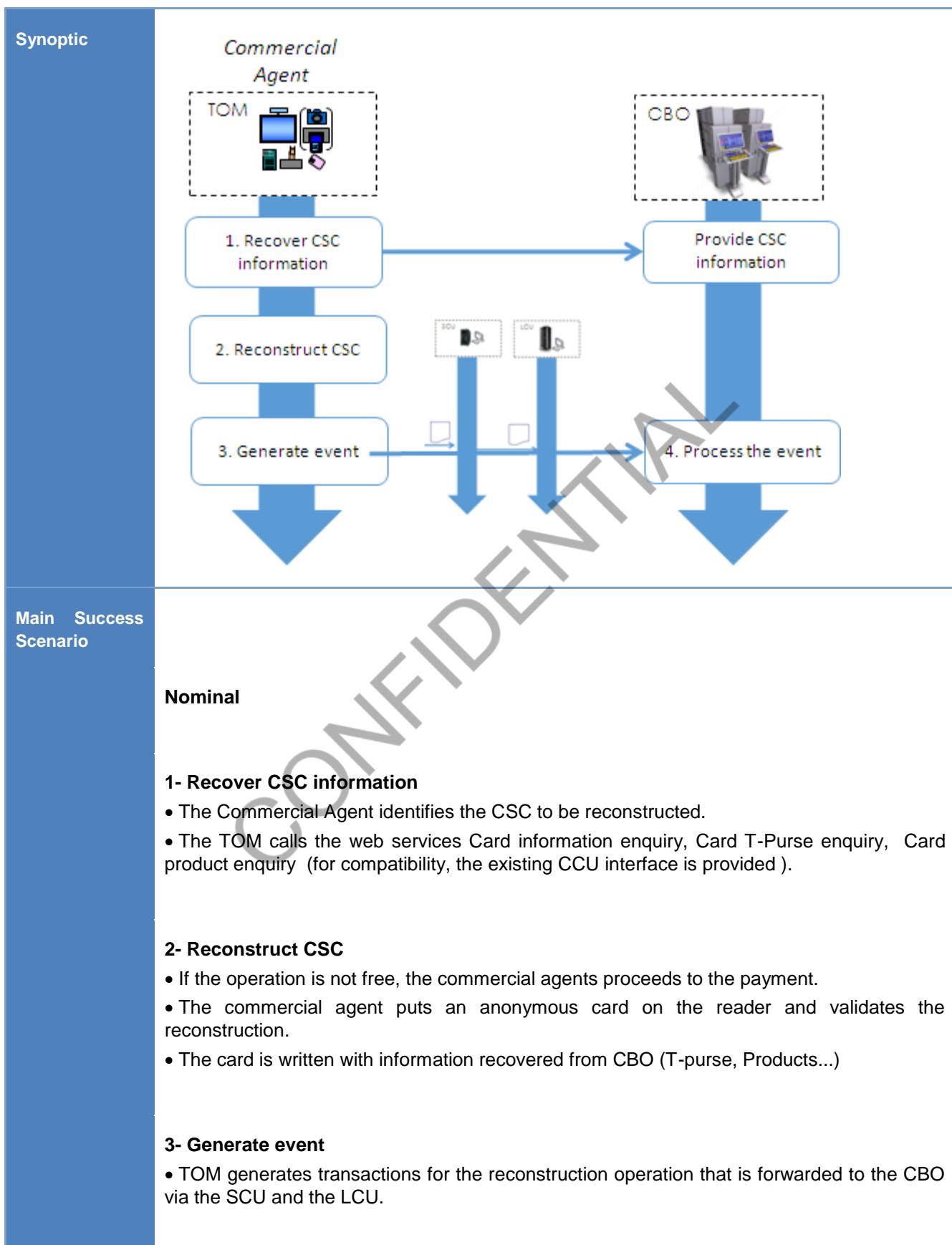
- TOM generates a transaction for the sale cancellation operation.

6- Process the event

- CBO processes the event "accounting operation" (for compatibility, the existing CCU interface is provided): charge cancellation or recharge cancellation:
 - Card image is updated and in particular the card products and T-purse
 - Transaction is taken into account for reporting

3.2.3.7 UC-AS08 - Reconstruction of a CSC at the TOM

ID	UC-AS08
Title	Reconstruction of a CSC at the TOM
Goal	<p>At the TOM, the commercial agent reconstructs a CSC from card information in CBO database</p> <p>The objective is that the process will not change from the Commercial Agent and End-Customer perspective compared to the existing solution. The objective is also that no change will be required on the existing TOM. The main change resides in the fact that the reconstruction relies on CBO information.</p> <p>The card reconstruction is applicable for CSC-A and CSC-P. In this later case, the card has to be re-printed as in the case of a first sale.</p>
Actors	<ul style="list-style-type: none"> • End-Customer, Commercial Agent
Technical Scope	<ul style="list-style-type: none"> • TOM • CBO
Pre-condition(s)	<ul style="list-style-type: none"> • Commercial Agent is logged on TOM
Post-condition(s)	<ul style="list-style-type: none"> • The Commercial Agent reconstructed a CSC
Assumption(s)	None



4- Process the event

- CBO processes the event "personalizationReconstruction" & unitReconstruction" (for compatibility, the existing CCU interface is provided):
 - Transaction is taken into account for reporting
- CBO processes the event "accounting operation" (for compatibility, the existing CCU interface is provided):
 - Transaction is taken into account for card history
 - Transaction is taken into account for reporting

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3.2.3.8 UC-AS09 - Disabling of a CSC at the TOM

ID	UC-AS09
Title	Disabling of a CSC at the TOM
Goal	<p>At the TOM, the commercial agent disables a CSC.</p> <p>The objective is that the process will not change from the Commercial Agent and End-Customer perspective compared to the existing solution. The objective is also that no change will be required on the existing TOM.</p> <p>The main change resides in the fact that the event is processed by CBO.</p>
Actors	• End-Customer, Commercial Agent
Technical Scope	• TOM • CBO
Pre-condition(s)	• Commercial Agent is logged on TOM
Post-condition(s)	• The Commercial Agent disabled a CSC
Assumption(s)	<p>Disabling card / blacklist</p> <p>Disabling the card will add it into blacklist whatever the reason.</p>
Synoptic	<pre> graph TD CA[Commercial Agent] --> 1[1. Trigger Disable CSC] 1 --> 2[2. Disable card] 2 --> CBO[CBO] </pre>
Main Success Scenario	Nominal

1- Trigger Disable CSC

- The Commercial Agent identifies the CSC to be disabled.
- The Commercial Agent selects the reason and validates the disabling action.
- The TOM calls the web services "Disable card" (for compatibility, the existing CCU interface is provided).

2- Disable card

- The card is added into the blacklist with reason provided by the TOM.

Alternatives**2.A Item already blacklisted**

If the item is already blacklisted, then an error message is returned.

3.2.3.9 UC-AS10 - Unblocking of a CSC at the TOM

ID	UC-AS10
Title	Unblocking of a CSC at the TOM
Goal	<p>At the TOM, the commercial agent unblocks a CSC.</p> <p>The objective is that the process will not change from the Commercial Agent and End-Customer perspective compared to the existing solution. The objective is also that no change will be required on the existing TOM.</p> <p>The main change resides in the fact that the event is processed by CBO.</p>
Actors	• End-Customer, Commercial Agent
Technical Scope	• TOM • SCU, LCU • CBO
Pre-condition(s)	• Commercial Agent is logged on TOM
Post-condition(s)	• The Commercial Agent unblocked a CSC
Assumption(s)	-
Synoptic	<p>The diagram illustrates the process flow between four entities: Commercial Agent (TOM), SCU, LCU, and CBO. The process starts with the Commercial Agent (TOM) performing two steps: 'Trigger Unblock CSC' and 'Generate event'. A blue arrow points down to the next step. The 'Generate event' step is connected by a blue arrow to the CBO, which then performs the final step: 'Process the event'. The other entities (SCU and LCU) are shown in dashed boxes without active participation in the current process flow.</p>

Main Success Scenario

Nominal

1- Unblock CSC

- The Commercial Agent checks that conditions for unblocking are fulfilled.
- The ticket office agent can ask the customer to pay an amount in order to unblock the related blocked item.
- The Commercial Agent unblocks the CSC.

2- Generate event

- TOM generates transactions for the unblocking operation.

3- Process the event

- CBO processes the event "Card action" (for compatibility, the existing CCU interface is provided):
 - Transaction is taken into account for updating the card image
 - Transaction is taken into account for reporting
- CBO processes the event "accounting operation" (for compatibility, the existing CCU interface is provided):
 - Transaction is taken into account for reporting

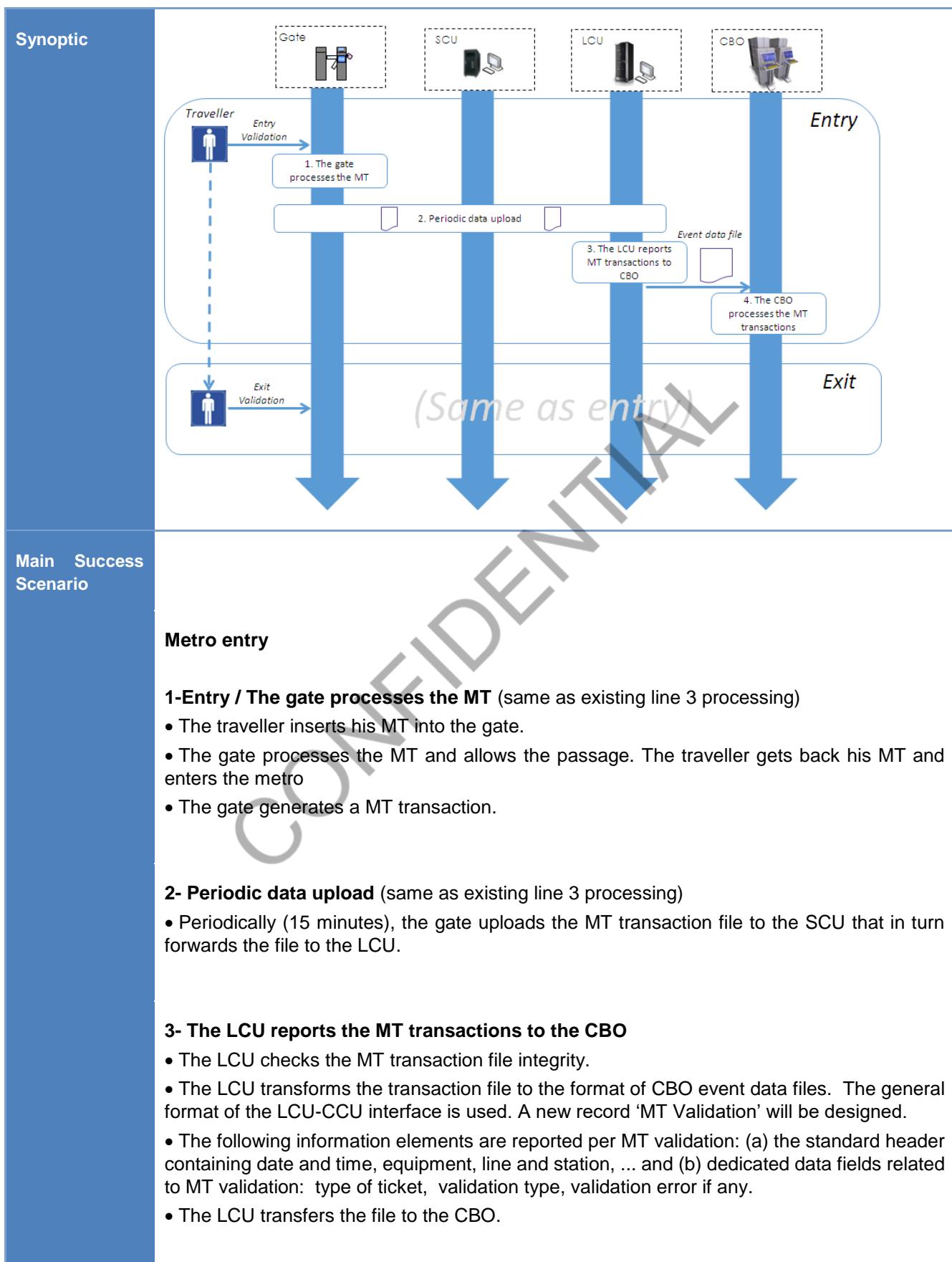
3.3 USAGE OF THE METRO

3.3.1 TRAVEL

3.3.1.1 UC-TR01 - Journey with a MT

ID	UC-TR01
Title	Journey with a MT
Goal	A traveller is doing a journey with a magnetic ticket (MT) entering the metro through an entry gate and leaving it through an exit gate.

	<p>From the customer perspective, there is no change compared to the existing MT processing on lines 1, 2 and 3. He inserts the ticket in the gate that processes the ticket and opens the turnstile.</p> <p>The ticket can be of any type (single or pass).</p> <p>The main change is related to the interaction with the CBO to which the MT validations will be reported.</p> <p>The main scenario describes a successful travel on the dual gates (line 3 gate or new gate installed on lines 1 & 2)</p> <p>The alternative A describes the case where the ticket is refused by the entry gate.</p> <p>The alternative B describes the case where an old gate (MT only) is used.</p> <p>Note: for the old magnetic only gate that will remain on line 1 and 2, the available events will be transferred to the CBO via the line 3 LCU. The existing format will remain unchanged.</p>
Actors	Traveller
Technical Scope	<ul style="list-style-type: none"> • Gate (Thales only) • SCU (Thales only) • LCU (Thales only) • CBO
Pre-condition(s)	<ul style="list-style-type: none"> • The traveller has a valid MT ticket.
Post-condition(s)	<ul style="list-style-type: none"> • The journey is successful. • The MT validation transaction is uploaded to the CBO and successfully processed.
Assumption(s)	-



4- The CBO processes the MT transactions

- The CBO receives the event data file containing the MT transactions and checks it (security and format).
- The MT transactions are transferred to the Business Intelligence solution to be stored.

Metro exit

Same as entry

Alternative A - The ticket is refused on entry**1.A - Entry / The gate processes the MT**

- The traveller inserts his MT into the gate.
- The gate processes the MT and refuses the passage.

2,3,4.A - Identical to main scenario**Alternative B - The entry (or the exit) is performed on an old MT gate.****1,2.B – MT processing and data upload** (Same as existing line 1&2 processing)

- The processing of the MT is the same as in the main scenario.
- The difference is that there is no MT transaction. The monitoring consoles of the MT system reports passage data file to the line 3 LCU

3.B – Processing at the Line 3 LCU (Same as existing)

- The Line 3 LCU processes the monitoring console data file.
- The available data is transferred to the CBO with no change of format

3.3.1.2 UC-TR02 - Journey with CSC

ID	UC-TR02
Title	Journey with CSC
Goal	<p>A traveller is doing a journey with a CSC, entering the metro through an entry gate and leaving it through an exit gate. From the customer perspective, there is no change compared to the existing processing.</p> <p>The card can be a CSC-A or a CSC-P and hold any type of product .The fare rules have no impact on the use case. Note that in the frame of the 850 gates project, there is no change of the fare rules.</p> <p>The main change is related to the interaction with the CBO.</p> <p>The main scenario describes a successful travel using either Thales or 3rd party gates.</p> <p>The alternative A describes the case where the ticket is refused by the entry gate.</p>
Actors	Traveller
Technical Scope	<ul style="list-style-type: none"> • Gate • SCU • LCU • CBO
Pre-condition(s)	<ul style="list-style-type: none"> • The traveller has a valid CSC.
Post-condition(s)	<ul style="list-style-type: none"> • The journey is successful. • The CSC validation transaction is uploaded to the CBO and successfully processed.
Assumption(s)	-

Synoptic	<pre> graph TD Traveller[Traveller] -- "Entry Validation" --> Gate[Gate] Gate -- "1. The gate processes the CSC" --> DataUpload[2. Periodic data upload] DataUpload --> LCU[LCU] LCU -- "3. The LCU reports CSC transactions to CBO" --> CBO[CBO] CBO -- "4. The CBO processes the CSC transactions" --> Exit[Exit] Traveller -- "Exit Validation" --> Exit </pre> <p><i>(Same as entry)</i></p>
Main Success Scenario	<p>Metro entry</p> <p>1-Entry / The gate processes the CSC (identical to existing processing)</p> <ul style="list-style-type: none"> The traveller presents his card to the reader of the gate. The gate processes the CSC and allows the passage. The gate generates a CSC validation transaction. In case the traveller uses a group product, step 1 is repeated several times (per traveller). <p>2- Periodic data upload (identical to existing processing)</p> <ul style="list-style-type: none"> Periodically (15 minutes), the gate uploads the CSC transaction file to the SCU that in turn forwards the file to the LCU. <p>3- The LCU reports the CSC transactions to the CBO (identical to existing processing)</p> <ul style="list-style-type: none"> The LCU reports the CSC transactions to the CBO using Event data files. The existing CCU-LCU data format is kept for compatibility. <p>4- The CBO processes the CSC transactions</p> <ul style="list-style-type: none"> The CBO receives the event data file containing the CSC transactions and checks it (security and format).

- The CSC validation transactions are expressed in the form of validation data events (this is the existing CCU-LCU format). The validation events contains (a) a standard header including date and time, equipment, line and station, ... (b) dedicated data fields related to the CSC validation: validation type, validation errors, card ID, consumption of trips or T-purse when applicable and (c) a copy of the card data structures (cardData) including the Application Context, the T-Purse Context and Value, the Contract List, the Contracts and the Event Logs.
- The data fields related to the validation event (a+b) are transferred to the Business Intelligence solution to be stored in the data warehouse
- The complete event (a+b+c) is transferred to the Media Management solution where the following process occurs: the media status is updated, the validation transaction (a+b) is recorded for on line enquiry from the TOM, the card image is updated using the Card Data (c) to be made available from the TOM.

Metro exit

Identical to entry

Alternative A - The CSC is refused on entry

1.A – The gate processes the CSC

- The traveller presents his card to the reader of the gate.
- The gate refuses the entry.
- The reason for refusing is indicated in the VGA display.
- The reasons for refusing the entry are hereafter broken down into 4 categories
- Case 1, the card cannot be read. The card is unreadable, wrongly presented, ... The entry is refused and the refusal is notified to the traveller (message, sound).
- Case 2, the card is invalid. The card is expired, blocked, The entry is refused and the refusal is notified to the traveller (message, sound).
- Case 3, the card is in black-list but not yet blocked. The gate blocks the card. The entry is refused and the refusal is notified to the traveller (message, sound). A blocking transaction is generated.
- Case 3, the travel rights stored on the card (product, T-purse) are un-sufficient to allow the entry. The entry is refused and the refusal is notified to the traveller (message, sound).

2, 3.A – Same as main scenario.

- The blocking transaction is transmitted as a Card Action event to the CBO.

4.A – The CBO processes the CSC transactions

- Same as main scenario. Especially, the blocking event is transmitted to the Business Intelligence and the Card Management.

3.3.2 ENFORCEMENT

3.3.2.1 UC-EN01 - Control of a CSC with the PVU

ID	UC-EN01
Title	Control of a CSC with the PVU
Goal	<p>The enforcement officer is on duty in the metro. Usually the enforcement staff is operating in a team of several people. However the global process has no impact on this use case that focuses on the check of a CSC with the PVU (interaction between an enforcement officer and a traveller).</p> <p>The check consists in the verification of the card content (status, products and validation history).</p> <p>The main scenario is a successful inspection (traveller in order). The case of a fare dodger with an invalid CSC is described in alternative A.</p> <p>Note that the management of penalties is the subject of a separate use case.</p> <p>Note that the control of magnetic tickets MT is outside of the scope of the PVU. This is done visually by the enforcement officer using the information printed on the ticket: product and parameters printed at sale time and usage data printed by the gate (1st validation, remaining trips, end of validity)</p>
Actors	Enforcement Officer, Traveller.
Technical Scope	• PVU
Pre-condition(s)	<ul style="list-style-type: none"> • The enforcement officer is in the metro with the PVU ready for inspection (shift is open). • The traveller is in the metro. He is travelling with a CSC.
Post-condition(s)	<ul style="list-style-type: none"> • The inspection is successful (the traveller is in order)
Assumption(s)	-

Synoptic	<pre> graph TD PVU[PVU] -- "1. The officer asks the traveller for his CSC" --> Traveller[Traveller] Traveller -- "Hands the CSC" --> PVU PVU -- "2. The Officer checks the CSC with the PVU" --> Decision{ } Decision -- "Check is positive, The officer hands back the card to the traveller" --> Traveller Decision -- "Check is negative, Penalty use case" --> Traveller </pre>
Main Success Scenario	<p>1-The officer asks the traveller for his CSC.</p> <ul style="list-style-type: none"> The enforcement team is on duty in the metro. An enforcement officer asks a traveller for his fare media. The traveller hands a CSC. <p>2- The officer checks the CSC with the PVU</p> <ul style="list-style-type: none"> The officer reads the CSC with the PVU. The PVU displays the CSC content including (a) CSC general information : card number, card status, card validity date and customer profile and (b) the last travel information : last entry validation date and location + the number of travellers in case of a group and (c) possibly the last exit validation The PVU does also an automatic check based on the last entry validation and displays a visual result. The enforcement officer sees that the card contains a valid entry validation. If the card contains a special profile, the officer asks the traveller for an evidence that justifies that he is eligible for profile. The traveller hands the evidence. If the entry validation is related to a group, the officer asks the traveller to indicate the people he is travelling with. The number of people is consistent with the number recorded in the card. The traveller is in order. The officer hands back the CSC to the traveller.

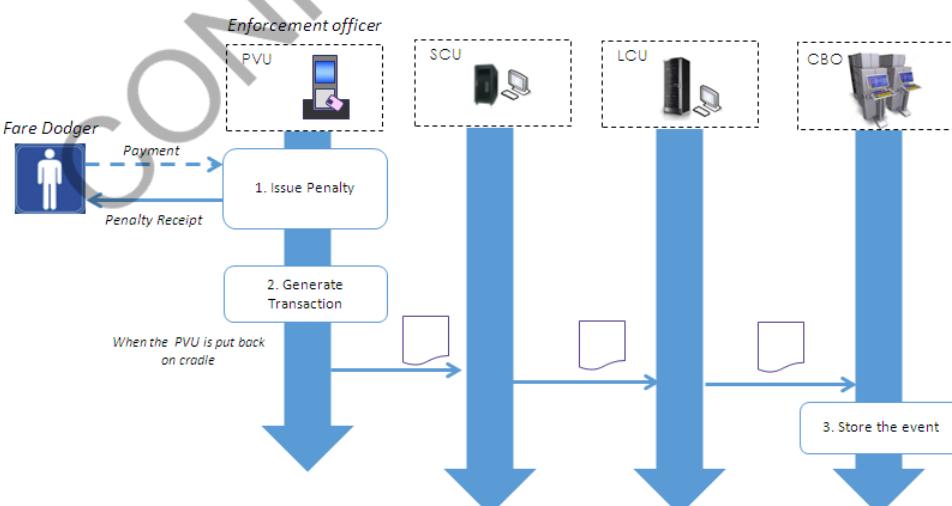
Alternative A – The traveller is not in order.

1.A -The officer asks the traveller for his CSC. (same as main scenario)

2.A - The officer checks the CSC with the PVU

- There are several reasons for which the check can be negative.
- Case 1: the CSC is unreadable.
- Case 2: the CSC is readable but invalid (blocked, expired). This is displayed in the general information.
- Case 3: the CSC is valid but does not contain a valid entry validation (no entry validation at all or an entry validation that is too old).
- Case 4: the CSC contains a discount profile but the traveller fails to provide the evidence he is eligible for the profile.
- In any of the previous cases, the traveller is not in order. The officer will give a penalty to the traveller (see penalty use case)

3.3.2.2 UC-EN02 - Issuing of a penalty with the PVU

ID	UC-EN02
Title	Issuing of a penalty with the PVU
Goal	<p>The enforcement officer is on duty. He has controlled a fare dodger who had either no ticket at all or an invalid ticket/CSC.</p> <p>The enforcement officer issues a penalty.</p>
Actors	<ul style="list-style-type: none"> Enforcement Officer, Traveller.
Technical Scope	<ul style="list-style-type: none"> PVU SCU, LCU.
Pre-condition(s)	<ul style="list-style-type: none"> The enforcement officer is in the metro with the PVU ready for inspection (shift is open). The Enforcement Officer is about to fine a fare dodger.
Post-condition(s)	<ul style="list-style-type: none"> The penalty is issued.
Assumption(s)	In case the penalty is not paid immediately, the recovery process is out of the scope of the system.
Synoptic	 <pre> graph TD FD[Fare Dodger] -- Payment --> PVU[PVU] PVU -- "1. Issue Penalty" --> TR[Traveller Receipt] PVU -- "2. Generate Transaction" --> ET[Event Transaction] PVU -- "When the PVU is put back on cradle" --> CBO[CBO] PVU --> SCU[SCU] PVU --> LCU[LCU] PVU --> CBO SCU --> ET LCU --> ET CBO --> ET ET --> SE[3. Store the event] </pre>
Main Success Scenario	<p>1- Issue the penalty</p> <ul style="list-style-type: none"> The Enforcement Officer selects the type of penalty.

- The PVU provides a form so that the Enforcement Officer can key the penalty data
- The Customer may pay immediately
 - By cash
 - By electronic payment. In this later case, the payment is processed with the PVU EFT. A receipt is printed.
- If the Penalty is not paid immediately, this is recorded by the Enforcement Officer.
- The Enforcement Officer closes the penalty.
- The PVU prints 2 paper versions of the penalty, one for the Enforcement Officer, the second one for the customer.

2- Generate event

- PVU generates a penalty transaction.
- The transaction is forwarded to the CBO via the SCU and the LCU when the PVU is back on the cradle.

3- Store the event

- CBO stores the event "Penalty" (for compatibility, the existing CCU interface is provided):
- The transaction is taken into account for reporting

3.4 AFC OPERATION

3.4.1 BLACKLIST MANAGEMENT

3.4.1.1 UC-BM01 - Triggering of blacklist distribution at the CBO

ID	UC-BM01
Title	Triggering of blacklist distribution at the CBO
Goal	The blacklist is distributed to LCU/SCU/Devices.
Actors	System
Technical Scope	<ul style="list-style-type: none"> • CBO • LCU / SCU / Front end devices
Pre-condition(s)	<ul style="list-style-type: none"> • Blacklist entries are created
Post-condition(s)	<ul style="list-style-type: none"> • Blacklist are distributed to LCU/SCU/Front end devices
Assumption(s)	<ul style="list-style-type: none"> • Third party devices conform to the blacklist download mechanism from CBO (using STFP server) • The SAM blacklist is out of scope of this use case (refer to SAM manager use cases) • The device blacklist is out of scope of this use case (refer to device management use cases) • The card blacklist file is signed by CBO
Synoptic	<p>The diagram illustrates the process of distributing blacklists. At the top, four boxes represent the CBO, LCU, SCU, and Device. A dashed line connects them to a central horizontal bar. Below this bar, two blue rounded rectangles represent steps: '1. Generate blacklist files' and '2. download blacklist file'. Four blue arrows point downwards from these steps to four blue boxes labeled 'Blacklist file', which are aligned with the CBO, LCU, SCU, and Device respectively.</p>

Main Success Scenario

Nominal

1- Generate blacklist file

- The CBO generates the card blacklist file. This is based on a periodic trigger (configurable, several times a day)
 - The file is generated in dedicated directory and made available via SFTP server
- NB: this step shall guarantee compatibility with the existing CCU interface.

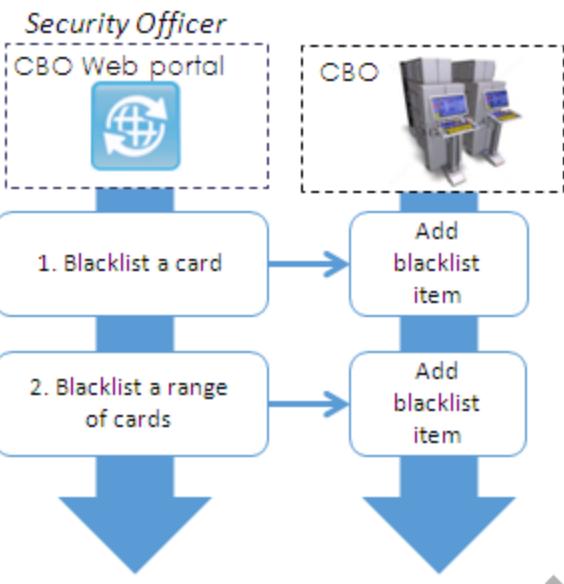
3- Download blacklist file

- The LCU downloads the blacklist file via SFTP from CBO server.
- The SCU downloads the blacklist file via SFTP from LCU server.
- The device downloads the blacklist file via SFTP from SCU server.

NB: mechanism is unchanged compared to existing solution

3.4.1.2 UC-BM02 - Insertion of a CSC in blacklist at the CBO

ID	UC-BM02
Title	Insertion of a CSC in blacklist at the CBO
Goal	The security officer can add an item in the blacklist. It allows blocking either the card or a range of cards.
Actors	<ul style="list-style-type: none"> • Security officer
Technical Scope	<ul style="list-style-type: none"> • CBO
Pre-condition(s)	<ul style="list-style-type: none"> • CSC is declared at back office • The security officer is logged on the CBO and is granted appropriate access rights
Post-condition(s)	<ul style="list-style-type: none"> • CSC is added into blacklist
Assumption(s)	<p>Items that can be blacklisted</p> <ul style="list-style-type: none"> - card - range of cards <p>Blacklist sequence number</p> <p>The blacklist sequence number is generated by incrementing the last blacklist sequence number of the blacklisted item.</p> <p>For card range blacklisting, the sequence number is meaningless, so the value is always set to 1.</p>

Synoptic	 <pre> graph TD SO[Security Officer] --> CBO_Web[CBO Web portal] SO --> CBO_Phys[CBO] CBO_Web --> Step1[1. Blacklist a card] CBO_Phys --> Step1 Step1 --> Add1[Add blacklist item] CBO_Web --> Step2[2. Blacklist a range of cards] CBO_Phys --> Step2 Step2 --> Add2[Add blacklist item] Add1 --> Item[New blacklist item] Add2 --> Item </pre>
Main Success Scenario	<p>Nominal</p> <p>1- Blacklist a card</p> <ul style="list-style-type: none"> The security officer keys the card graphical number and searches for the card The card content is displayed The security officer selects the action 'add card in blacklist' The security officers selects a reason. The security officer validates the action The CBO generates the blacklist sequence number by incrementing the last blacklist sequence number and creates the blacklist item. <p>2- Blacklist a card range</p> <ul style="list-style-type: none"> The security officer selects the action 'add a card range in blacklist' The security officer keys the card start number The security officer keys the card end number The security officer validates the action The CBO set the blacklist sequence number to 1 and creates the blacklist item <p>Alternatives</p> <p>1a Item already blacklisted</p>

- If the item is already blacklisted, the blacklisting action is not available in the MMI.

CONFIDENTIAL

3.4.1.3 UC-BM03 - Removal of a CSC from the blacklist at the CBO

ID	UC-BM03
Title	Removal of a CSC from the blacklist at the CBO
Goal	The security officer can add an item in the blacklist. It allows blocking either the card or a range of cards.
Actors	<ul style="list-style-type: none"> • Security officer
Technical Scope	<ul style="list-style-type: none"> • CBO • CBO web portal
Pre-condition(s)	<ul style="list-style-type: none"> • CSC is declared at back office and blacklisted • The security officer is logged on the CBO and is granted appropriate access rights
Post-condition(s)	<ul style="list-style-type: none"> • CSC is removed from blacklist
Assumption(s)	<p>Items that can be removed from blacklist</p> <ul style="list-style-type: none"> - card - range of cards
Synoptic	<pre> graph TD SO[Security Officer] --> CBO_Card[1. Remove a card from blacklist] SO --> CBO_Range[2. Remove a range of cards from blacklist] CBO_Card --> RBL1[Remove blacklist item] CBO_Range --> RBL2[Remove blacklist item] </pre>
Main Success Scenario	Nominal

1- Remove a card from blacklist

- The security officer keys the card graphical number and searches for the card
- The security officer selects the action 'remove card from blacklist'
- The security officer validates the action
- The CBO removes the blacklist item.

2- Remove a card range from blacklist

- The security officer selects a card range in blacklist and selects the action 'remove card range from blacklist'
- The security officer validates the action
- The CBO removes the blacklist item

Alternatives**1a Item is not blacklisted**

- If the item is not blacklisted, the blacklist removal action is not available in the MMI.

3.4.1.4 UC-BM04 - Display of the CSC blacklist at the CBO

ID	UC-BM04
Title	Display of the CSC blacklist at the CBO
Goal	The security officer can display the CSC blacklist on the CBO web portal.
Actors	<ul style="list-style-type: none"> • Security officer
Technical Scope	<ul style="list-style-type: none"> • CBO • CBO web portal
Pre-condition(s)	<ul style="list-style-type: none"> • The security officer is logged on the CBO and is granted appropriate access rights
Post-condition(s)	<ul style="list-style-type: none"> • CSC blacklist is displayed on CBO web portal
Assumption(s)	-
Synoptic	<pre> graph TD SO[Security Officer] --> CBO_CWP[CBO Web portal] CBO_CWP --> R1[Retrieve CSC blacklist] CBO_CWP --> R2[Retrieve card range blacklist] R1 --> D1[1. Display CSC blacklist] R2 --> D2[2. Display card range blacklist] D1 <--> D2 D1 --> FD[Final Display] D2 --> FD </pre>
Main Success Scenario	<p>Nominal</p> <p>1- Display CSC blacklist</p>

- The security officer selects the CSC blacklist page from CBO web portal.
- The list of blacklisted CSC and ranges of CSC are displayed.

2- Remove a card range from blacklist

- The security officer selects the card range blacklist page from CBO web portal.
- The list of card range blacklisted are displayed.

CONFIDENTIAL

3.4.1.5 UC-BM05 - Blacklisting a CSC from the PVU

ID	UC-BM05
Title	Blacklisting a CSC from the PVU
Goal	<p>The objective is for the enforcement officer to put illegal cards in blacklist. This is the case where he gets informed that an illegal card is used (he is not in possession of the card).</p> <p>NOTE: the implementation of this use cases depends on the mobile network (3G/4G) that will be provided for the PVU. This network is outside of Thales scope.</p>
Actors	• Enforcement officer
Technical Scope	• PVU • CBO
Pre-condition(s)	• The PVU is connected to the CBO
Post-condition(s)	• The CSC is in blacklist.
Assumption(s)	None
Synoptic	<p><i>Enforcement officer</i></p> <pre> graph LR subgraph PVU [PVU] direction TB A[1. Blacklist card] --> B[2. Insert card in blacklist] end subgraph CBO [CBO] direction TB B --> A end </pre>
Main Success Scenario	<p>Nominal</p> <p>1- Blacklist card</p>

- The enforcement officer wants to insert a CSC in blacklist. He is in possession of the card tag id.
- He uses the card blacklisting function at the PVU and keys the tag-id.
- The PVU calls the CBO card disabling service.

2- Insert card in blacklist

- The CSC is added into the blacklist with reason provided by the TOM.

Alternatives

2.A Item already blacklisted

If the item is already blacklisted, then an error message is returned.

3.4.2 BUSINESS PARAMETER MANAGEMENT

3.4.2.1 UC-PM01 - Distribution of the parameters to the equipment from the CBO

ID	UC-PM01
Title	Distribution of the parameters to the equipment from the CBO
Goal	<p>The topology, CSC parameters (fare and time) and MT parameters are distributed to the LCU/SCU/Devices.</p> <p>The general objective is that the process for distributing parameters will not change compared to the existing solution. Thus the file format is kept as well as the SFTP distribution mechanism.</p> <p>The single difference with the existing implementation is that the MT fare parameters are managed at the CBO and downloaded together with the CSC fare parameters.</p>
Actors	Central data management officer
Technical Scope	<ul style="list-style-type: none"> • CBO • LCU / SCU / Front end devices
Pre-condition(s)	<ul style="list-style-type: none"> • Central data management officer is logged on the CBO web portal and is granted adequate access rights on CBO
Post-condition(s)	<ul style="list-style-type: none"> • The desired parameters are distributed to LCU/SCU/Front end devices
Assumption(s)	<ul style="list-style-type: none"> • Third party devices conform to the parameter download mechanism from CBO (using STFP server) • For compatibility, the generated files are in the format of the existing LCU-CCU interface.
Synoptic	<p><i>Data Management Officer</i></p> <pre> graph TD subgraph DMO [Data Management Officer] direction TB A[CBO Web portal] --> B[1. Trigger parameter distribution] B --> C[2. Generate parameter files] C --> D[3. download parameter files] end subgraph CBO [CBO] direction TB E[CBO] end subgraph LCU [LCU] direction TB F[LCU] end subgraph SCU [SCU] direction TB G[SCU] end subgraph Device [Device] direction TB H[Device] end D --> E D --> F D --> G D --> H </pre>

Main Success Scenario

Nominal

1- Trigger parameter distribution

- The security officer selects the desired data source files (topology, CSC, MT parameters) and the application date for the data set that will be deployed.

2- Generate parameter files

- The CBO checks the compatibility and consistency of the data source files.
- The CBO computes the new version of the files.
- The files are placed in dedicated directory and made available via SFTP server

3- Download parameter files

- The LCU downloads the parameter files via SFTP from CBO server.
- The SCU downloads the parameter files via SFTP from LCU server.
- The device downloads the parameter files via SFTP from SCU server.
- The Line 3 LCU generates the EOD files at the adequate format for the old equipment of Lines 1 & 2

NB: mechanism is unchanged compared to existing solution

3.4.2.2 UC-PM02 - Configuration of the topology at the CBO

ID	UC-PM02
Title	Configuration of the topology at the CBO
Goal	The central data management officer can configure the topology parameters through CBO web portal.
Actors	Central data management officer
Technical Scope	<ul style="list-style-type: none"> • CBO • CBO Web Portal
Pre-condition(s)	<ul style="list-style-type: none"> • The central data management officer is logged on the CBO and is granted appropriate access rights
Post-condition(s)	<ul style="list-style-type: none"> • Topology parameters is updated in CBO
Assumption(s)	<p>Topology Parameters that can be configured: Topology parameters are defined in the existing solution; which contains the following categories:</p> <ul style="list-style-type: none"> • <Lines> • <Floating Zones> • <Zones> • <Stations> • <Inter-station Matrix> • <Zone to Zone Matrix> <p>Parameter configuration method: Import from an valid topology parameters file As an alternative, the parameters can be updated using the Web MMI.</p> <p>Topology Parameter Files Format: Same file format as per the existing solution (i.e. XML).</p>

Synoptic	<p><i>Central Data Management Officer</i></p> <pre>graph TD; CBO_Web_portal[CBO Web portal] --> Import[1. Import a topology parameters file]; Import --> Update[Update topology parameters record]; Update --> Output;</pre>
Main Success Scenario	<p>Nominal</p> <p>1-. Import Topology parameters file</p> <ul style="list-style-type: none">• The central data management officer selects import topology parameters function from CBO web portal.• The central data management officer selects a topology parameter file to import.• The CBO checks that the file is valid and updates the topology parameters. If the file is inconsistent, it is rejected.

3.4.2.3 UC-PM03 - Configuration of the CSC fare and time parameters at the CBO

This use case allows the configuration of new Profiles, Fare Tables, Products, Purse Parameters, ..

ID	UC-PM03
Title	Configuration of the CSC fare and time parameters at the CBO
Goal	The central data management officer can configure the CSC fare and time parameters through CBO web MMI.
Actors	Central data management officer
Technical Scope	<ul style="list-style-type: none"> • CBO • CBO Web MMI
Pre-condition(s)	<ul style="list-style-type: none"> • The central data management officer is logged on the CBO and is granted appropriate access rights
Post-condition(s)	<ul style="list-style-type: none"> • CSC fare and time parameters is updated in CBO
Assumption(s)	<p>CSC fare and Time Parameters that can be configured:</p> <ul style="list-style-type: none"> • Fare parameters are defined in the existing solution; which contains the following categories: <ul style="list-style-type: none"> • <Global Parameters> • <Profiles> • <Purse Fare> • <Time Charges> • <Fare Tables> • <Cards Supports> • <Family Passes> • <Pass Definition> • Time parameters are defined in the existing solution; which contains the following categories: <ul style="list-style-type: none"> • <Days> • <Special Days> • <Day Types> <p>Parameter configuration methods:</p> <ul style="list-style-type: none"> • Manually configuration at CBO web MMI. • Importation from an valid fare/time parameter file. <p>Fare/Time Parameter Files Format:</p> <ul style="list-style-type: none"> • Same file format as per the existing solution (i.e. XML).

Synoptic	<p><i>Central Data Management Officer</i></p> <pre> graph TD subgraph CBO_Web [CBO Web portal] direction TB A1[1. Configure Fare parameters] --> B1[Update Fare parameters record] end subgraph CBO [CBO] direction TB A2[2. Configure Time parameters] --> B2[Update Fare parameters record] end B1 --> B3[Update Fare parameters record] B2 --> B3 B3 --> C1[Large Downward Arrow] </pre>
Main Success Scenario	<p>Nominal</p> <p>1. Configure fare parameters</p> <ul style="list-style-type: none"> The central data management officer opens the parameters web MMI and selects the desired set The current fare parameters are retrieved and displayed. Parameters with the same category are grouped. The central data management officer selects the corresponding group and parameter to modify. The central data management officer changes some parameter values. The web MMI checks the global validity of parameters (against topology and time parameters) The central data management officer confirms the changes The Web MMI updates the CSC parameters. <p>2-Configure time parameters</p>

- The central data management officer opens the parameters web MMI and selects the desired set.
- Current time parameters are retrieved and displayed.
- Parameters with the same category are grouped.
- The central data management officer changes some parameter values.
- The central data management officer confirms the changes.
- The Web MMI updates the time parameters.

Alternatives

1.A Import a Fare Parameters file

- The central data management officer selects the import fare parameters function from CBO web portal.
- The central data management officer selects a fare parameters file to import.
- The CBO checks that the file is valid and updates the fare parameters. If the file is invalid, it is rejected.

2.A Import a Time Parameters file

- The central data management officer select import time parameters function from CBO web portal.
- The central data management officer selects a time parameters file to import.
- The CBO checks that the file is valid and updates the time parameters. If the file is invalid, it is rejected.

3.4.2.4 UC-PM04 - Configuration of the MT fare parameters at the CBO

ID	UC-PM04
Title	Configuration of the MT fare parameters at the CBO
Goal	The central data management officer can configure the MT fare parameters through CBO web MMI.
Actors	Central data management officer
Technical Scope	<ul style="list-style-type: none"> • CBO • CBO Web MMI
Pre-condition(s)	<ul style="list-style-type: none"> • The central data management officer is logged on the CBO and is granted appropriate access rights
Post-condition(s)	<ul style="list-style-type: none"> • The MT fare parameters are updated at the CBO.
Assumption(s)	<p>Parameter configuration method:</p> <ul style="list-style-type: none"> • Manually configured at CBO web MMI. • Imported from a valid MT tickets parameters file. <p>MT tickets Parameter Files Format:</p> <ul style="list-style-type: none"> • Same file format as per the existing solution (i.e. XML) as managed at Thales LCU. <p>Update of LCU interface</p> <p>For MT parameters download, a dedicated file is added in CBO SFTP server. The LCU applies the same download mechanism as for other parameter files.</p>
Synoptic	<pre> graph TD subgraph Left [Central Data Management Officer] A1[CBO Web portal] --> B1[1. Configure MT fare parameters] B1 --> C1[Update MT fare parameters] end subgraph Right [Central Data Management Officer] A2[CBO Web portal] --> B2[1. Import a MT fare parameters file] B2 --> C2[Update MT fare parameters] end </pre>
Main Success Scenario	

Nominal

1. Configure fare parameters

- The central data management officer opens the parameters Web MMI and selects the desired set.
- Current MT fare parameters are retrieved and displayed.
- Parameters with the same category are grouped.
- The central data management officer selects the corresponding group and parameter to modify.
- The central data management officer changes some parameter values. The web MMI checks the global validity of the parameters.
- The central data management officer confirms the changes
- The CBO updates the MT parameters.

Alternatives

1.A Import a Fare Parameters file

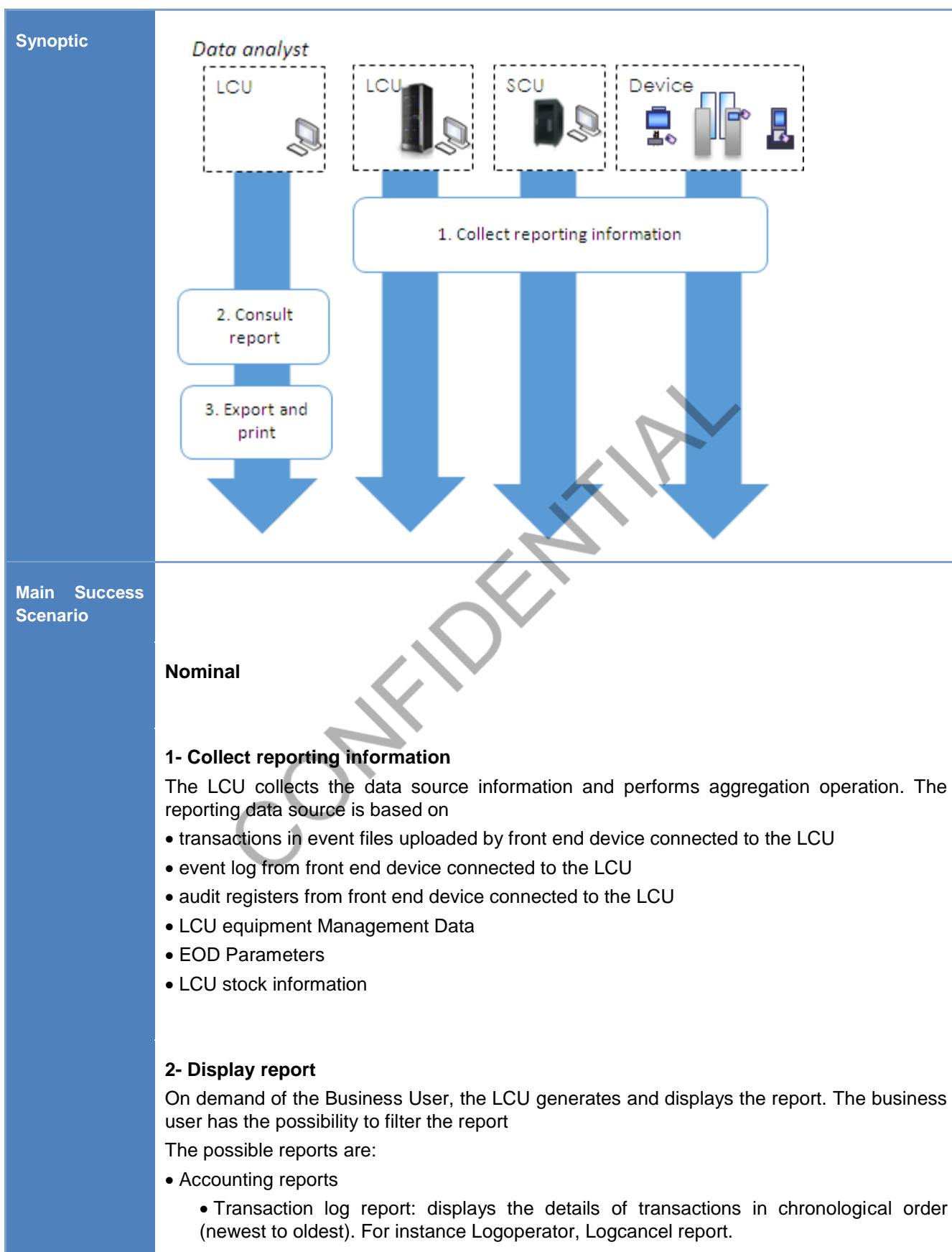
- The central data management officer selects import MT parameters function from CBO web portal.
- The central data management officer selects a fare parameters file to import.
- The CBO checks that the file is valid and updates the MT parameters. If the file is inconsistent, it is rejected.

3.4.3 BUSINESS INTELLIGENCE

This section contains the Business Intelligence use cases (i.e. use cases related to the collection, storage, access, analysis of the AFC business data). It focuses on the business solution included in the CBO. However, for clarify, the first use case is a reminder of the reporting solution included in Thales LCU and that will remain in place)

3.4.3.1 UC-BI01 - Usage of the accounting, traffic, maintenance and system reports at the LCU [THALES]

ID	UC-BI01
Title	Usage of the accounting, traffic, maintenance and system reports at the LCU
Goal	<p>The existing reports available at Thales line 3 LCU will be kept in place on the Line 1 & 2 LCU. This will be especially useful during the transition phase.</p> <p>Note: this use case is restricted to Thales LCU.</p>
Actors	• Line Business User.
Technical Scope	• Thales LCU
Pre-condition(s)	• The Business User is logged on the LCU
Post-condition(s)	• The Business User has access to the reports.
Assumption(s)	<p>Note that the following information comes from the current LCU documentation. This is a reminder of the available reports at the LCU. The rational behind is to have in this document a global picture of the available reports (CBO & LCU).</p> <p>Note that the existing reports used for the MT tickets data reported from the old gates and TOMs will be maintained at the line 3 LCU as long as the old gates and TOM are not phased out.</p>



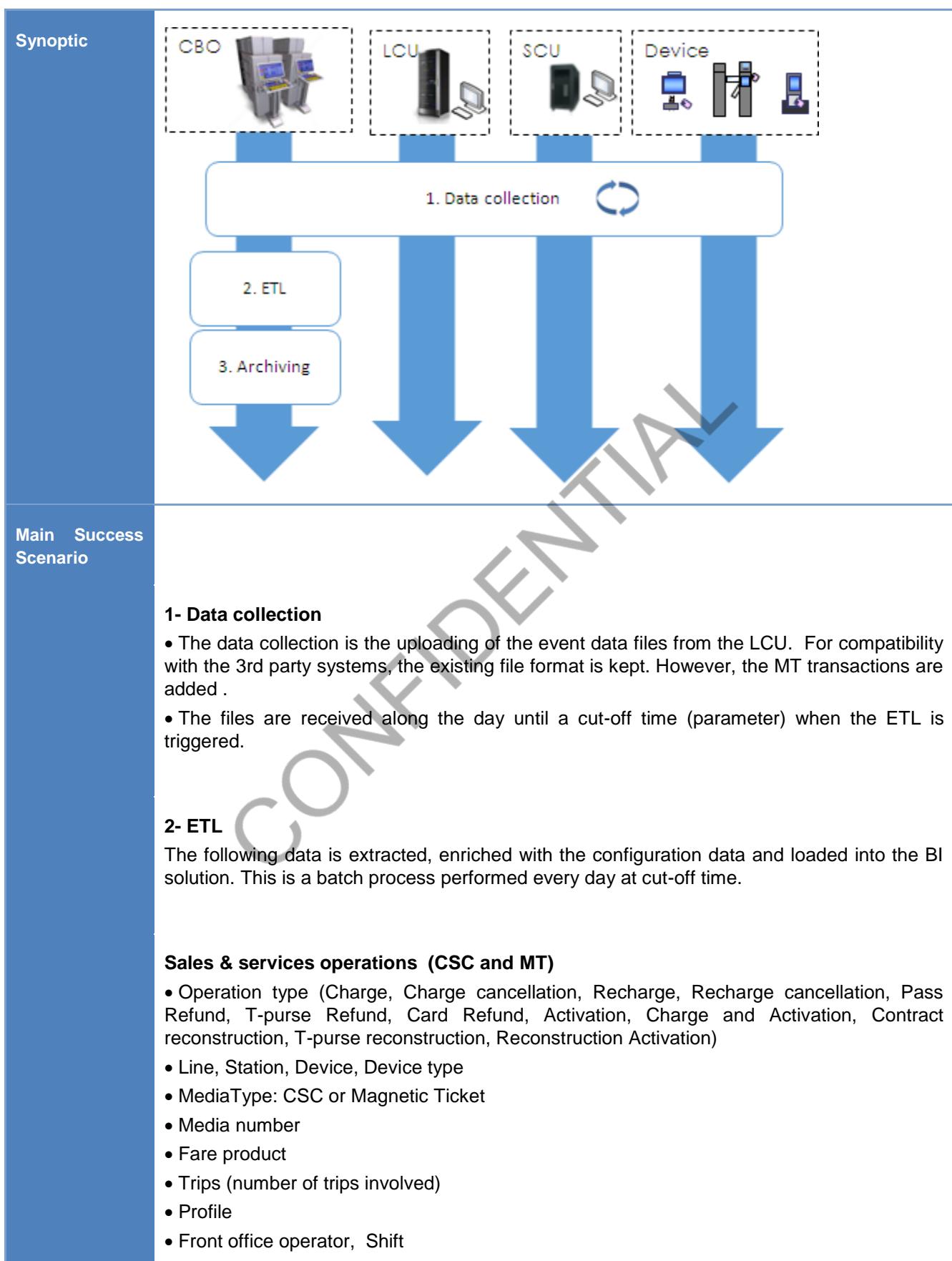
- Sales report: displays the summaries of sale transactions. Reports are produced daily, on a daily and monthly basis. For instance Dayticket station report, Dayticket station per ticket type report.
- TOM/CIPS classification report: classifies the TOM/CIPS Level-1 equipments per Number of sale transactions, Shift revenue.
- Line 1 & Line 2 accounting report (LCU line 3, old gates and TOMs only): provides for each station, each sale device and each shift: the shift revenue, the totals per device, the totals per station
- Traffic reports
 - Traffic log report: displays the details of transactions in chronological order (newest to oldest). For instance Logtraffic report, Logreject report.
 - Traffic report: displays the summaries of traffic related transactions. These reports are produced daily, on a **10 minutes aggregation** basis, daily and monthly. For instance Daytraffic station report, Daytraffic line report
 - Line 1 & Line 2 traffic report (LCU line 3, old gates and TOMs only): For instance this report provides for each station and per period of 10 minutes: the total of entries, the total of exits.
- Maintenance reports
 - Stock reports
 - LCU/SCU stock report: displays the summaries of stocks at LCU and SCU level at the end of the business day. These reports are produced daily, on a daily and monthly basis
 - TOM/CIPS stock report: display the summaries of TOM/CIPS stock at the end of the business day. These reports are produced daily, with the information provided by the last "end of shift" transaction received.
 - Level-1 equipment maintenance reports: displays the summaries of Level-1 equipment failures. These reports are produced on a monthly basis
 - SCU Maintenance Report: displays the summaries of SCU failures. This report is produced monthly on a monthly basis.
 - Event log report: provide a list of events for a selected Level-1 equipment for a user defined period (up to one month).
 - Line & Line 2 maintenance report (LCU line 3, old gates and TOMs only): provides maintenance counters for each Level-1 equipment in each Line 1 and Line 2 station.

3 - Export and print report

The Business User can export the report in PDF format and print the report.

3.4.3.2 UC-BI02 - ETL processing at the CBO

ID	UC-BI02
Title	ETL processing at the CBO
Goal	<p>The scope of this process is the preparation of the business data that will be used by the Business Intelligence (BI) Solution. This is commonly known as ETL: Extraction of the data from data sources, Transformation and Loading into the BI storage.</p> <p>This is an automatic process carried out by the CBO system (no human actor). However, the description hereafter helps at understanding the functional design of the proposed solution. Especially the business users and the business analysts who uses the CBO BI solutions are managing the data resulting from the ETL.</p> <p>Note: the long-term archiving is also managed after the end of the ETL process.</p>
Actors	NA
Technical Scope	• CBO
Pre-condition(s)	NA
Post-condition(s)	• A daily set of business data is loaded into the BI storage and the source data is archived.
Assumption(s)	<p>CBO Business Intelligence solution: QlikSense</p> <p>Data sources. The data sources that are used are the following</p> <ul style="list-style-type: none"> • Event data files (CSC & MT transactions) uploaded from the LCU. • Claim information exchanged with the TOM • The configuration files downloaded to the LCU: <ul style="list-style-type: none"> • Topology • CSC & MT Fare parameters • Agent list • Equipment & SAM Black Lists <p>Performances</p> <ul style="list-style-type: none"> • BI on-line detailed data storage capacity : 13 months • Off-line archiving capacity (detailed data) : 5 years. • ETL process frequency. Once a day.



- Payment means
- Date/time
- Amount, fee, deposit of transaction

Card personalization (CSC)

- Line, Station, Device, Device type
- Profile
- Front office operator, Shift
- Result
- Date/time

Card reconstruction data (CSC)

- Line, Station, Device, Device type
- Profile
- Front office operator, Shift
- Result
- Date/time

Traffic data (CSC and MT)

- Validation type (Refused, First Check-in, Group Check-in, Close Check-in at check-in, Close Check-out at check-in, First Check-out, Group Check-out, First Free Exit, Group Free Exit, First Penalty Exit, Group Penalty Exit, CSC Failed reading, Entry penalty because of missing exit validation, Entry penalty because of missing entry validation)
- Validation error (only CSC)
- Line, Station, Device, Device type
- MediaType: CSC or Magnetic Ticket
- Media number
- Fare product
- Trips (Number of trips discounted because of the operation)
- Profile (only CSC)
- Date/time
- OperationBalance

Enforcement data (CSC)

- Penalty reason
- Penalty amount
- Line, Station, Device, Device type
- Media number
- Profile
- Front office operator, Shift

- Payment mode
- Date/time
- Amount

Action data (CSC)

- Line, Station, Device, Device type
- Action type
- Media number
- Blocking reason
- Blacklist version
- Fare product
- Date/time

SAM data (SAM change and quota update)

- Line, Station, Device, Device type
- Number of events
- oldSAMquota
- newSAMquota

Claim data (based upon claim records exchanged with the TOM)

- Claim status
- Creation date time
- Last update date time

Configuration data

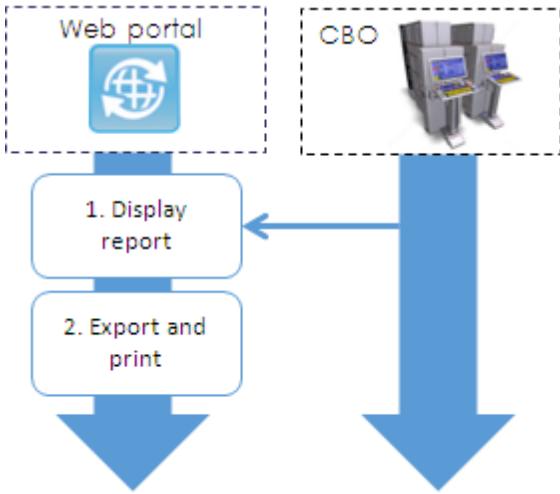
- Topology
- CSC & MT Fare parameters
- Agent list
- Equipment & SAM Black Lists

3 - Off-line data archiving

The source data is archived (a tape drive is used). This is done every day following the ETL.

3.4.3.3 UC-BI03 - Usage of reports at the CBO

ID	UC-BI03
Title	Usage of reports at the CBO
Goal	<p>Reports and dashboards can be designed by a Business Analyst in the BI solution. (Thales will also deliver the system with a set of pre-defined reports).</p> <p>The purpose of this use case is the use of the reports by a Business User : selection of the report, selection of parameters, display and possibly printing or export.</p> <p>The access to the reports is done through a web browser.</p>
Actors	Business user
Technical Scope	<ul style="list-style-type: none"> • CBO
Pre-condition(s)	<ul style="list-style-type: none"> • The Business User is allowed to use the reports (He is in possession of the correct credentials and has been granted access to BI portal)
Post-condition(s)	<ul style="list-style-type: none"> • The desired reports are displayed and possibly printed / exported.
Assumption(s)	<p>CBO Business Intelligence solution: QlikSense</p> <p>Note: Thales is proposing to deliver the BI solution with the following pre-defined reports</p> <ul style="list-style-type: none"> • Monthly sale summary. Summary of sales per operation type (CSC & MT). The displayed data include the amounts and quantities. • Daily sale summary. Same as monthly sale summary but for a given day. • Daily agent sale summary. Summary of sales per operation type (CSC & MT) for a selected agent and a given day. • Daily station sale summary. Summary of sales per operation type (CSC & MT) for a selected station and a given day. • Daily line sale summary. Summary of sales per operation type (CSC & MT) for a selected line and a given day. • Monthly traffic. Monthly traffic per validation type. The displayed data includes the number of validation per type. • Daily traffic. Same as monthly traffic but for a given day. • Daily traffic per hour. Distribution of the global traffic per hour on a given day (i.e. number of validations per hour) • Daily traffic per line and hour. Same as daily traffic per hour for a selected line. • Daily traffic per station and hour. Same as daily traffic per hour for a selected station.

Synoptic	
Main Success Scenario	<p>Nominal</p> <p>1- Display report</p> <ul style="list-style-type: none">• The Business User chooses the report, keys the required parameters (e.g. day, line).• The BI solution displays the report. <p>2 - Export and print</p> <p>The Business User can export and print the report</p>

3.4.3.4 UC-BI04 - Design of reports and dashboards at the CBO

ID	UC-BI04
Title	Design of reports and dashboards at the CBO
Goal	<p>This use case gives an overview of the activity of the Business Analyst using the Business Intelligence Platform.</p> <p>The proposed BI platform is an open solution allowing a Business Analyst to explore the data and design dashboards and reports. Contrary to legacy BI platforms, there is no hard coded aggregations limiting the possibilities for organizing and presenting the data. Therefore any data loaded into the BI can be used and combined (of course assuming it makes sense).</p> <p>The dashboards and reports can be saved and used by the Business Users..</p>
Actors	Business Analyst
Technical Scope	<ul style="list-style-type: none"> • CBO
Pre-condition(s)	<ul style="list-style-type: none"> • The Business Analyst is allowed to use the BI solution (He is in possession of the correct credentials and has been granted access)
Post-condition(s)	<ul style="list-style-type: none"> • The desired reports / dashboards have been published
Assumption(s)	CBO Business Intelligence solution: QlikSense
Synoptic	<p>The diagram illustrates the workflow for report and dashboard design. At the top, the 'Business Analyst' is shown interacting with a 'Web portal' icon. This interaction leads to two main steps: '1. Explore and design' and '2. Save'. A double-headed arrow connects the Web portal and the 'Explore and design' step. A single-headed arrow points from 'Explore and design' to 'Save'. Below these steps is a large downward-pointing arrow. To the right of the 'Explore and design' and 'Save' steps is a dashed box containing an icon of two computer monitors, representing the 'CBO' system.</p>

Main Success Scenario

Nominal

1- Explore and Design

- The Business Analyst explores the data, selects the data of interest, chooses the measures and values to display.
- He also designs the layout (graphs, tables).
- The drag and drop paradigm is used, especially for the selection of the data.
- It is assumed that the values used in the dashboards and reports will be amounts and/or counts (operations, events, ..)

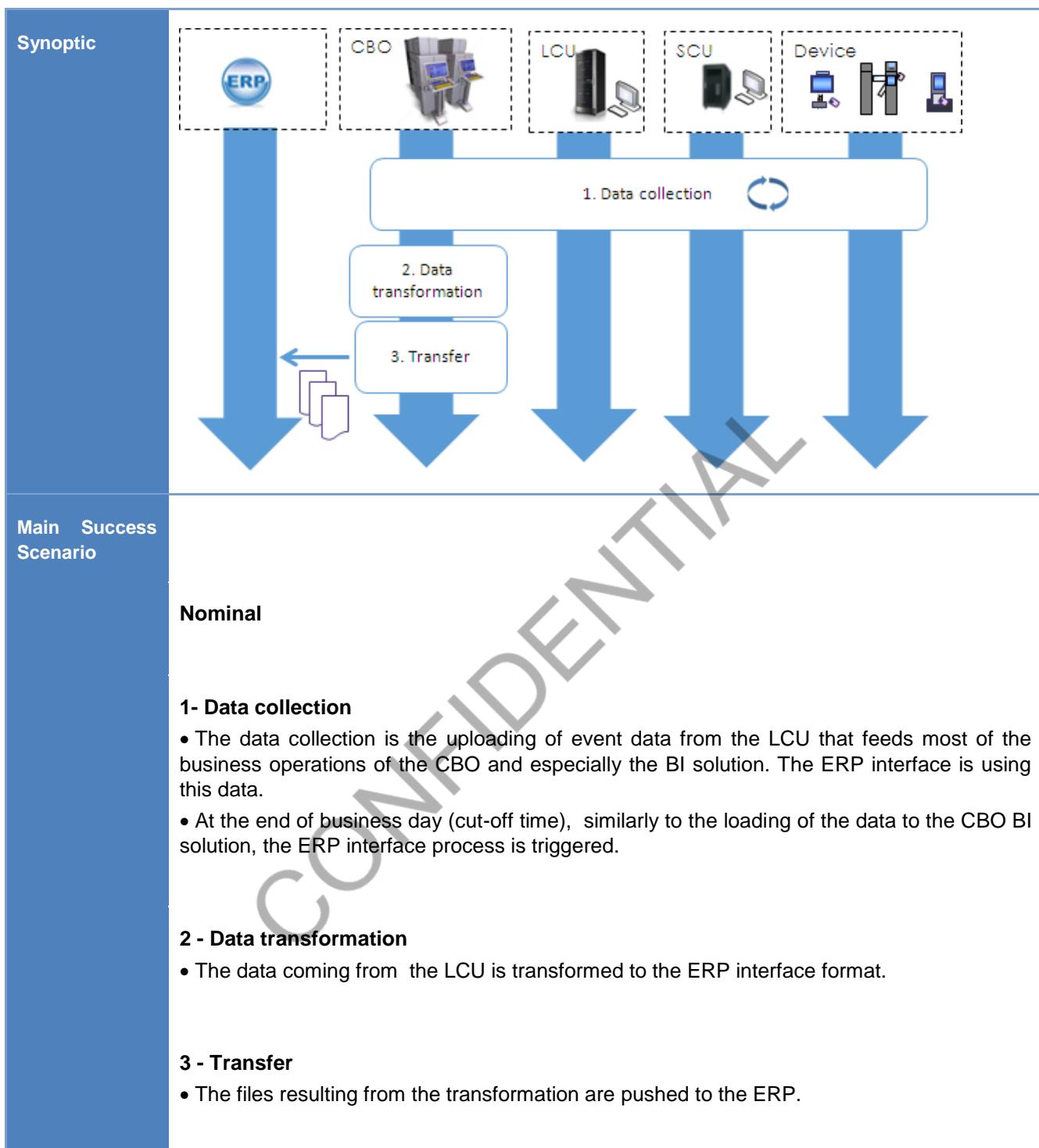
3 - Save

The Business Analyst saves the report/dashboard so that the Business Users will use them.

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3.4.3.5 UC-BI05 - ERP interface management at the CBO

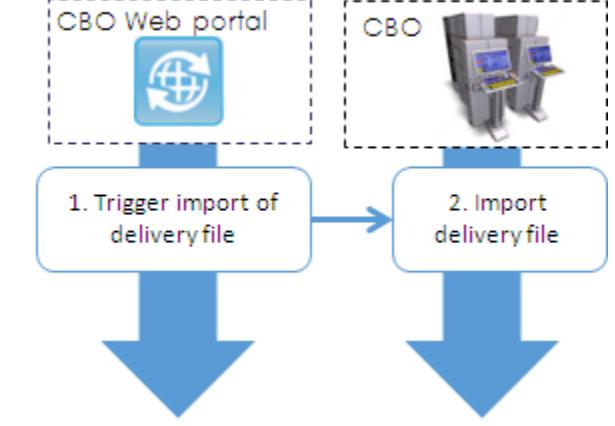
ID	UC-BI05
Title	ERP interface management at the CBO
Goal	<p>The CBO is interfaced with an external ERP in order to forward finance, stock, maintenance and human resources data.</p> <p>This is an automatic process that occurs every day at the cut-off time (i.e. end of business day).</p>
Actors	NA
Technical Scope	• CBO
Pre-condition(s)	NA
Post-condition(s)	• The daily transfer to the ERP has been performed.
Assumption(s)	<p>The ERP is assumed to include several modules : finance, asset management, maintenance and human resources. Therefore AFC business data that are useful for these modules are transferred.</p> <p>The interface is based on files. In order to avoid an excessive coupling between the systems, the CBO does not access directly the ERP databases.</p> <p>The file format (XML files) will be proposed by Thales during the detailed specification phase.</p> <p>The exchanges are from the CBO to the ERP. The assumption is that there is no transfer from the ERP to the CBO.</p> <p>The business data comes from the event files collected from the front-end devices and include:</p> <ul style="list-style-type: none"> • Finance data : accounting operations, validation events, penalties • Stock data : stock updates • Maintenance data : alarms • Human resource data : shift events



3.4.4 MEDIA MANAGEMENT

3.4.4.1 UC-MM01 - Reception of a batch of CSCs from the CIS at the CBO

ID	UC-MM01
Title	Reception of a batch of CSCs from the CIS at the CBO
Goal	<p>When new CSC media are required, they are prepared at the Card Initialization System (CIS). When the delivery is received, it is accompanied by a delivery file that contains the details of media that were produced. This file is imported in the CBO system in order to identify individually each media.</p> <p>This use case focuses on the management of the delivery file and the initialization of the media in the CBO database. The management of the physical stocks of media is addressed in the following sections.</p>
Actors	<ul style="list-style-type: none"> • Data management officer
Technical Scope	<ul style="list-style-type: none"> • CBO
Pre-condition(s)	<ul style="list-style-type: none"> • A card delivery file is received • The data management officer is logged on the CBO and is granted appropriate access rights
Post-condition(s)	<ul style="list-style-type: none"> • Card received are registered in the system
Assumption(s)	<p>CIS The existing CIS is used. The interface structure is assumed to be the existing one.</p> <p>CSC Content Received CSC are anonymous and not pre-loaded with any product, T-purse amount or personalization data.</p>

Synoptic	<p><i>Data management officer</i></p>  <pre> graph TD A[CBO Web portal] --> B[Trigger import of delivery file] B --> C[Import delivery file] C --> D[CBO] </pre>
Main Success Scenario	<p>Nominal</p> <p>1- Trigger import of delivery file The data management officer launches the importation of the delivery file from CBO portal; he selects the file to be imported and validates.</p> <p>2- Import delivery files The CBO imports the file and fills in the Media Management database with each card listed in the file. At the end of the import, a status is displayed indicating the number of cards that were created.</p>
Alternatives	<p>2a - Wrong file structure The file structure is not correct. The import is aborted and an error message is displayed to the operator.</p> <p>2b - CSC already declared in database If the file contains a CSC already declared in the database, the whole file content is discarded.</p>

3.4.4.2 UC-MM02 - Checking of the CSC status at the CBO

ID	UC-MM02
Title	Checking of the CSC status at the CBO
Goal	The data management officer analyzes a potential problem with a card; he consults the card information.
Actors	<ul style="list-style-type: none"> • Data management officer
Technical Scope	<ul style="list-style-type: none"> • CBO
Pre-condition(s)	<ul style="list-style-type: none"> • The data management officer is logged on the CBO and is granted appropriate access rights
Post-condition(s)	<ul style="list-style-type: none"> • The data management officer was provided access to the CSC information.
Assumption(s)	
Synoptic	<pre> graph TD subgraph "Data management officer" direction TB A[CBO Web portal] A --> B[1. Search CSC] A --> C[2. Consult CSC information] end B --> D[Card database] C --> E[Card information] D --> E </pre> <p>The diagram illustrates the workflow. At the top left, a dashed box labeled 'Data management officer' contains a 'CBO Web portal' icon. Two arrows point downwards from this box to two sequential steps: '1. Search CSC' and '2. Consult CSC information'. From each of these steps, an arrow points to a central vertical column. This column contains two boxes: 'Card database' at the top and 'Card information' at the bottom. Finally, an arrow connects the 'Card database' box to the 'Card information' box.</p>
Main Success Scenario	<p>Nominal</p> <p>1 - Search CSC</p> <ul style="list-style-type: none"> • The data management officer keys the CSC graphical number and launches the search.

2 - Consult CSC information

The data management officer accesses following information:

- Card state
- T-purse information
- Product information
- Transaction history

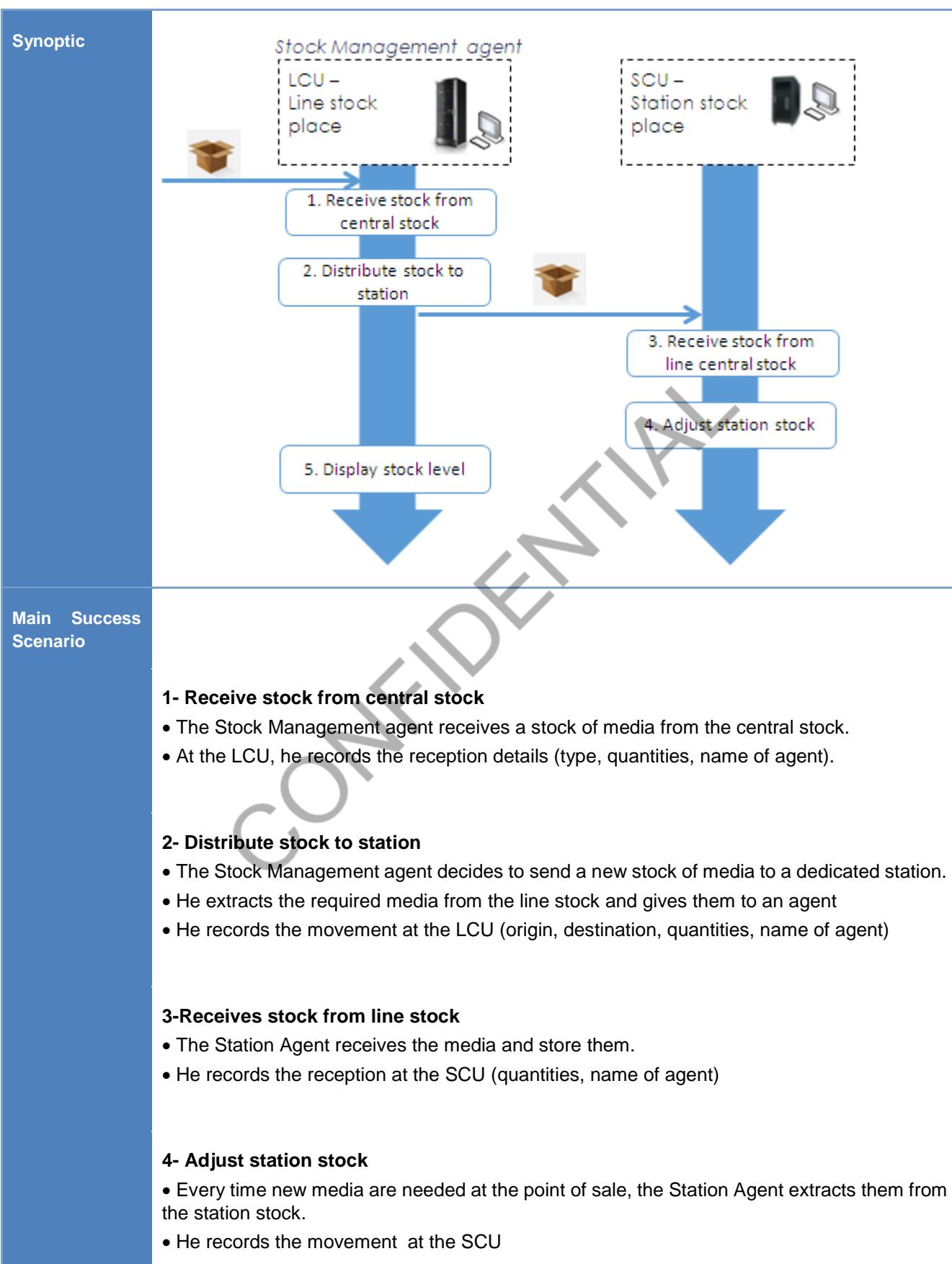
Alternatives

1a – CSC not found

If CSC is not found in database, the result table is empty.

3.4.4.3 UC-MM03 - Distribution of media stocks [THALES]

ID	UC-MM03
Title	Distribution of media stocks
Goal	<p>The media (CSC, MT) have to be distributed from central storage areas to the stations in order to be sold. This distribution process has to be managed in order to control the movements of the stocks between the different locations.</p> <p>Thales proposal is to use for this purpose the stock distribution solution included in Thales LCU/SCU (but not yet used at present on line 3).</p> <p>Note that this use case relies on Thales LCU functionalities and is there is no assumption that it will be provided by 3rd party vendors.</p> <p>There are central stocks, line stocks and station stocks.</p> <p>The proposed solution is configurable in term of nature of stocks : CSC-A, CSC-P, MT paper, MT composite.</p> <p>The proposed solution manages the line and station stocks as well as the reception from the central stock.</p> <p>This use case gives an overview of the proposed distribution process</p>
Actors	<ul style="list-style-type: none"> Stock Management agent Station agent
Technical Scope	<ul style="list-style-type: none"> Thales LCU, SCU
Pre-condition(s)	NA
Post-condition(s)	<ul style="list-style-type: none"> The stocks are distributed to the stations.
Assumption(s)	The MT stock management used for the "old" TOMs with station number printed on the tickets will not be anymore in use on the new system.



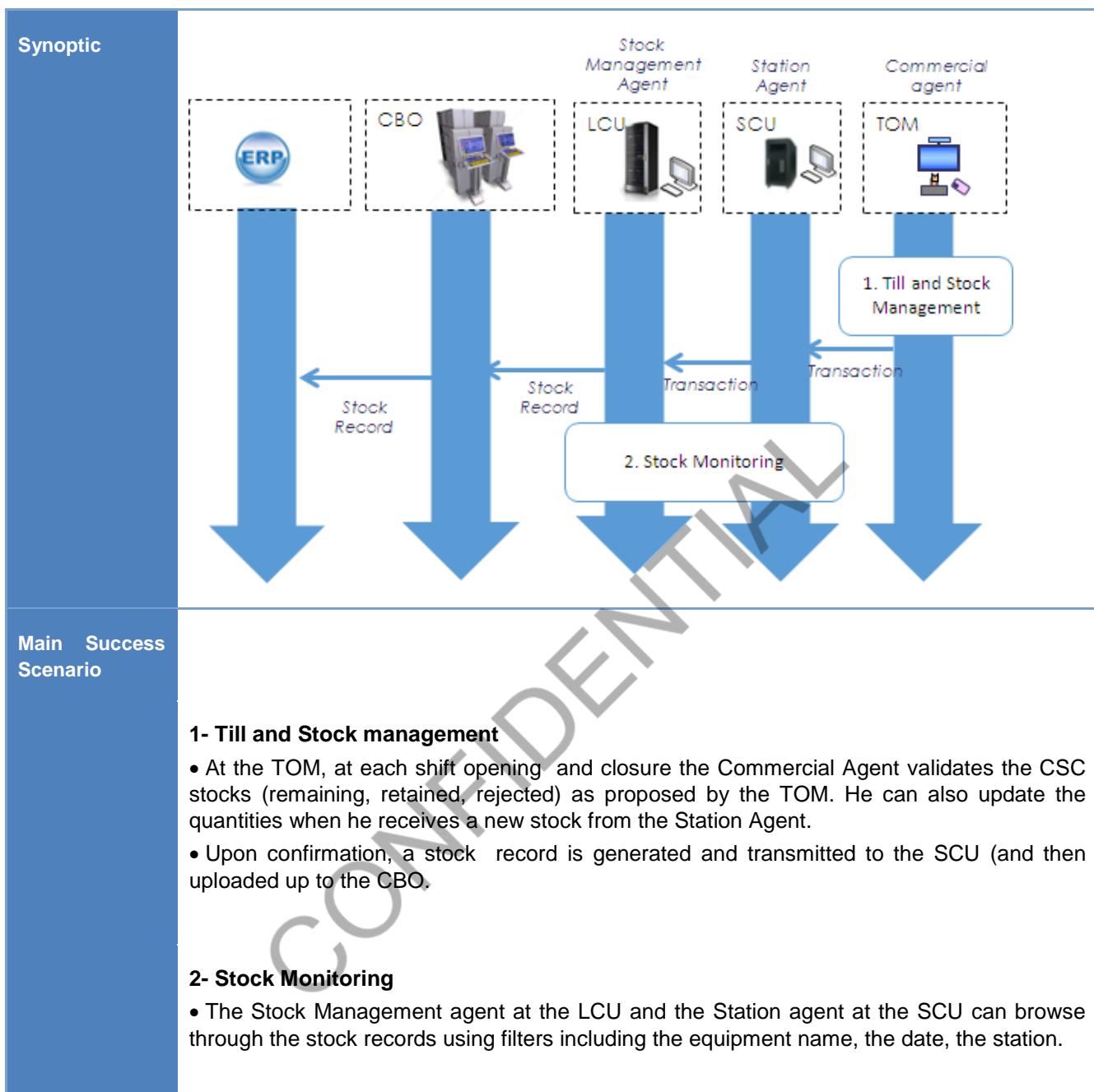
5- Display stock level

- The Stock management agent checks the stocks at the LCU: level of line and station stocks
- He can decide to re-order media or re-distribute to a station

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3.4.4.4 UC-MM04 - Monitoring of the point of sale stocks [THALES partially]

ID	UC-MM04
Title	Monitoring of the point of sale stocks
Goal	<p>At the TOM, at every start/end of Commercial Agent shift and also in case of reception of new CSCs, the stock details are updated/validated by the agent. This record is uploaded to the SCU and then to the LCU and CBO.</p> <p>Thanks to this, the stocks at the point of sale can be checked at station and line level. In addition the stock records are uploaded to the CBO and forwarded to the ERP (refer to UC-BI-05).</p> <p>This mechanism is included in the existing system and remains unchanged. The management of the stocks at the SCU/LCU does not cover the 3rd party TOMs..</p> <p>Note that if the monitoring of stocks at LCU/SCU is Thales specific, the upload of the stock records and their forwarding to the ERP is applicable to any vendor.</p>
Actors	<ul style="list-style-type: none"> • Stock Management Agent • Station Agent
Technical Scope	<ul style="list-style-type: none"> • CBO • Thales LCU/SCU • TOM
Pre-condition(s)	NA
Post-condition(s)	<ul style="list-style-type: none"> • Stock records are uploaded from the TOM and correctly checked and processed.
Assumption(s)	

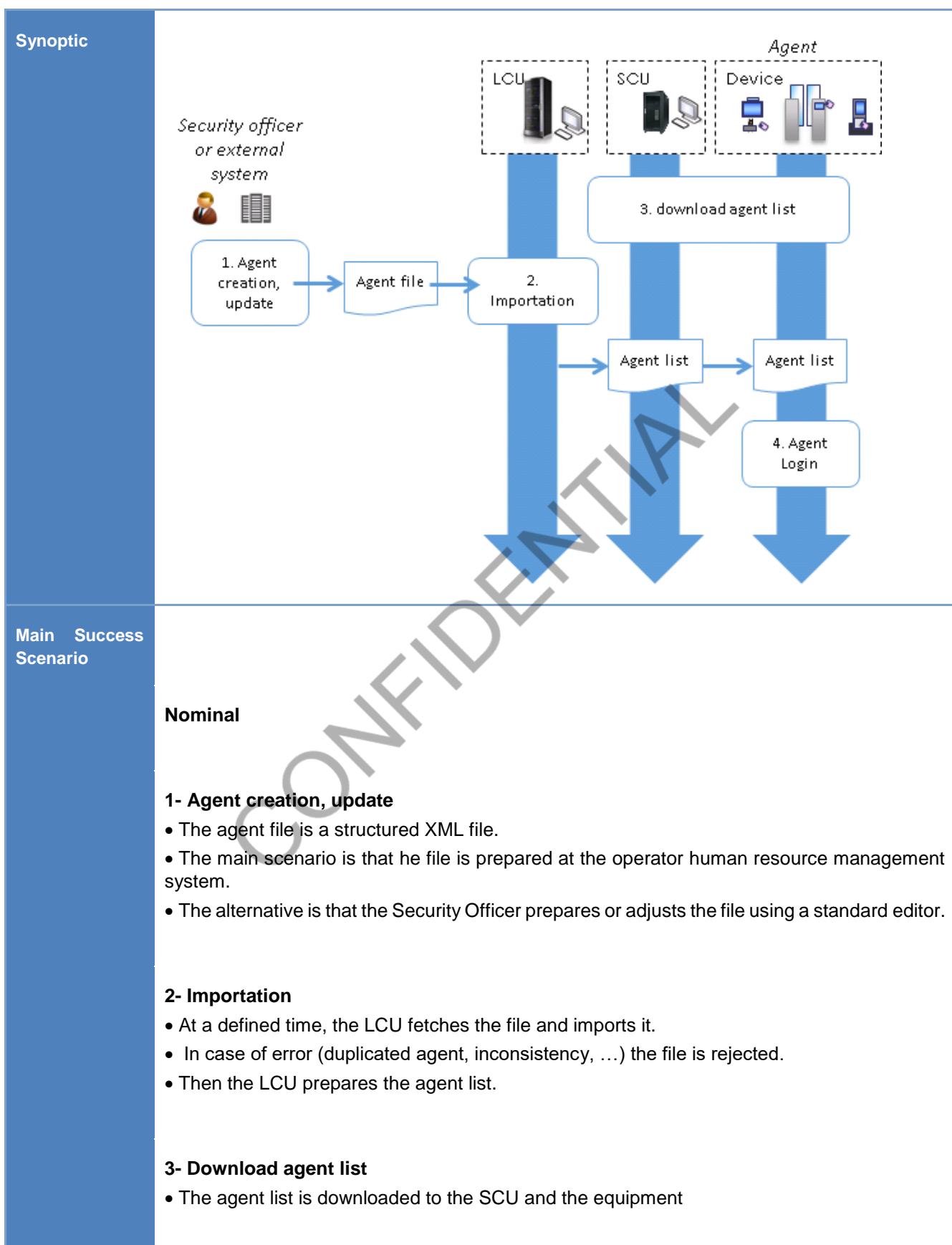


3.5 SYSTEM ADMINISTRATION

3.5.1 STAFF MANAGEMENT

3.5.1.1 UC-SM01 - Management of front-office agents [THALES]

ID	UC-SM01
Title	Management of front-office agents
Goal	<p>The front-office agents are managed at LCU level in order to make the operation of each line independent from the other ones.</p> <p>The agents can be imported from an external system where they could be already recorded (typically the operator human resource management system)</p>
Actors	<ul style="list-style-type: none"> • Security officer • Front office agent
Technical Scope	<ul style="list-style-type: none"> • LCU / SCU / Front end devices
Pre-condition(s)	<ul style="list-style-type: none"> • The security officer is able to prepare the agent file or the agent file is available at an external system.
Post-condition(s)	<ul style="list-style-type: none"> • Agent can log on front end device
Assumption(s)	None.

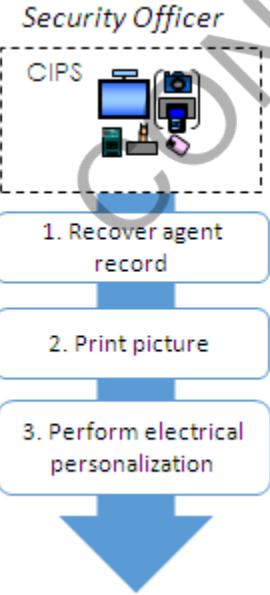


4- Agent login

- The agent logs on the front end device.
- The agent is granted access to functions corresponding to his profile.

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3.5.1.2 UC-SM02 - Creation of a front-office agent card at the CIPS

ID	UC-SM02
Title	Creation of a front-office agent card at the CIPS
Goal	<p>The security officer creates an agent card.</p> <p>The objective is that the process for issuing an agent card will not change from the security officer perspective compared to the existing solution. The objective is also that no change will be required on the existing CIPSs.</p>
Actors	<ul style="list-style-type: none"> Security officer
Technical Scope	<ul style="list-style-type: none"> CIPS
Pre-condition(s)	<ul style="list-style-type: none"> The shift is open on the CIPS The agent is already recorded and the agent list has been downloaded on the device.
Post-condition(s)	<ul style="list-style-type: none"> Agent can log on front end device with his agent card
Assumption(s)	-
Synoptic	<p><i>Security Officer</i></p>  <pre> graph TD CIPS[CIPS] --> Step1[1. Recover agent record] Step1 --> Step2[2. Print picture] Step2 --> Step3[3. Perform electrical personalization] Step3 --> Arrow(()) </pre>
Main Success Scenario	Nominal

1- Recover agent information

- The security officer keys in the agent ID and launch the search
- The CIPS searches for the AgentID into the local agent file.
- Agent information is displayed

2- Print picture

- The security officer takes a picture of the agent and print it on a new anonymous card.

3- Perform electrical personalization

- The Security officer puts the card on the reader and electrical personalization is performed using the agent record information.

3.5.1.3 UC-SM03 (Removed)

3.5.1.4 UC-SM04 - Management CBO agent access rights

ID	UC-SM04
Title	Management CBO agent access rights
Goal	The security officer manages the access right of operators that will connect to the CBO portal.
Actors	<ul style="list-style-type: none"> • security officer
Technical Scope	<ul style="list-style-type: none"> • CBO (Staff Management)
Pre-condition(s)	<ul style="list-style-type: none"> • Security office is logged on the CBO and is granted adequate access rights. • Security officer is granted adequate access rights on the LDAP.
Post-condition(s)	<ul style="list-style-type: none"> • The security officer modified access rights of CBO agent.
Assumption(s)	<p>Declaration of users</p> <p>Users are declared and associated to user groups in LDAP directory.</p> <p>Corresponding user groups are created in CBO in order to specify the access rights associated to the groups. The correspondence relies on the naming of the group.</p>
Synoptic	<pre> graph TD SO1[Security officer] --> L1[LDAP] SO2[Security officer] --> C1[CBO Web portal] CBO[CBO] --> CG[CBO User groups] CU[CBO user] --> CP[CBO Web portal] L1 --> UG1[1. Declare the users] UG1 --> UG2[2. Declare LDAP groups and associate them to the users] UG2 --> LUG[LDAP users and groups] C1 --> DUG[3. Define user group access] DUG --> CG CG --> LUG CU --> LUG CU --> CP CP --> LUG </pre> <p>The diagram illustrates the process flow for managing CBO agent access rights. It starts with two parallel steps: '1. Declare the users' (from LDAP) and '3. Define user group access' (from CBO Web portal). Both lead to a central step 'LDAP users and groups'. Finally, '4. Login' leads to the 'CBO User groups' and the 'CBO Web portal'.</p>

Main Success Scenario

Nominal

1- Declare the users

- The security officer declares the users in LDAP as well as their password.

2- Declare LDAP groups and associate them to the users

- The security officer declare some user groups in LDAP and associates the users to these groups.

3- Define user group access

- In CBO, the security officer creates the corresponding groups with same names than LDAP groups. For each group, the security officer defines the functions that are accessed by the group.

4- Login

- The CBO user logs on CBO portal. He is provided access to the functions that are authorized by at least one group he is a member of.

3.5.1.5 UC-SM05 - Management of LCU/SCU agent access rights [THALES]

ID	UC-SM05
Title	Management of LCU/SCU agent access rights
Goal	<p>The administration of the user rights at Thales LCU and SCU remains unchanged compared to the existing L3 solution.</p> <p>The configuration of the user rights is done at the LCU and the resulting configuration is automatically replicated to the associated SCUs.</p> <p>The available functionalities include the configuration of users, user groups and the mapping the users groups to the LCU/SCU functions (i.e. which function is available for a given user group).</p>

	<p>Note that administration of the user rights at the CBO remains separated from the administration of the user rights at the LCU/SCU</p> <p>Note that this use cas is specific to Thales LCU.</p> <p>This use case gives a general overview of the LCU/SCU user administration process.</p>
Actors	<ul style="list-style-type: none"> • Security Officer • LCU/SCU agent.
Technical Scope	<ul style="list-style-type: none"> • Thales LCU, SCU
Pre-condition(s)	<ul style="list-style-type: none"> • The Security Officer is using the LCU in administrator mode.
Post-condition(s)	<ul style="list-style-type: none"> • The Security Officer has updated the LCU/SCU user right configuration
Assumption(s)	NA
Synoptic	<p>The diagram illustrates the user administration process. It shows two main components: the LCU (Left) and the SCU (Right), each enclosed in a dashed box. A central vertical blue bar represents the 'Update transmission'. The process is divided into three main stages:</p> <ol style="list-style-type: none"> 1. The Security Officer administers the LCU/SCU user rights: This stage is shown on the left, with a dashed arrow indicating the transmission of updates from the Security Officer's side to the central update channel. 2. Agent logs on based on the new configuration: This stage is shown on both the LCU and SCU sides, with solid arrows indicating the agents logging on based on the updated configuration received via the central channel.
Main Success Scenario	<p>Nominal</p>

1- The Security Officer administrates the LCU/SCU user rights

- The Security Officer is logged on the LCU with administrator rights.
- He goes to the LCU user administration page and does some updates (e.g. addition of new user)
- When the update is validated it is recorded in the LCU database and also transmitted to all SCU for update.

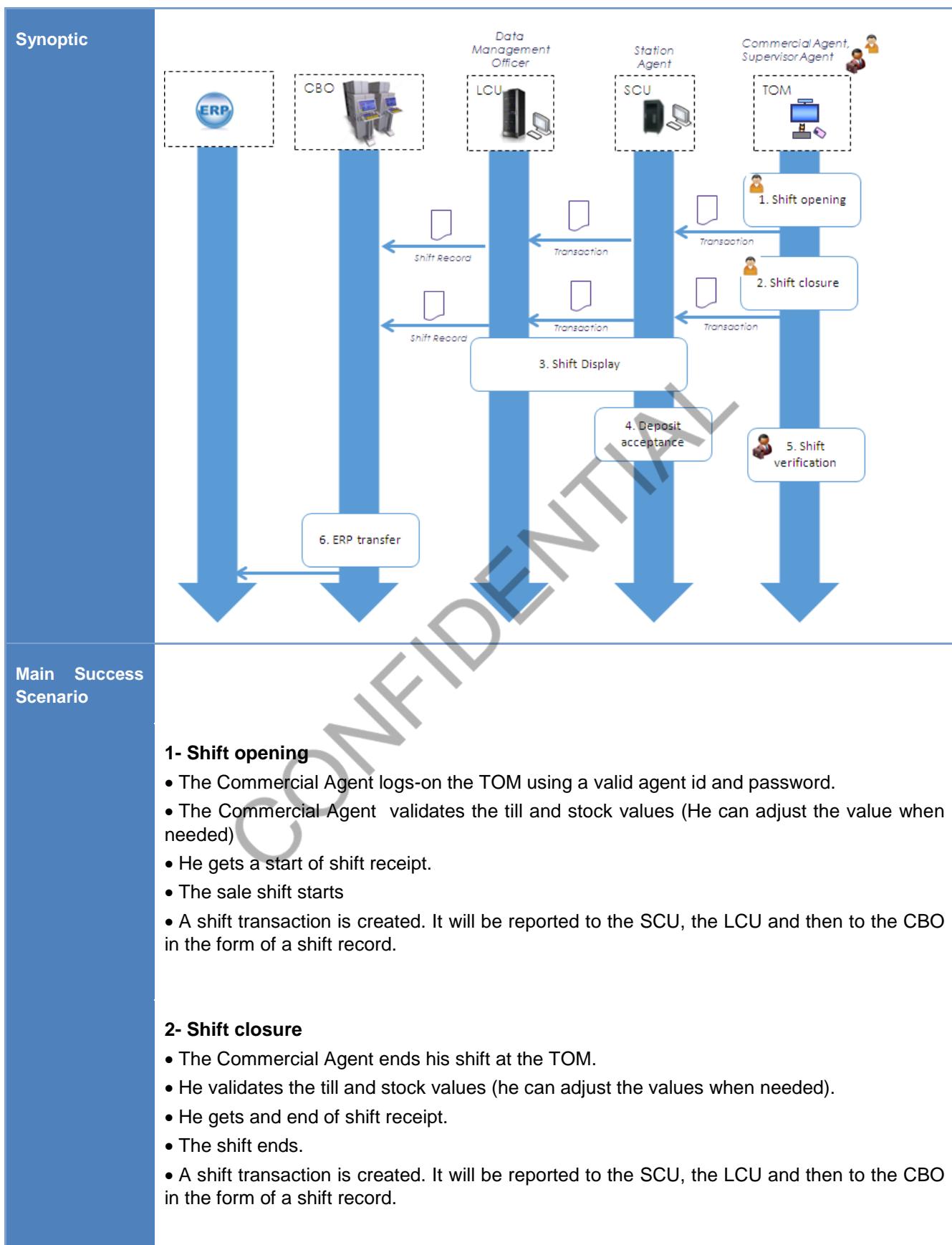
2- Agent logs on based on the new configuration

- A the LCU or any SCU of the line an agent logs on and the new user right configuration is applied (e.g. a new agent can log-on)

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3.5.1.6 UC-SM06 - Start and end of shift at the TOM [THALES partially]

ID	UC-SM06
Title	Start and end of shift at the TOM
Goal	<p>The opening and closure of a shift by Commercial Agent is the subject of a dedicated process including the log-on and log-out of the agent, the generation of start and shift transactions and verification procedures at the TOM, and the LCU/SCU.</p> <p>Note that till and stock management included in the shift management participates also in the stock monitoring process (see use case MM04). This use case focuses on the shift management.</p> <p>The shift management will remain unchanged compared to the existing situation on line 3. A brief reminder of it is proposed hereafter.</p> <p>Note that if the management of the shifts at LCU/SCU is Thales specific, the uploading of the shift records to the CBO and then to the ERP is applicable to any vendor.</p>
Actors	<ul style="list-style-type: none"> • Commercial Agent • Supervisor Agent • SCU Agent • Data Management Officer
Technical Scope	<ul style="list-style-type: none"> • Thales TOM • Thales SCU • Thales LCU • CBO
Pre-condition(s)	NA
Post-condition(s)	<ul style="list-style-type: none"> • The shift starts and ends correctly • The deposit is accepted
Assumption(s)	-



3- Shift display

- The Data Management Agent at the LCU and the SCU Agent can check shift details. This includes the search of the shift with various criteria, the display of the general data and the details.

4- Deposit Acceptance

- The LCU/SCU provides an automatic reconciliation between the till values (especially the cash) and the fare transactions generated during the shift. The gaps are highlighted.
- The SCU Agent is in charge of validating the till (i.e. deposit acceptance). This is done at the SCU.

5- Shift verification

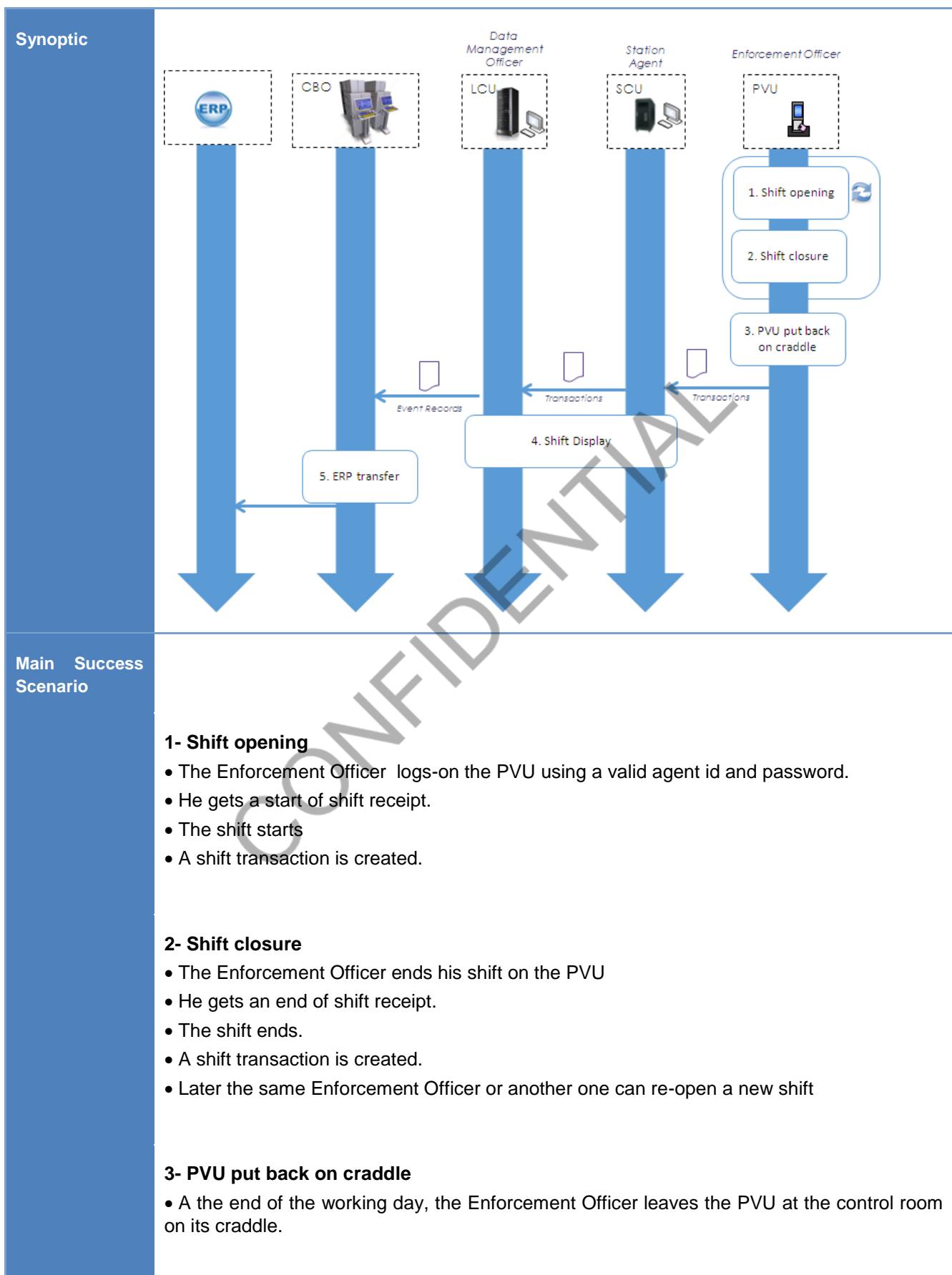
- When needed, the Supervisor Agent can go to any TOM and check the details of the last shifts. This may be needed in case of discrepancies detected in the deposit.

6- ERP transfer

- At the end of the day, the CBO reports the shift events to the ERP (refer to UC-BI-05). The shift events are dedicated to human resource management. They contain the identity of the agent and the start and end of shift. But there is no stock or till data.

3.5.1.7 UC-SM07- Start and end of shift at the PVU [THALES partially]

ID	UC-SM07
Title	Start and end of shift at the PVU
Goal	<p>The Enforcement Officer will have to open and close a shift when using the PVU.</p> <p>The log-on process is very similar to the one used at the TOM. However the shift management differs on the following points: (a) there is no till and stock management and (b) the shift opening and closure occur during the day to day activity of a roving enforcement officer when the PVU is not connected to the SCU</p> <p>This use case gives an overview of the shift management at the PVU.</p> <p>Note that if the management of the shifts at LCU/SCU is Thales specific, the uploading of the shift records to the CBO and then to the ERP is applicable to any vendor.</p>
Actors	<ul style="list-style-type: none"> • Enforcement Officer • Station Agent • Data Management Officer
Technical Scope	<ul style="list-style-type: none"> • Thales PVU • Thales SCU • Thales LCU • CBO
Pre-condition(s)	The Enforcement Officer has taken the PVU from its cradle. He is ready to start his shift.
Post-condition(s)	<ul style="list-style-type: none"> • The shift starts and ends correctly • The shift data is reported to the SCU, LCU, CBO, ERP
Assumption(s)	The PVU are stored at control rooms located in certain stations. They are managed by the SCU associated with this station.



4- Shift display

- The Data Management Agent at the LCU and the SCU Agent can check shift details. This include the search of the shift with various criteria, the display of the general data and the details.

5- ERP transfer

- At the end of the day, the CBO reports the shift events to the ERP (refer to UC-BI-05).. The shift events are dedicated to human resource management. They contain the identity of the agent and the start and end of shift. But there is no stock or till data.

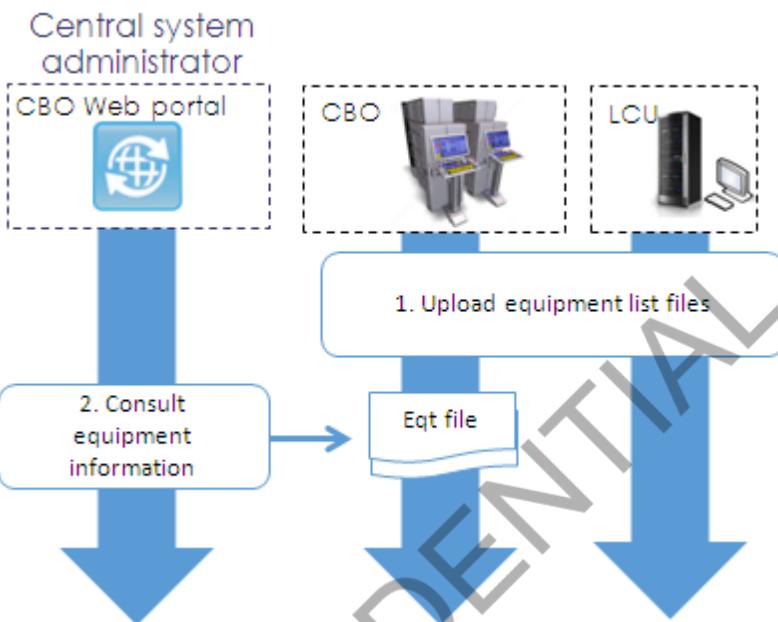
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3.5.2 EQUIPMENT MANAGEMENT

Note. As per the Unified Interface, the equipment pieces are configured at LCU level and uploaded to the CBO. This is addressed in the following use cases. Details in LCU uses cases are restricted to Thales as it may be that other vendors deliver a different implementation nevertheless compliant with the Unified Interface.

3.5.2.1 UC-EM01 - Check of the equipment list at the CBO

ID	UC-EM01
Title	Check of the equipment list at the CBO
Goal	The equipment list are collected from the LCU and the central system administrator consults the equipment information.
Actors	<ul style="list-style-type: none"> • Central system administrator
Technical Scope	<ul style="list-style-type: none"> • CBO • LCU
Pre-condition(s)	<ul style="list-style-type: none"> • Devices are declared at LCU level • The central system administrator is logged on the CBO and is granted appropriate access rights
Post-condition(s)	<ul style="list-style-type: none"> • The central system administrator was provided access to equipment information
Assumption(s)	<p>Background</p> <p>The addition and configuration of AFC equipment in existing or new stations, is managed at the lower level (system level 3-1) under the responsibility of the vendor. This is addressed in use case UC-EM02. This configuration includes especially the identification and the location of the equipment. This identification is used in the data issued by the equipment and especially the transactions.</p> <p>The configuration of the equipment from all subsystems is centralized at the CBO for inventory. This is the purpose of the present use case.</p> <p>Equipment list file upload</p> <p>The LCU are responsible for uploading the equipment configuration to the CBO. The file is uploaded by LCU once a day. The Equipment list file contains the full list of devices for the line (not a delta with previous file).</p>

	Equipment management MMI
Synoptic	 <pre> graph TD A[Central system administrator] --- B[CBO Web portal] B --> C[CBO] B --> D[LCU] C --> E[1. Upload equipment list files] E --> F[Eqt file] F --> G[2. Consult equipment information] </pre>
Main Success Scenario	<p>1- Upload equipment list files</p> <p>When a new file is discovered, CBO processes it :</p> <ul style="list-style-type: none"> • new equipments are created • existing equipments are updated if information is modified • if an equipment of the line is no more present in the imported file, CBO tags the element as "deleted". • At the end of processing, CBO removes the imported file from the folder and saves it in CBO archive directory. <p>2- Consult equipment information</p> <p>The equipment information is displayed in a table:</p> <ul style="list-style-type: none"> • LCU (LINE ID) • StationID • Device type (TOM or Gate) • SerialNumber • Hall • Ordinal

- Name

The table provides filtering and sorting possibility.

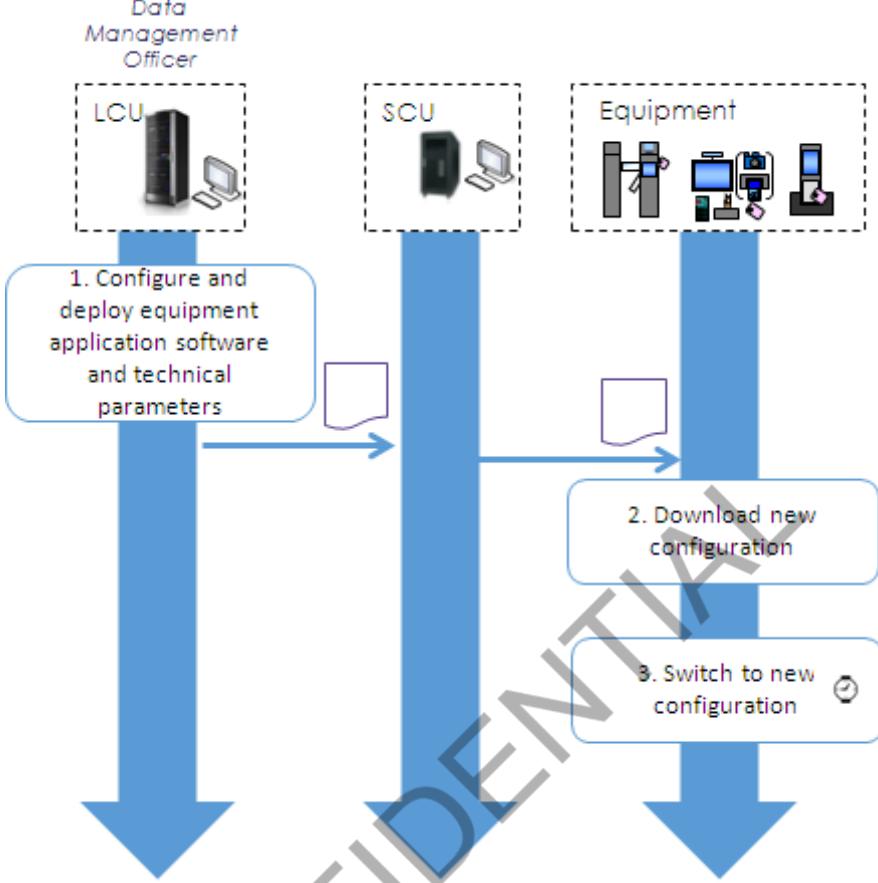
3.5.2.2 UC-EM02 - Management of the equipment at the LCU/SCU [THALES partially]

ID	UC-EM02
Title	Management of the equipment at the LCU/SCU
Goal	<p>The equipment located in the stations have to be managed in the system. This management includes the configuration, check, update and possibly removal.</p> <p>This functionality is available at the LCU/SCU on line 3 and it will remain unchanged for line 1 and 2.</p> <p>This solution allows the management of the equipment per line: SCU and associated TOM and Gates. The PVU will be added within the context of the project but their management will be similar to the one of the TOM and gates.</p> <p>Note that if the management of the equipment at LCU/SCU is Thales specific, the uploading of the equipment configuration to the CBO is applicable to any vendor.</p> <p>As a reminder, the proposed functionalities are the following:</p> <ul style="list-style-type: none"> • Display of the equipment : tree view and search capability. • Configuration of SCU, sites and equipment: identifier , type, IP address, location, ... • Association of equipment to PKI-SAM (security module used on Thales equipment). <p>The management of the equipment has to be done locally and the functionalities are therefore available at the LCU and SCU. However the equipment configuration is reported to the CBO as detailed in use case EM01.</p> <p>The description hereafter gives an overview of the equipment management process.</p>
Actors	<ul style="list-style-type: none"> • Data Management Officer • Station Agent • Maintenance Agent
Technical Scope	<ul style="list-style-type: none"> • CBO • Thales SCU, LCU, TOM, Gate, PVU
Pre-condition(s)	<ul style="list-style-type: none"> • The Data Management Officer and the Station Agent have the adequate credentials for using the equipment management function at the LCU/SCU

Post-condition(s)	<ul style="list-style-type: none"> The equipment configuration is updated.
Assumption(s)	
Synoptic	<pre> graph TD CBO[CBO] --> EM[1. Equipment Management] LCU[LCU] --> EM SCU[SCU] --> EIM[2. Equipment Installation / Maintenance] Equipment[Equipment] --> EIM Eqf_file[Eqf file] <--> EM </pre>
Main Success Scenario	<p>1- Equipment Management</p> <ul style="list-style-type: none"> At the LCU the Data Management Officer displays the equipment list and adds or updates an equipment (TOM, Gate, PVU) The same action can be performed by the Station Agent at the SCU. The changes, once validated will be reported to the CBO. <p>2- Equipment Installation / Maintenance</p> <ul style="list-style-type: none"> Once the configuration has been updated (e.g. addition of new equipment), the Maintenance Agent can put the equipment in service (i.e. the equipment will connect to the SCU and be managed correctly).

3.5.2.3 UC-EM03 - Management the equipment technical parameters and application software at the LCU [THALES]

ID	UC-EM03
Title	Management the equipment technical parameters and application software at the LCU
Goal	<p>The equipment application software and the technical parameters (e.g. thresholds, configuration files) can be updated remotely.</p> <p>The existing line 3 system provides this service via the EOD management. The equipment parameters and application software can be configured and downloaded. The EOD workflow allows the management of versions and also the scheduling of the application of the changes.</p> <p>The proposal is that this process will remain unchanged for line 1 and 2. Especially, the configuration will be managed separately since the software versions distribution schedule will differ between the lines (e.g. line 3 uses different equipment versions).</p> <p>Note also that the application software and technical parameters as well as the installation procedures are vendor specific and therefore a global management including the 3rd party equipment is not feasible.</p> <p>This use case is a general reminder of the existing process.</p> <p>Note that this use case is Thales specific. It is up to any vendor to manage the technical parameters required by their equipment at the LCU/SCU.</p>
Actors	<ul style="list-style-type: none"> • Data Management Officer
Technical Scope	<ul style="list-style-type: none"> • Thales SCU, LCU, TOM, Gate, PVU
Pre-condition(s)	<ul style="list-style-type: none"> • The Data Management Officer has the adequate credentials
Post-condition(s)	<ul style="list-style-type: none"> • The equipment application software and parameters are correctly deployed
Assumption(s)	

Synoptic	 <pre> graph TD subgraph "Data Management Officer" LCU[LCU] SCU[SCU] end subgraph Equipment E1[Equipment] end LCU --> Step1[1. Configure and deploy equipment application software and technical parameters] SCU --> Step1 Step1 --> Step2[2. Download new configuration] Step2 --> Step3[3. Switch to new configuration] Step3 --> Equipment </pre>
Main Success Scenario	<p>1- Configure and deploy equipment application software and technical parameters</p> <ul style="list-style-type: none"> The Data Management Officer has received new software releases for the equipment or he wants to adjust technical parameters. Using the LCU EOD management, he creates new containers in which he includes the new software releases or the adjusted parameters. He then validates the container and schedules the distribution (date of application and possibly a selection of sites). The files are generated and transferred to the SCUs. <p>2- Download new configuration</p> <ul style="list-style-type: none"> The equipment downloads the new files from the SCU <p>3- Switch to new configuration</p> <ul style="list-style-type: none"> When the activation time comes (possibly immediately after download), the new application software and technical parameters are put into service at the equipment.

3.5.2.4 UC-EM04 - Equipment Revocation [THALES]

ID	UC-EM04
Title	Revocation of an equipment.
Goal	<p>The purpose is the revocation of an equipment (case of stolen, faulty equipment). This consists in revoking the equipment PKI-SAM certificate. This is specific to Thales security implementation.</p> <p>The purpose of the revocation is that the equipment cannot be anymore connected to the system.</p>
Actors	<ul style="list-style-type: none"> • Security Officer, LCU agent
Technical Scope	<ul style="list-style-type: none"> • Thales CA, LCU, SCU, TOM, Gate, PVU
Pre-condition(s)	None
Post-condition(s)	<ul style="list-style-type: none"> • The equipment is revoked, cannot be connected anymore and goes out of service.
Assumption(s)	
Synoptic	<pre> graph TD SO[Security Officer] --> ThalesCA[Thales CA] ThalesCA -- "1. The Security Officer revokes a PKI-SAM" --> CRL1[CRL] CRL1 --> LCU[LCU] LCU -- "2. The LCU agent imports the CRL" --> CRL2[CRL] CRL2 --> SCU[SCU] CRL2 --> Equipment[Equipment] SCU -- "3. Equipment authentication is refused" --> Refused[Refused] Equipment -- "3. Equipment authentication is refused" --> Refused </pre>

Main Success Scenario

1- The security officer revokes a PKI-SAM

- An equipment has been stolen or is signalled as faulty.
- The security officer revokes the PKI-SAM certificate at Thales Certificate Authority.

2 -The LCU agent imports the CRL

- At the LCU, the LCU agent imports the CRL (this is together with the device list).
- The CRL is downloaded to the SCUs.

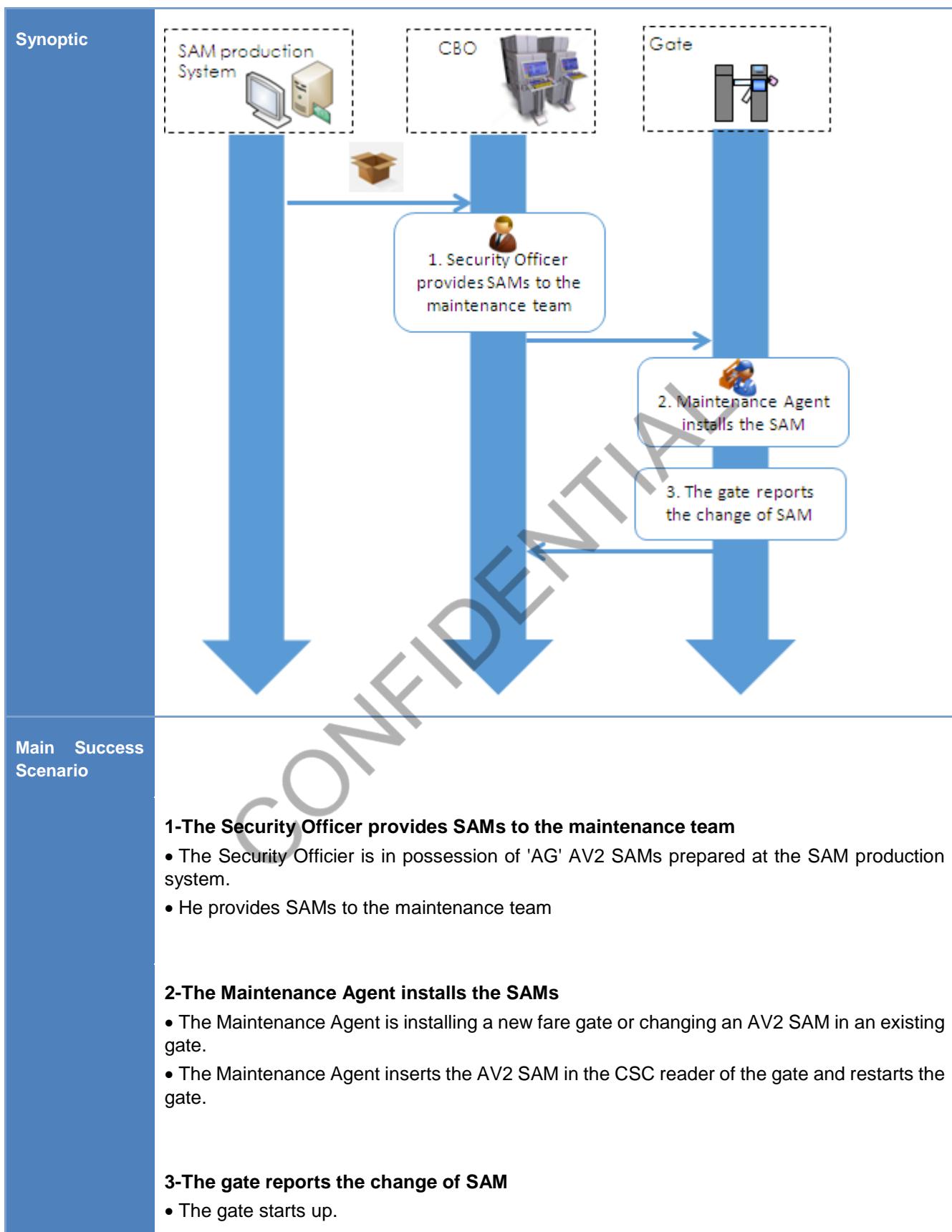
3- Equipment authentication is refused

- When the revoked equipment tries to connect to the SCU, the authentication is refused. The equipment cannot be connected.
- After a certain time (equipment parameter based on time and/or number of transactions), the equipment will go out of service.

3.5.3 SECURITY

3.5.3.1 UC-SE01 - Installation of AV2 SAMs - Fare gate case

ID	UC-SE01
Title	Installation of AV2 SAMs - Fare gate case
Goal	<p>The AV2 SAMs are used for managing the security of the CSCs. They are initialized (key loading) at the SAM Production System and delivered to the Security Officer.</p> <p>There are different sets of ticketing keys : validation (T.V), sale (T.S), personalisation (T.P), ... and different types of SAM configurations. The T.S and T.P keys are very sensitive data pieces since they allow the creation of value on the CSC.</p> <p>The fare gate is using a 'AG' AV2 SAM that contains only T.V and reading keys. The fare gate AV2 SAMs are therefore not supervised which makes the installation process simple.</p> <p>This process is described hereafter.</p>
Actors	<ul style="list-style-type: none"> • Security Officer • Maintenance Agent
Technical Scope	<ul style="list-style-type: none"> • Fare gate
Pre-condition(s)	<ul style="list-style-type: none"> • Fare gate SAMs have been produced
Post-condition(s)	<ul style="list-style-type: none"> • The fare gate is in service
Assumption(s)	<ul style="list-style-type: none"> • There is no change of the existing AV2 SAM layout. • The existing SAM production system is used for initializing the SAMs.

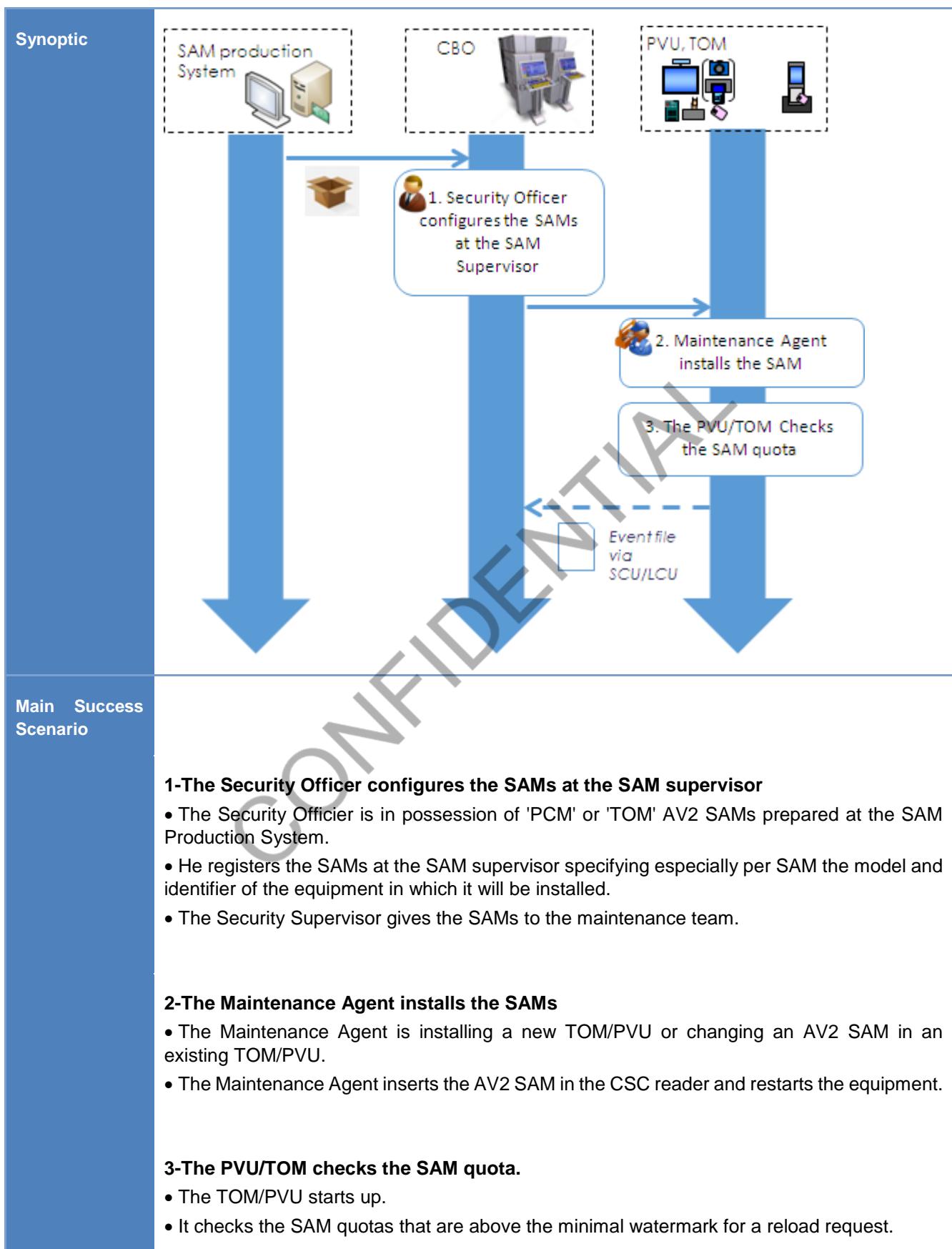


- The gate records the SAm related events in the file that will be forwarded to the CBO via SCU and LCU (the existing CCU interface is used). At the CBO the events will be loaded into the BI solution.
- Once in service, the gate can process the CSC.

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3.5.3.2 UC-SE02 - Installation of AV2 SAMs - TOM and PVU case

ID	UC-SE02
Title	Installation of AV2 SAMs - TOM and PVU case
Goal	<p>The AV2 SAMs are used for managing the security of the CSCs. They are initialized (key loading) at the SAM Production System and delivered to the Security Officer.</p> <p>There different sets of ticketing keys : validation (T.V), sale (T.S), personalisation (T.P), ... and different types of SAM configurations. The T.S and T.P keys are very sensitive data pieces since they allow the creation of value on the CSC.</p> <p>The PVU is using a 'PCM' AV2 SAM that includes especially the T.S key and the TOM is using a 'TOM' SAM that includes T.S and T.P keys.</p> <p>For a better security, the TOM and PVU AV2 SAM are supervised and their usage is limited by quotas (counter limiting the usage of the keys). This level of security makes the installation more complex.</p> <p>This use case describes the installation process..</p> <p>Note that this use case will also be applicable to Fare Gates when they will use T.S keys (in the perspective of the implementation of the action lists)</p>
Actors	<ul style="list-style-type: none"> • Security Officer • Maintenance Agent
Technical Scope	<ul style="list-style-type: none"> • PVU, TOM • CBO SAM Supervisor
Pre-condition(s)	<ul style="list-style-type: none"> • PVU/TOM SAMs have been produced. • The CBO SAM Supervisor is in service. It is especially fitted with a reloading SAM including the required keys. • The PVU/TOM is connected to the communication network
Post-condition(s)	<ul style="list-style-type: none"> • The TOM/PVU is in service
Assumption(s)	<ul style="list-style-type: none"> • There is no change of the existing AV2 SAM layout. • The existing SAM Production System is used for initializing the SAMs. • The CBO SAM Supervisor is used. However, the existing CCU interface is kept for compatibility. • After production, the quotas are set to the max value meaning that the PVU/TOM does not need a first connection to the SAM Supervisor in order to be in service.



- The PVU/TOM records events that will be forwarded to the CBO via SCU and LCU (the existing CCU-TOM interface is used). At the CBO the event will be loaded into the BI solution.

Alternative A - The SAM is not configured at the SAM Supervisor

Either the SAM was not registered at the SAM Supervisor or the equipment is which it is inserted is not the correct one. The equipment starts anyway. The check will be done at the SAM Supervisor at the first reload request.

1,2,3 - Identical

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3.5.3.3 UC-SE03 - Automatic update of SAM AV2 quota

ID	UC-SE03
Title	Automatic update of SAM AV2 Quota
Goal	<p>The AV2 SAMs are used for managing the security of the CSCs. They are initialized (key loading) at the SAM Production System and delivered to the Security Officer.</p> <p>For a better security, the SAMs that contain sensitive keys (T.S keys) are supervised and their usage is limited by quotas (counter limiting the usage of the keys).</p> <p>The equipment automatically sends reload requests when the quotas go low (below the watermark configured in the fare parameters).</p> <p>This use case is describing the reload process.</p>
Actors	• None
Technical Scope	<ul style="list-style-type: none"> • Equipment • CBO (SAM Supervisor)
Pre-condition(s)	<ul style="list-style-type: none"> • The Equipment is configured for accessing the CBO Web Service Interface. Especially, the required credentials (certificate) have been registered. (See security in administration section) • The SAM AV2 is registered at the SAM Supervisor.
Post-condition(s)	<ul style="list-style-type: none"> • The SAM AV2 quota is updated
Assumption(s)	<ul style="list-style-type: none"> • The equipment is connected to the communication network (PVU is on its cradle) • The CBO SAM Supervisor is used. However, the existing CCU interface is kept for compatibility.

Synoptic	<pre> graph TD CBO[CBO] --> Request[1. Equipment sends a SAM quota reload request] Request --> Process[2. The SAM Supervisor processes the reload request] Process --> Update[3. The Equipment updates the SAM] Update -.-> Event[Event file via SCU/LCU] </pre>
Main Success Scenario	<p>1- The equipment sends a SAM quota reload request</p> <ul style="list-style-type: none"> • Based on the watermark configured in the fare parameters, the equipment sees that the quotas are low. • The equipment sends a SAM quota reload request using the CBO 'Update SAM Quota' web service (the existing CCU interface is used) <p>2-The SAM Supervisor processes the reload request</p> <ul style="list-style-type: none"> • The SAM Supervisor checks that the SAM is known and computes the new quota value for the different SAM keys, according to the current counter value and to the SAM Supervisor parameters (key type, terminal type, etc.). • The SAM Supervisor sends back the answer to the equipment <p>3-The equipment updates the SAM</p> <ul style="list-style-type: none"> • The cryptogram received from the SAM Supervisor is loaded into the SAM. The quota is updated. • The equipment records a SamQuotaUpdate event in the file that will be forwarded to the CBO via SCU and LCU (the existing CCU-TOM interface is used). At the CBO the event will be loaded into the BI solution.

Alternatives

2.A- The SAM AV2 is not registered in CBO

- The CBO returns an error code (for compatibility, the existing CCU response code is used)
- However, the SAM is automatically registered in alarm state. The Security Officer can later if required validate the SAM so that the next request will be accepted.

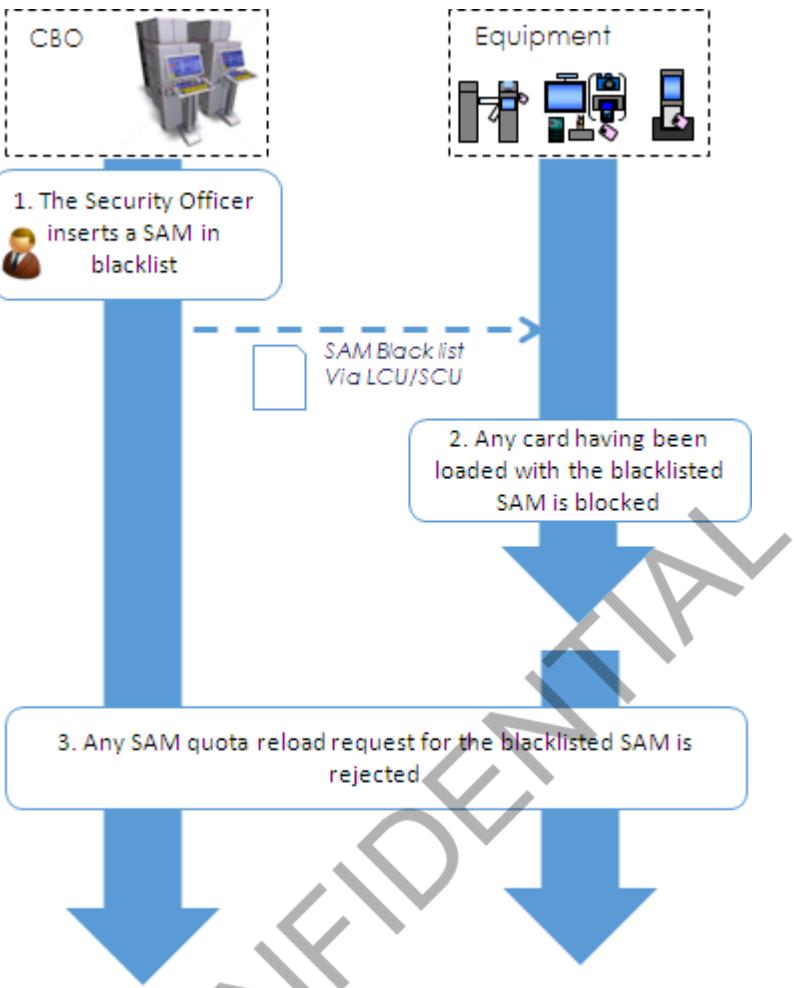
2.B- The reload request is rejected (SAM is blacklisted)

- The CBO returns an error code (for compatibility, the existing CCU response code is used)

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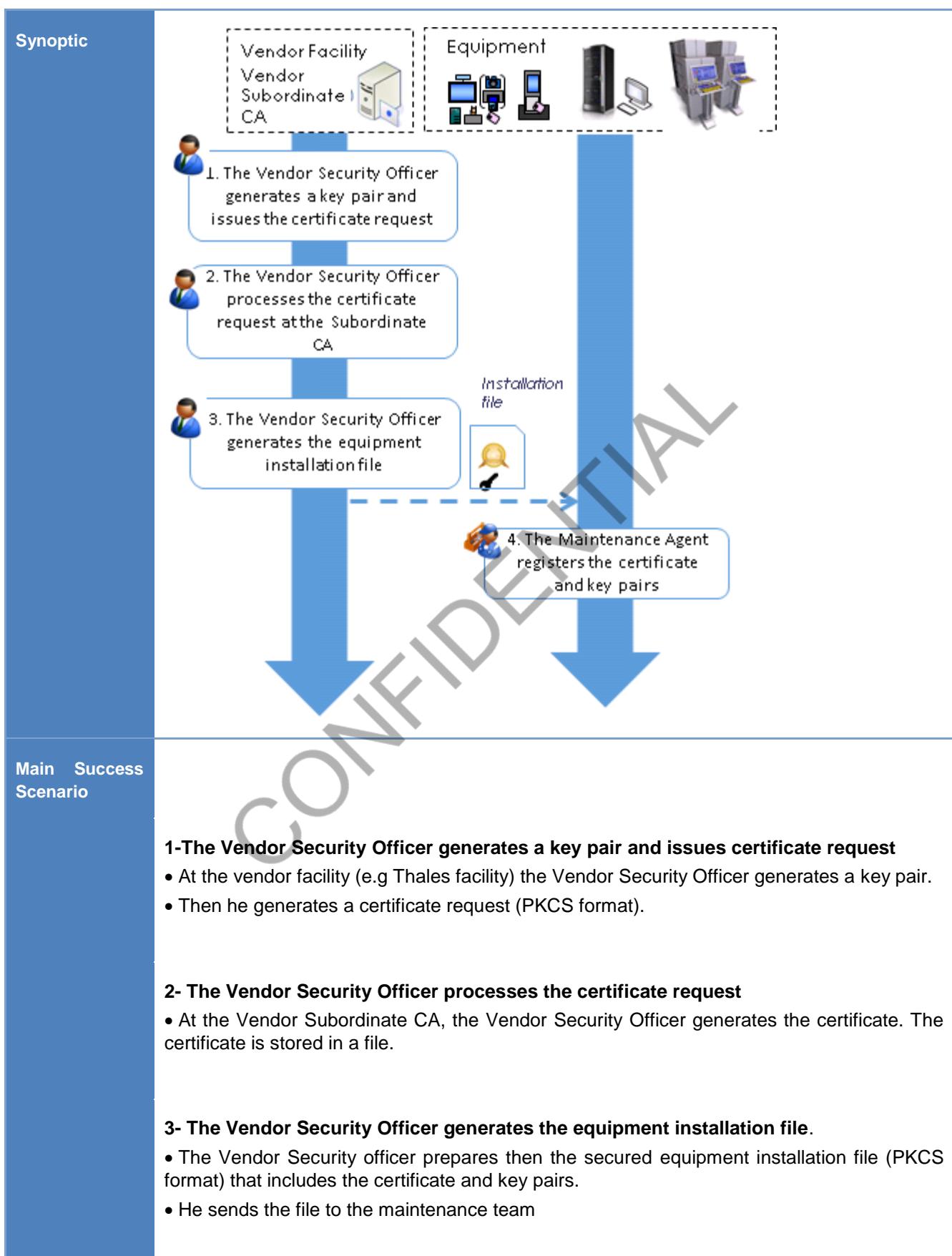
3.5.3.4 UC-SE04 - AV2 SAM blacklisting

ID	UC-SE04
Title	AV2 SAM blacklisting
Goal	<p>In case an AV2 SAM is compromised (e.g. lost, stolen), it can be blacklisted so that its usage will be prohibited.</p> <p>The black listing of an AV2 SAM is performed at the SAM Supervisor.</p> <p>A black listed SAM cannot be reloaded anymore (the reload request if sent by the equipment will be rejected by the SAM Supervisor).</p> <p>A blacklisted SAM will also be inserted in SAM blacklist that is downloaded to the equipment via the LCU and SCU.</p> <p>This use case describes the SAM blacklisting process..</p>
Actors	<ul style="list-style-type: none"> • Security Officer.
Technical Scope	<ul style="list-style-type: none"> • TOM / PVU / Gate • CBO (SAM Supervisor)
Pre-condition(s)	<ul style="list-style-type: none"> • The SAM is registered at the SAM Supervisor.
Post-condition(s)	<ul style="list-style-type: none"> • The AV2 SAM is blacklisted.
Assumption(s)	NA.

Synoptic	 <pre> graph TD CBO["CBO"] --> CentralBar[Central Vertical Bar] CentralBar --> Equipment["Equipment"] CentralBar -- "SAM Blacklist Via LCU/SCU" --> Equipment subgraph Step1 [Step 1] direction TB S1_1["1. The Security Officer inserts a SAM in blacklist"] S1_2[" </pre>
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3.5.3.5 UC-SE05 - Certificate and keys management for CBO, LCU and TOM/PVU

ID	UC-SE05
Title	Certificate and keys management for CBO, LCU and TOM/PVU
Goal	<p>The principle of the security infrastructure used for securing the communications between the central system and the LCU and the front-end devices remains in place.</p> <p>The infrastructure is based on RSA key pairs and certificates that allows to secure the on-line communication between the TOM/PVU and the CBO (web services secured via TLS) and also the batch transfers between the level 3-1 systems and the CBO (LCU file signature and SFTP).</p> <p>A new root CA is provided as part of the CBO. This is the central certification authority for the global system.</p> <p>Each vendor system (means level 3-1 system including the front-end devices) has its own subordinate CA. Each subordinate CA is included in the CBO certification hierarchy through the signature of its certificate by the CBO root CA.</p> <p>Then the vendor subordinate CA signs the certificates of the vendor LCU and front-end devices. Thanks to the certification hierarchy, a transitive trusted relationship is established: the CBO trusts the LCU and front-end devices since they are trusted by the subordinate CA.</p> <p>This use case gives an overview of the certificate management process between the subordinate CA and the LCU and front-end devices. It is applicable to any vendor including Thales. Details may vary depending on the vendor.</p> <p>Note that the access to the new CBO portal from the workstations will be secured via TLS. There will be no mutual authentication here so no need to generate a dedicated certificate for each workstation.</p>
Actors	<ul style="list-style-type: none"> • Vendor Security Officer. • Maintenance Agent
Technical Scope	<ul style="list-style-type: none"> • TOM / PVU / LCU / CBO / Vendor Subordinate CA.
Pre-condition(s)	<ul style="list-style-type: none"> • NA
Post-condition(s)	<ul style="list-style-type: none"> • The certificate and key pairs are installed in the target equipment
Assumption(s)	The Subordinate CA certificate has been signed by the CBO root CA.



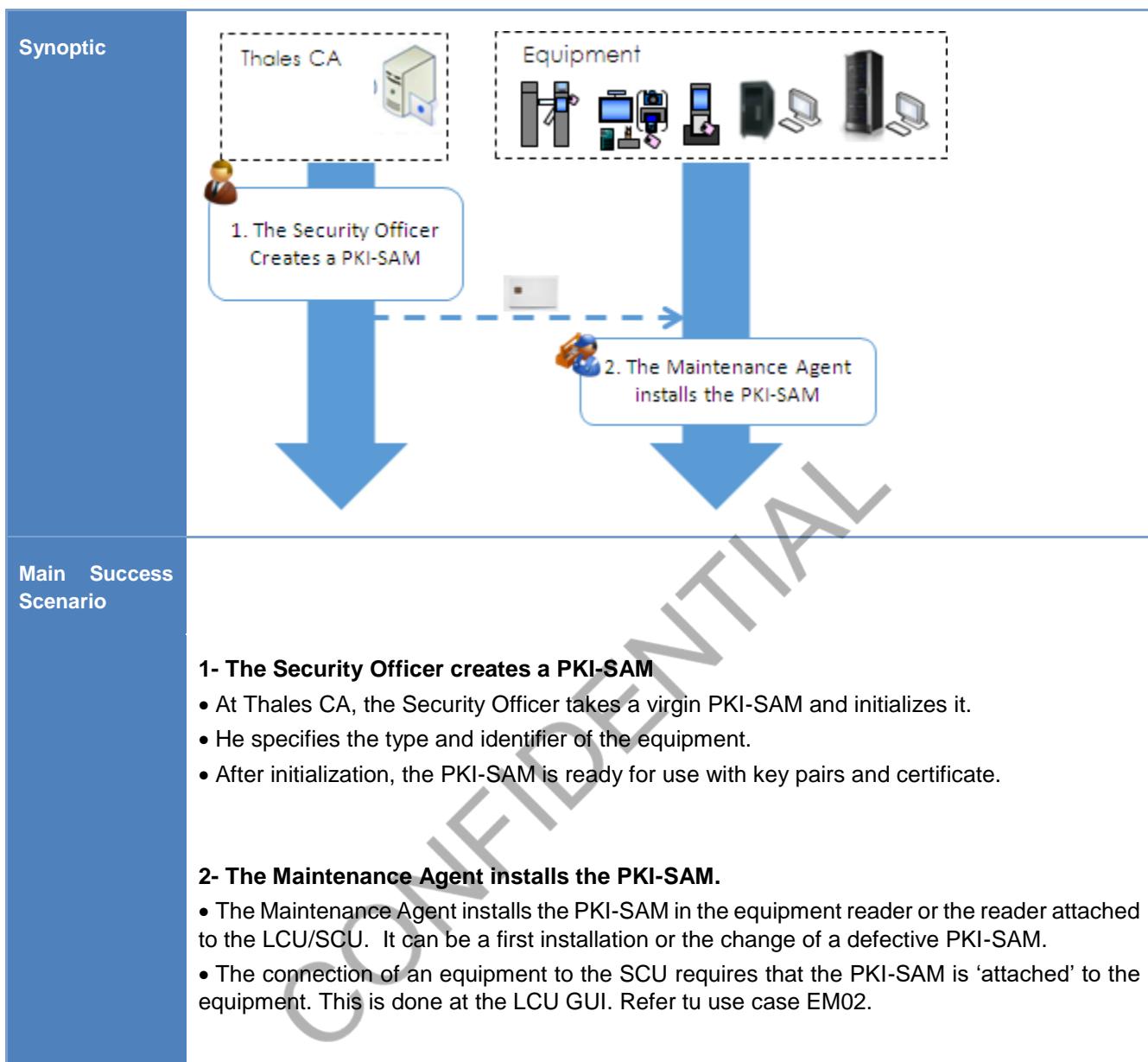
4- The Maintenance agent registers the certificate and key pairs.

- The Maintenance Agent receives the PKCSs file. He registers it at the equipment using the adequate software.

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3.5.3.6 UC-SE06 - PKI-SAM creation and installation [THALES]

ID	UC-SE06
Title	PKI-SAM creation and installation
Goal	<p>The communication with the Thales equipment is secured using a Public Key Infrastructure and dedicated security modules called PKI-SAM. This is the solution in use on line 3 and it will be used on line 1 and 2 for the new devices. The PVU will be added to this infrastructure.</p> <p>Each Line is equipped with a dedicated Certificate Authority in charge of producing the PKI SAM.</p> <p>This use case describes the existing process used for creating the PKI-SAMs.</p> <p>Note that this use case is Thales specific. It is up to any vendor to provide a convenient level of security for the local communication of the equipment.</p>
Actors	<ul style="list-style-type: none"> • Security Officer. • Maintenance Agent
Technical Scope	<ul style="list-style-type: none"> • Thales CA. • Thales LCU, CCU, gate, TOM, PVU
Pre-condition(s)	<ul style="list-style-type: none"> • NA
Post-condition(s)	<ul style="list-style-type: none"> • The equipment is fitted with a PKI-SAM
Assumption(s)	NA

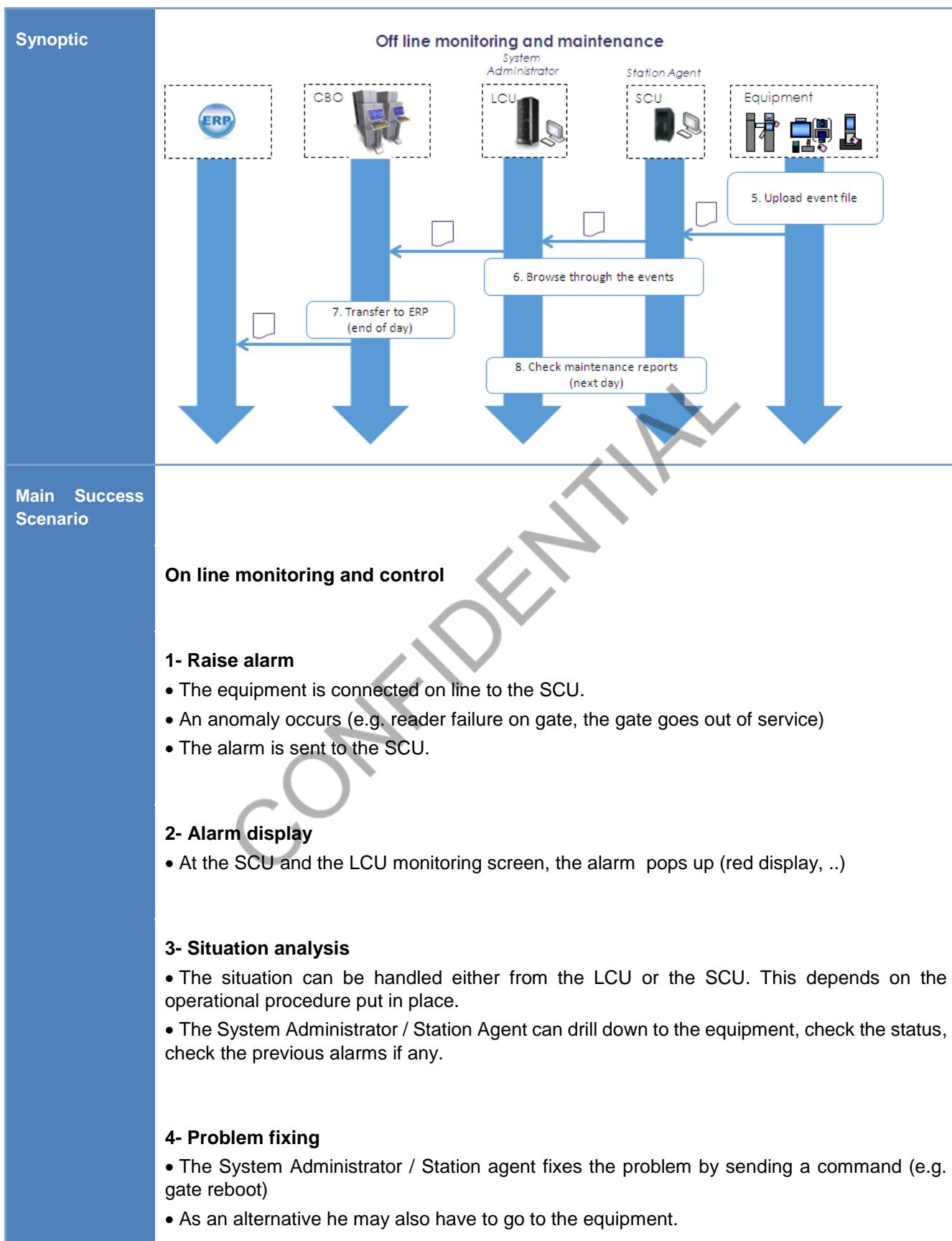


3.5.4 ADMINISTRATION

3.5.4.1 UC-AD01 - Monitoring and control of the front-end equipment [THALES]

ID	UC-AD01
Title	Monitoring and control of the front-end equipment
Goal	<p>The monitoring and control the front-end equipment help at ensuring the quality of the service delivered to the end customer.</p> <p>For the connected equipment (TOM and gates), this consists in monitoring of the alarms, events and change of states as well as the transmission of commands.</p> <p>In the solution deployed by Thales on line 3, this is achieved through a graphical interface available at the LCU and the SCU. The main functionalities that are available are:</p> <ul style="list-style-type: none"> • Graphical display of the line (at LCU), the station, the equipment (a drill down functionality is provided) • Search for an equipment. • Visualization, search and acknowledgement of the alarms. • Sending of commands to the equipment (e.g. reboot) • Operational configuration (e.g. gate in entry only). Operational schedules can also be defined (e.g. gate in entry in the morning and in exit in the evening) <p>This monitoring and control solution will be used on Thales line 1 & 2 LCU and SCU.</p> <p>In addition, the solution proposed by Thales on line 3 includes an off-line monitoring of the behaviour of the equipment through the following mechanisms</p> <ul style="list-style-type: none"> • The equipment uploads event files including alarms, events and changes of state. The LCU/SCU agents can browse these events via a System Event Log application. • The correctness of the uploaded data can also be checked (missing files, faulty files, ...) • Maintenance reports including the alarms are also available at the LCU and SCU. <p>This off-line monitoring will be used on Thales line 1 &2 LCU and SCU and be especially applicable to the PVU that is not monitored on line (this is a mobile device)</p> <p>Note that the other vendors have their own monitoring solution and therefore the solution proposed by Thales is restricted to Thales equipments.</p> <p>However, the alarms of all devices (Thales and 3rd parties) are transferred to the CBO</p> <p>In the following, 2 typical monitoring and control use cases are illustrated.</p>

	<p>Note that this use case is Thales specific since it is up to any vendor to provide their own monitoring and control solution (technical monitoring is not part of the interoperability scheme).</p>
Actors	<ul style="list-style-type: none"> • LCU System Administrator • Station Agent
Technical Scope	<ul style="list-style-type: none"> • CBO • Thales LCU • Thales SCU • Thales Gate, TOM, PVU
Pre-condition(s)	<ul style="list-style-type: none"> • The Station Agent and LCU System Administrator have access to the monitoring and control tools.
Post-condition(s)	<ul style="list-style-type: none"> • Incidents are identified.
Assumption(s)	
Synoptic	<p style="text-align: center;">On line monitoring and control</p> <pre> graph TD SA[Station Agent] -- "1. Raise alarm" --> Transmission in real time SD[System Administrator] SD -- "2. Alarm display" --> SA SD -- "3. Situation analysis" --> SA SD -- "4. Problem fixing" --> SA SA -- "Command in real time" --> SA </pre>



- If the problem is not fixed, he can register a ticket for the maintenance team (this is outside of the system).

Off line monitoring and control

5--Upload event files

- Cyclically or when back to the cradle (PVU case), the equipment uploads event files to the SCU. The files are forwarded to the LCU and then to the CBO using the CCU event file format.

6- Browse through the events

- In case an incident was reported (e.g. by an enforcement officer after his shift), the System Administrator / Station agent can check the events reported by the equipment.
- He can at this point register a ticket for the maintenance team (this is outside of the system)

7- Transfer to ERP

- At the end of the day, all alarms collected at the CBO are transferred to the ERP (refer to UC-BI-05).

8- Check maintenance reports

- The next day, the System Administrator or the Station Agent depending on the operational procedure put in place can check the maintenance reports and analyse the alarms of the past days.
- He can at this point register a ticket for the maintenance team (this is outside of the system)

3.5.4.2 UC-AD02 - Monitoring and control of the CBO

ID	UC-AD02
Title	Monitoring and control of the CBO
Goal	<p>The CBO applications and IT components are administrated by the CBO System Administrator.</p> <p>In case of anomaly he can fix the problem or register a ticket for the maintenance team (this is outside of the system).</p>
Actors	<ul style="list-style-type: none"> CBO System Administrator
Technical Scope	<ul style="list-style-type: none"> CBO
Pre-condition(s)	<ul style="list-style-type: none"> The CBO System Administrator is logged onto the IT monitoring application.
Post-condition(s)	<ul style="list-style-type: none"> The health of the CBO is monitored.
Assumption(s)	<p>IT Management Tool: Nagios</p> <p>Access rights</p> <p>The IT monitoring tool has access to the CBO IT components: such as servers and storage hardware and applications.</p>

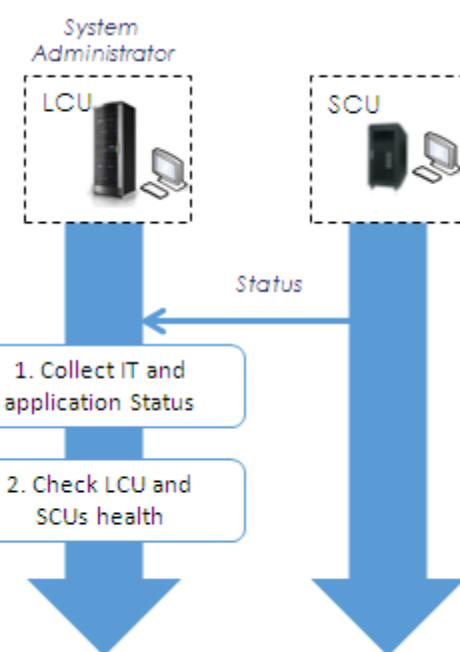
Synoptic	<p><i>CBO system administrator</i></p> <pre> graph TD WebPortal[Web portal] --- CBO[CBO] CBO --> Step1[1. Collect IT components and CBO application status] CBO --> Step2[2. Manage CBO IT] </pre>
Main Success Scenario	<p>1- Collect IT components and application status</p> <p>The CBO IT monitoring tool collects the IT components and application status. That includes:</p> <ul style="list-style-type: none"> • Server hardware: <ul style="list-style-type: none"> • CPU usage • Physical memory usage • Swap memory usage • Disk usage • Network usage • Storage hardware <ul style="list-style-type: none"> • Disk usage • Network usage • Application Servers <ul style="list-style-type: none"> • Application server status • Oracle Server <ul style="list-style-type: none"> • Database server status • Message queue <ul style="list-style-type: none"> • Message queue service status <p>2- Manage CBO IT</p> <ul style="list-style-type: none"> • On demand of the CBO System Administrator, the CBO generates and displays the IT monitoring dashboard. The IT monitoring dashboard displays the live status of IT components.

- The CBO System Administrator identifies the possible anomalies.
- The CBO System Administrator can stop/start the application services in order to fix the problems.
- He can also register a ticket for the maintenance team (this is outside of the system)

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3.5.4.3 UC-AD03 - Monitoring and control of the LCU and SCUs [THALES]

ID	UC-AD03
Title	Monitoring and control of the LCU and SCUs
Goal	<p>The LCU System administrator monitors the LCU and SCU applications and IT. This includes especially a centralized management of all the SCUs.</p> <p>This is a functionality available on Thales line 3 system that will be used on the new line 1&2 systems.</p> <p>In case of anomaly, The System Administrator can fix the problem or register a ticket for the maintenance team (this is outside of the system).</p> <p>This use case is Thales specific since it is up to any vendor to provide their monitoring solution for LCU/SCU. Technical monitoring is not part of the interoperability scheme.</p>
Actors	<ul style="list-style-type: none"> • LCU System Administrator
Technical Scope	<ul style="list-style-type: none"> • Thales LCU, SCU
Pre-condition(s)	<ul style="list-style-type: none"> • The LCU System Administrator is logged onto the LCU.
Post-condition(s)	<ul style="list-style-type: none"> • The health of the LCU-SCU is monitored.
Assumption(s)	

Synoptic	 <pre> graph TD SA[System Administrator] --- LCU[LCU] SA --- SCU[SCU] LCU -- Status --> SCU SCU -- Status --> SA SCU --> Step1[1. Collect IT and application Status] SCU --> Step2[2. Check LCU and SCUs health] </pre>
Main Success Scenario	<p>1- Collect IT components and application status</p> <ul style="list-style-type: none"> The IT and application status available are the following <ul style="list-style-type: none"> Status of servers: LCU servers and each SCU Event logs Status of the applications and batches <p>2- Check LCU and LCUs health</p> <ul style="list-style-type: none"> The status of the servers and the applications is available on a graphical display The System administrator can check the event logs and the status of the batches. He can stop/restart the applications when needed. This include especially the restart of the SCUs. The System Administrator can register a ticket for the maintenance team (this is outside of the system).

3.6 INTEROPERABILITY USE CASES

This section contains examples of use cases that illustrate the true interoperability offered by the global system as introduced in section 1.3.3. The first part (section 3.6.1) depicts the integration of other transport services. The second part (section 3.6.2) presents the integration of new vendors in the metro system.

Section 3.6.3 presents a case study of the integration of new equipment types, typically the TVM.

3.6.1 OTHER TRANSPORT SERVICES

The purpose of this section is to give a vision of the integration of other transport services that could join the global scheme in the future.

Even if Thales has not committed to deliver AFC equipment for other transport modes than the metro, the objective here is to outline the way such transport modes could be integrated in the global AFC solution and especially with the CBO. Note that the go-live of such connections (tests, upgrade of CBO capacities, ...) is not in the scope of the Greater Cairo Metro Upgrade Lines 1 & 2 project

The interoperability model is introduced in section 1.3.3. The other transport services would use the same media (CSC and MT) and would be managed by a dedicated level3-1 system that would be connected to the CBO via the unified interface. Such systems could be delivered by any vendor provided it comply with the interoperable interfaces.

The 2 examples expanded hereafter are bus system and BRT (Bus Rapid Transit or light railway).

It is assumed that the customer service use cases (section 3.2) as existing on the metro will not differ on the bus and BRT from the customer perspective: there will be TOMs at the main stations, the enforcement officers will use a PVU.

It is also assumed that the operation and administration (sections 3.4 and 3.5) will not differ from the CBO perspective: blacklists will be downloaded, business parameters will be defined centrally at the CBO, the CBO business intelligence solution will keep managing the production transactions, the card and customer reference will be centralized at the CBO, the security will be centralized, the equipment reference will be centralized

However the use of the transportation service will differ at least from the customer perspective. This section gives an overview of travel use cases on BRT and bus highlighting the integration in the global AFC system.

3.6.1.1 UC-TS01 - Journey with MT or CSC on BRT

ID	UC-TS01
Title	Journey with MT or CSC on BRT
Goal	<p>A traveller is doing a journey with CSC or MT on the BRT.</p> <p>The following assumptions are used to set the scene for the use case.</p> <ul style="list-style-type: none"> On the BRT, the validation of the fare media is done on the platform and not on board. The on board validation is addressed in the bus case. In case of BRT with on board validation, this would really be like bus. On the BRT platform there are either gates or standing validators (i.e.. open platforms in small stations). The validation rules are similar to the one of the metro : entry/exit. The BRT is separated from the metro : a traveller cannot enter at a metro station and leave at a BRT station. There are intermediate validation devices. The main reason for this is that the operator of the BRT will not be the same of the metro and therefore the traffic shall be clearly separated. The level 2 and 3 are made of SCU and LCU. There is no reason to change the metro model even if this could be envisioned (e.g. SCU for several stations).
Actors	Traveller
Technical Scope	<ul style="list-style-type: none"> Gate or Station Validator SCU LCU CBO
Pre-condition(s)	<ul style="list-style-type: none"> The traveller has a valid MT ticket or a valid CSC
Post-condition(s)	<ul style="list-style-type: none"> The journey is successful. The validation transaction is uploaded to the CBO and successfully processed.
Assumption(s)	-

Synoptic	<pre> graph TD Traveller((Traveller)) -- "Entry Validation" --> Gate[Gate or validator] Gate -- "1. The gate/validator processes the media" --> SCU[SCU] SCU -- "2. Periodic data upload" --> LCU[LCU] LCU -- "3. The LCU reports transactions to CBO" --> CBO[CBO] CBO -- "4. The CBO processes the transactions" --> Exit((Exit)) subgraph Entry [Entry] Gate SCU LCU CBO end subgraph Exit [Exit] CBO end Note["(Same as entry)"] --- Line[] </pre>
Main Success Scenario	<p>Entry</p> <p>1-Entry / The gate/validator processes the media</p> <ul style="list-style-type: none"> The traveller goes to the platform and reaches the gate line or the standing validator The traveller inserts his MT in the gate or the validator or presents his CSC to the reader The gate/validator processes the media. The gate allows the passage. The validator gives a positive light or sound. The gate/validator generates a validation transaction compliant with the unified interface (UI). This is a MT or CSC validation transaction including especially the line, station, service provider and details on CSC or MT. <p>2- Periodic data upload</p> <ul style="list-style-type: none"> The assumption is that as for the metro gate the BRT gate/validator update periodically the transaction file to the SCU that in turn forwards it to the LCU. <p>3- The LCU reports the transactions to the CBO</p> <ul style="list-style-type: none"> The LCU reports the transactions to the CBO in compliance with the UI. <p>4- The CBO processes transactions</p> <ul style="list-style-type: none"> The CBO receives the event data file containing the transactions and checks it (security and format).

- All transactions are transferred to the Business Intelligence solution to be stored.. The transaction fields and especially the line will allow to discriminate the BRT transactions from the metro ones and do separated reports/dashboards when required.
- The CSC transactions will be used for updating the card image. This is similar to what happens with the CSC metro transactions. There is a single central repository for all cards. Hence the traveller can load his card on the metro and travel on the BRT or vice et versa.

Exit

Same as entry

Alternative A - The media is refused on entry

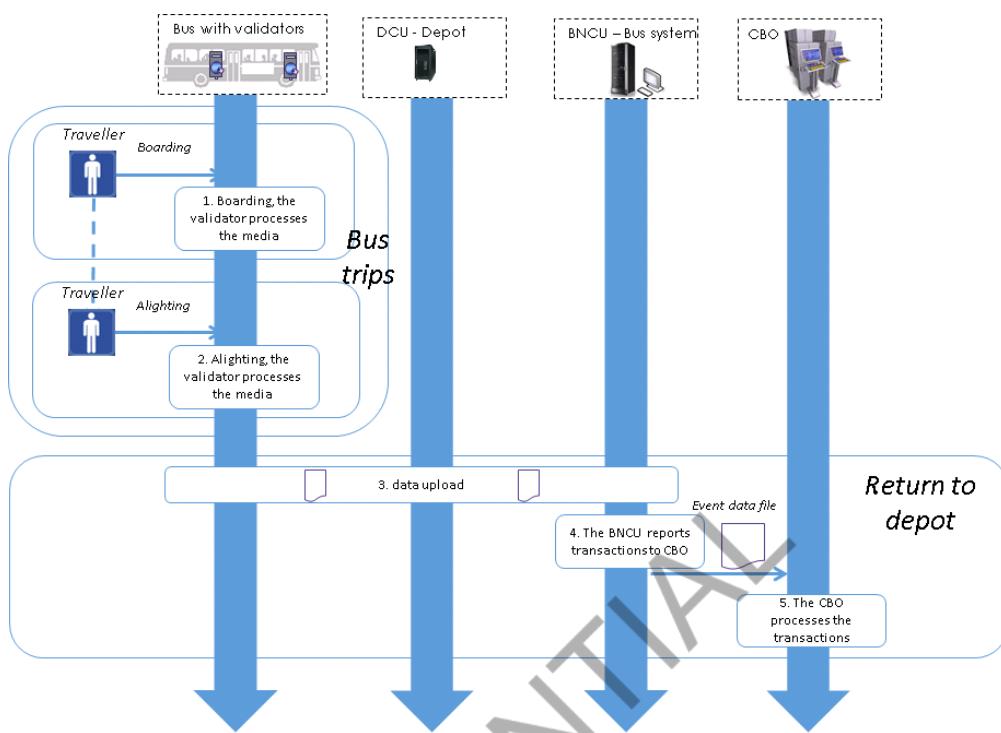
1.A Entry / The gate/validator processes the media

- A MT is refused because it cannot be read or is invalid.
- The CSC can be refused for the same reasons and also because it is in blacklist.
- In both cases the reason is notified to the traveller.
- The traveller can go to the closest TOM (BRT station) to get information on the reason of the rejection.
- Whenever possible, a transaction with error is reported.

2,3,4.A - Identical to main scenario

3.6.1.2 UC-TS02 - Journey with MT or CSC on bus

ID	UC-TS02
Title	Journey with MT or CSC on bus
Goal	<p>A traveller is doing a journey with CSC or MT on a bus</p> <p>The following assumptions are used to set the scene for the use case.</p> <ul style="list-style-type: none"> • On the bus, the validation of the fare media is done aboard the bus using validators. • The validation rules are identical to the one of the metro : entry/exit, here rather boarding/alighting. This is especially interesting for the use of the t-purse on the CSC and the MT with variable number of zones. • The traveller is supposed to validate when boarding and leaving the bus in order to calculate the exact fare. • The bus network is separated from the metro or the BRT. The traveller has to validate when leaving the bus and entering the BRT or the metro. The main reason for this is to clearly separate the traffic • There might be on board sale units. The assumption is that they will provide a limited set of TOM functionalities and use the same interfaces to the CBO (typically sale transactions) • The on board validators will use a positioning system in order to be able to calculate the fare. There is no special assumption on how this is managed. • The bus system behaves like a level 3-1 system for the CBO. However there is no requirement to have SCU, LCU. The suggestion hereafter is that depot concentrators units (DCU) will be used for collecting the data when the bus is back to the depot (e.g. over WIFI) and bus network central unit (BNCU) as bus level 3 system managing several lines. Another alternative would be to use mobile communication and in this case, no DCU would be needed.
Actors	Traveller
Technical Scope	<ul style="list-style-type: none"> • Gate or Station Validator • DCU - Depot central unit • BNCU - Bus network central unit • CBO
Pre-condition(s)	<ul style="list-style-type: none"> • The traveller has a valid MT ticket or a valid CSC
Post-condition(s)	<ul style="list-style-type: none"> • The journey is successful. • The validation transactions are uploaded to the CBO and successfully processed.
Assumption(s)	-

Synoptic**Main Success Scenario****Bus trips**

The bus has left the depot and is on commercial service. At each stop, travellers are boarding and alighting.

- **1- Boarding / The validator processes the fare media**

- The bus stops at a station. A traveller boards the bus. A validator is placed closed to the boarding door.
- The traveller inserts his MT in the validator or presents his CSC to the reader
- The validator is aware of the current position of the bus thanks to the positioning system.
- The validator processes the media and gives a positive light or sound.
- The validator generates a validation transaction compliant with the unified interface (UI). This is a MT or CSC entry validation transaction including especially the line, station, service provider and details on CSC or MT.
- The validation transaction is stored in the validator.

- **2- Alighting / The validator processes the fare media**

- The bus stops at a station. A traveller leaves the bus. A validator is placed closed to the exit door.
- The traveller inserts his MT in the validator or presents his CSC to the reader
- The validator is aware of the current position of the bus thanks to the positioning system.

- The validator processes the media, calculate the fare and provides a positive light or sound.
- The validator generates a validation transaction compliant with the unified interface (UI). This is a MT or CSC exit transaction including especially the line, station, service provider and details on CSC or MT.
- The validation transaction is stored on the validator.

Return to depot

At the end of the service, the bus goes back to the depot.

3. Data upload

- The transactions collected during the service are uploaded from the validators to the DCU (using typically a WIFI connection).

4- The LCU reports the transactions to the CBO

- The LCU reports the transactions to the CBO in compliance with the UI.

5- The CBO processes transactions

- The CBO receives the event data file containing the transactions and checks it (security and format).
- All transactions are transferred to the Business Intelligence solution to be stored.. The transaction fields and especially the line will allow to discriminate the bus transactions from the metro ones and do separated reports/dashboards when required.
- The CSC transactions will be used for updating the card image. This is similar to what happens with the CSC metro transactions. There is a single central repository for all cards. Hence the traveller can load his card on the metro and travel on the bus or vice versa.

Alternative A - The media is refused at boarding time

1.A The boarding validator processes the media

- A MT is refused because it cannot be read or is invalid.
- The CSC can be refused for the same reasons and also because it is in blacklist.
- In both cases the reason is notified to the traveller.
- At the terminus or a main station, the traveller can go to the closest TOM (bus station) to get information on the reason of the rejection.
- Otherwise, he may ask an inspector. If no inspector is in the bus, he may ask the driver.
- Whenever possible, a transaction with error is reported.

2,3,4.A - Identical to main scenario

3.6.2 INTEGRATION OF NEW VENDORS FOR THE METRO

The integration of new vendors in the metro system is done based on the principle introduced in section 1.3.3. Each vendor system is a level 3-1 system that complies with the CBO Unified Interface and the Media interface.

This is applicable to the inclusion of a new metro line in the AFC system but also to the extension of existing lines. Note that the go-alive of such connections (tests, upgrade of CBO capacities, ...) is not in the scope of the Greater Cairo Metro Upgrade Lines 1 & 2 project.

In case of the extension of existing lines, typically addition of gates and TOMs on line 1 & 2, this is similar to what is done with the existing 3rd party vendor with in addition the fact that the vendor system could manage both CSC and MT tickets.

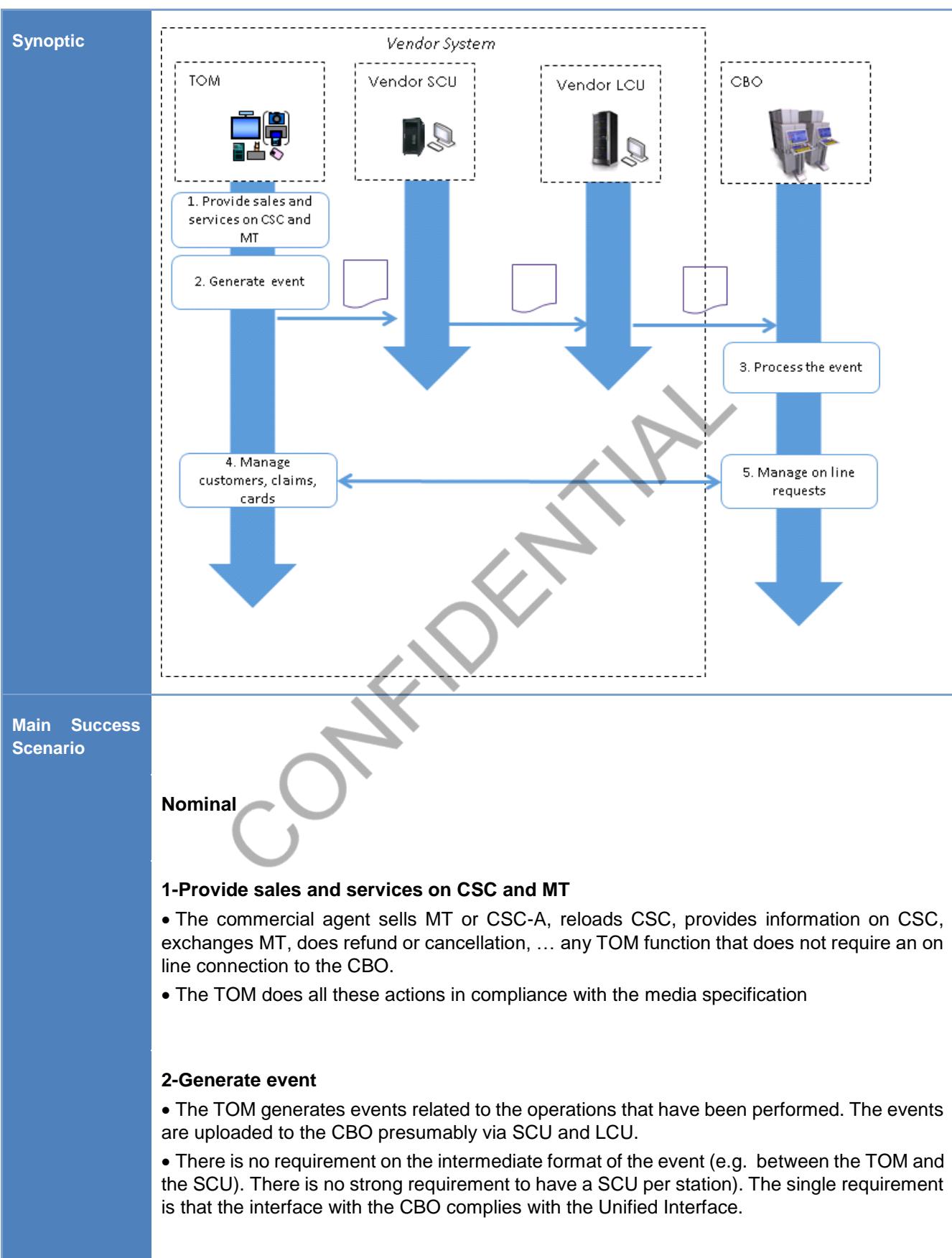
The metro vendor system could be structured as the Thales one (one SCU per station, one LCU per line) or in a more centralized way (limited number of servers located in a data centre). There is no assumption on this as soon as the compliance with the Unified Interface is ensured.

It is assumed that the use cases described in this document and marked as not Thales specific will be applicable to the vendor.

This section focuses on 3 generic use cases, customer service at 3rd party TOM, usage of the metro in order to make clear the concept, external Customer Service Management System.

3.6.2.1 UC-NV01 - Customer service at 3rd party TOM

ID	UC-NV01
Title	Customer service at 3rd party TOM
Goal	<p>The purpose of this use case is to give an overview of the integration of 3rd party TOM into the metro system. The integration model is based on the interoperability scheme introduced in section 1.3.3.</p> <p>The TOM are delivered as part of a level 3-1 system that is integrated with the CBO through the unified interface. The 3rd party TOM offers the same services as the existing ones (or a subset of the services).</p> <p>The use case illustrates the services provided by the TOM in autonomous mode and the services performed with on line connection to the CBO</p>
Actors	<ul style="list-style-type: none"> • End-Customer, Commercial Agent
Technical Scope	<ul style="list-style-type: none"> • TOM • LCU, SCU • CBO
Pre-condition(s)	<ul style="list-style-type: none"> • Commercial agent is logged on TOM
Post-condition(s)	<ul style="list-style-type: none"> • Sales and customer services are provided.
Assumption(s)	None



3-Process the event

- CBO processes the events. Especially the required data is pushed to the BI solution, the CSC card images are updated

4-Manages customers, claims, cards

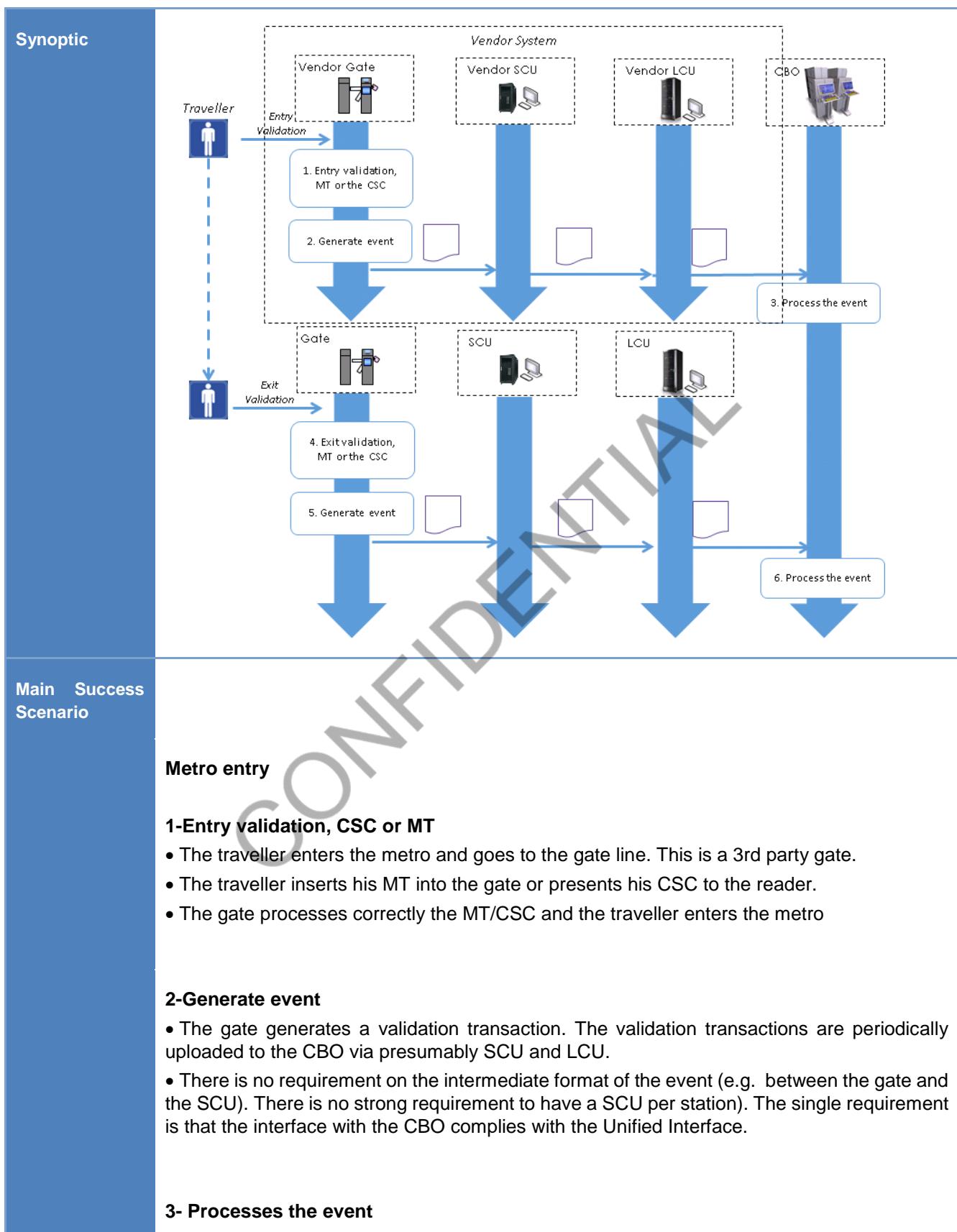
- The commercial agent manages the customer record, attaches a card to an account, manage claims, does card reconstruction ... any action that requires an on-line connection to the CBO.
- The TOM uses the web services exposed by the CBO in compliance with the Unified Interface

5-Manage on line requests

- The CBO serves the TOM requests. The TOM is integrated in the security infrastructure (see EU-SE05) and is properly authenticated.

3.6.2.2 UC-NV02 - Journey with a MT or CSC using 3rd party gates

ID	UC-NV02
Title	Journey with a MT or CSC using 3rd party gates
Goal	<p>The purpose of this use case is to gives an overview of the integration of 3rd party gates into the metro system. The integration model is based on the interoperability scheme introduced in section 1.3.3.</p> <p>The gates are delivered as part of a level 3-1 system that is integrated with the CBO through the unified interface. The 3rd party gate offers MT or CSC validation (could be MT only , CSC only or both)</p> <p>The use case illustrate the case on a journey where the entry is performed on a 3rd party gate and the exit on an existing gate (any gate delivered as part of the line 1 &2 upgrade project or a line 3 gate).</p>
Actors	Traveller
Technical Scope	<ul style="list-style-type: none"> • Gate • SCU • LCU • CBO
Pre-condition(s)	<ul style="list-style-type: none"> • The traveller has a valid MT or CSC
Post-condition(s)	<ul style="list-style-type: none"> • The journey is successful. • The validation transactions are uploaded to the CBO and successfully processed.
Assumption(s)	-



- CBO processes the events. Especially the required data is pushed to the BI solution, the CSC card image is updated

Metro Exit

4-Exit validation, CSC or MT

- The traveller leaves the metro using a standard gate
- The traveller inserts his MT into the gate or presents his CSC to the reader.
- The gate processes correctly the MT/CSC and the traveller leaves the metro

5-Generate event

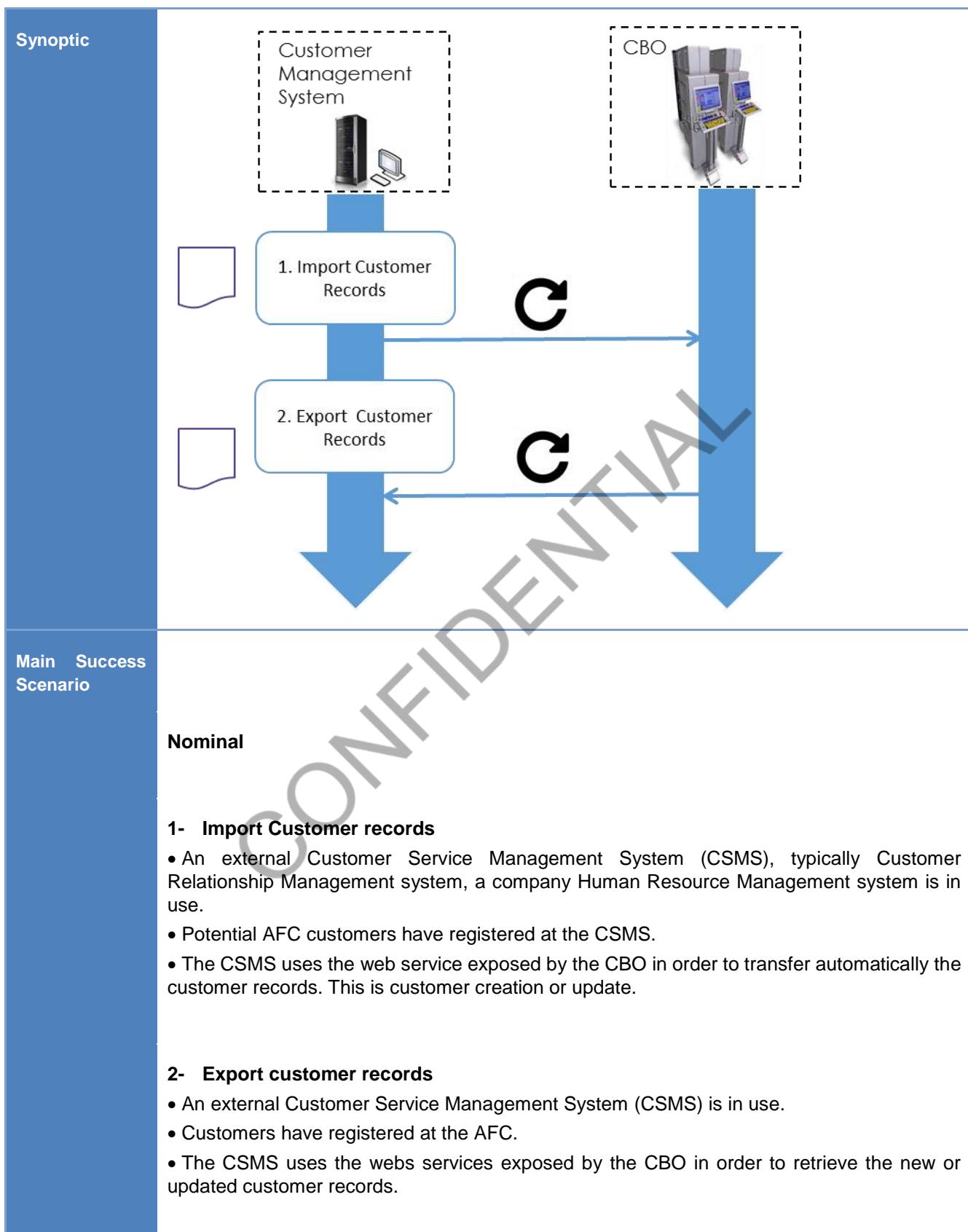
- The gate generates a validation transaction. The validation transactions are periodically uploaded to the CBO via SCU and LCU.

5s- Processes the event

- CBO processes the events. The required data is pushed to the BI solution, the CSC card image is updated. This operation managed at the CBO does not differ whether this is a 3rd party gate or a standard gate.

3.6.2.3 UC-NV03 - External Customer Service Management System

ID	UC-NV03
Title	External Customer Service Management System
Goal	<p>The purpose of this use case is to show the integration of External Customer Service Management Systems the purpose being to import/export customer records.</p> <p>2 cases are illustrated below, the automatic creation of customer records and the export of customer records.</p>
Actors	<ul style="list-style-type: none"> External Customer Service Management System (CSMS)
Technical Scope	<ul style="list-style-type: none"> CBO
Pre-condition(s)	NA
Post-condition(s)	<ul style="list-style-type: none"> Customer records imported or exported.
Assumption(s)	NA



3.6.3 INTEGRATION OF NEW EQUIPMENT TYPE

This section presents a case study for the integration of new equipment types in the global system.

The general assumption is that the technical management of the equipment is done at the vendor system (i.e. the LCU, the SCU, possibly the MMS maintenance management system). This may include (not exhaustive), the communication with the equipment, the technical configuration, the local security procedures, the technical monitoring.

The integration level addressed here is the inclusion into the global interoperable model as introduced in section § 1.3.3. Two main interfaces participate in this model, the fare media and the Unified Interface (CBO interface)

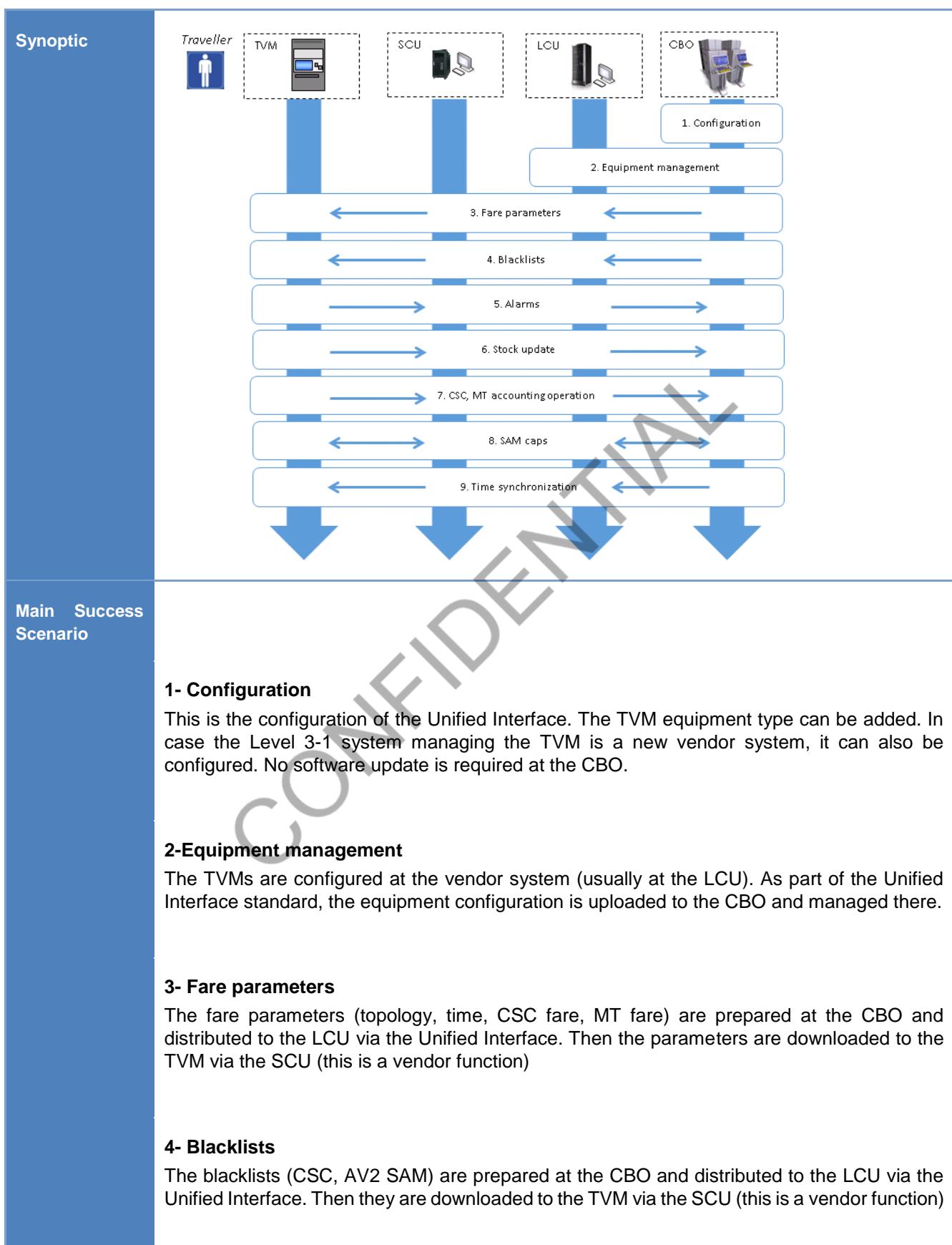
Concerning the media interface, whenever a new equipment type is incorporated in the system, it has to comply with the existing fare media specification (CSC and MT). In case the new equipment type were to require a new handling of the media this would lead to an update of the media specification and a general upgrade of all (existing) equipment types. This later case is out of the scope of this study.

This section focuses on the integration in the Unified Interface. The TVM case is used.

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3.6.3.1 UC-NE01 - TVM integration case study

ID	UC-NE01
Title	Case study of TVM integration into the CBO via the Unified Interface
Goal	<p>The general assumption is that the TVM will not require new functionalities or interface changes at the CBO. This is very likely since the sale functionalities, the main purpose of the TVM, are already managed at the CBO.</p> <p>The integration process starts with a general configuration of the CBO.</p> <p>Then the case study below illustrates a number of functions and exchanges with the CBO that are applicable to the TVM: equipment management, fare parameters, blacklists, alarms, stock update, CSC accounting operation, MT accounting operation, SAM caps, time synchronization.</p>
Actors	Traveller
Technical Scope	<ul style="list-style-type: none"> • TVM • SCU • LCU • CBO
Pre-condition(s)	NA
Post-condition(s)	NA
Assumption(s)	-



5- Alarms

The alarms generated by the TVM are uploaded up to the LCU (this is managed by the vendor). Then, the alarms of interest are uploaded to the CBO via the Unified Interface.

6- Stock update

When the TVM includes a CSC dispenser (dedicated to the sale of cards), the dispenser refill events are managed and uploaded to the LCU (this is managed by the vendor). Then the stock updates are uploaded to the CBO via the Unified Interface. The stock data is especially forwarded to the ERP interface.

7- CSC, MT accounting operations

Whenever sale or reload operations are performed at the TVM (CSC sale, fare product sale, T-purse reloading, MT sale) the associated transactions are uploaded to the LCU (this is managed by the vendor). Then the transactions are transferred to the CBO via the Unified Interface. The data is used to populate the card data base at the CBO and the Business Intelligence. The information is also transferred to the ERP.

8- SAM CAPS

The TVM makes use of AV2 SAM for the CSC security. The Unified Interface is used for managing the SAM caps.

9- Time synchronization

The NTP server provided by the CBO is used to synchronize the time of the LCU that in turn synchronize the time of the SCU and equipment it manages.

4. DEPLOYMENT AND MIGRATION STRATEGY

4.1 INTRODUCTION

This chapter gives a general overview of the deployment and migration strategy for the new line 1&2 systems and the CBO. It is further detailed in the deployment and migration plan.

This strategy leads to a number of requirements and constraints on the design of solution. It is therefore worth to have in mind this strategy during the analysis of the business requirements.

The key drivers for the deployment are, from Thales point of view:

- Ensure the continuity of the service through a strategy allowing the parallel usage of the existing and the new system.
- Limit the un-availability of the infrastructures.
- Maximize the availability of the fare collection for the operator.
- Facilitate the end-customer experience during the transition phase
- Assist the personnel during the transition phase..

The proposed strategy is outlined in the following figure

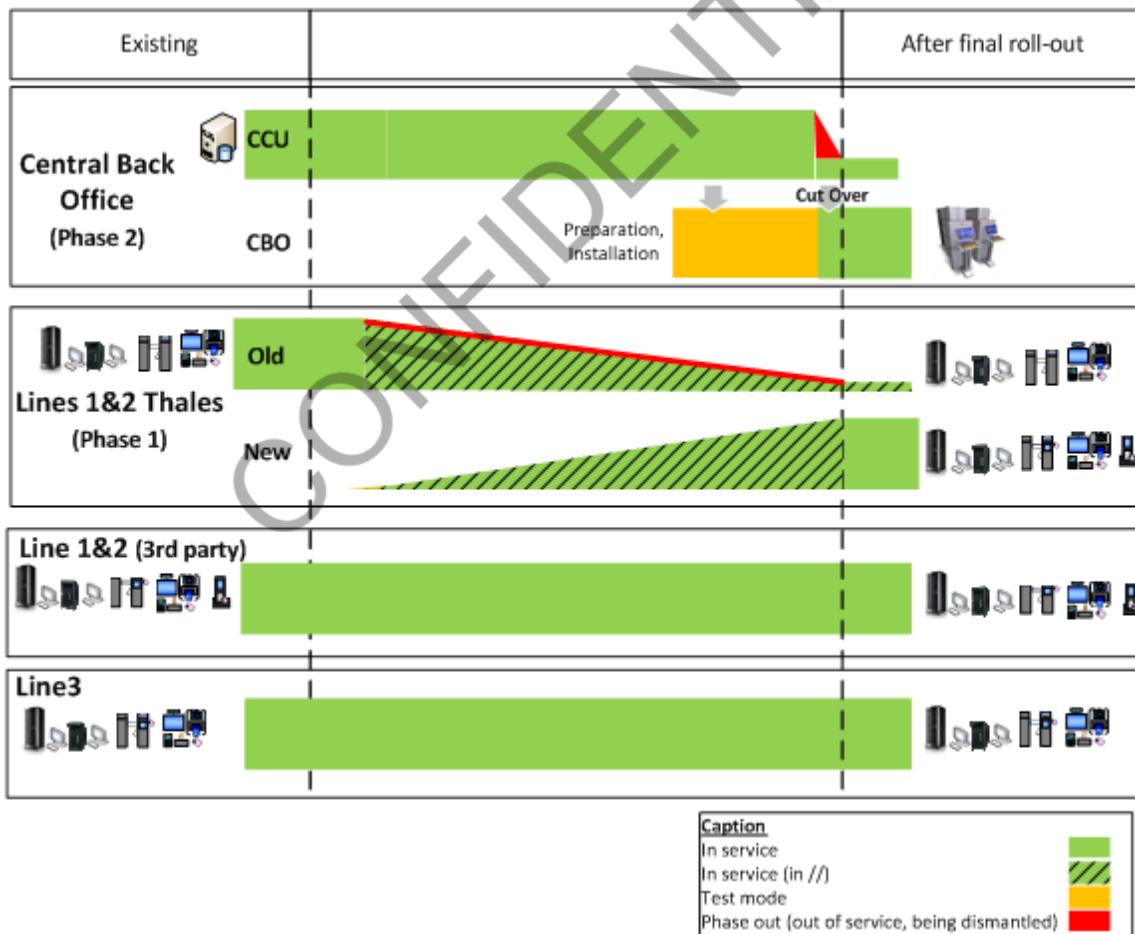


Figure 7 : Transition and migration strategy

The figure shows the transition from the existing situation (on the left) to the situation after the final roll-out (on the right).

4 stream lines are presented:

- The Central Back Office where there will be the transition from the CCU to Thales CBO.
- The Thales systems on lines 1&2 where the existing system (LCU, SCU, gates, TOM) will be (partially) replaced by the new one.
- The 3rd party system on lines 1&2 that will remain unchanged.
- The line 3 system provided by Thales that will remain unchanged.

A narrowing streamline shows that the size of the system is reduced (e.g. less gates). An expanding streamline is the opposite.

The following colour codes are used:

- Green : system in service
- Stripped green : system in service in parallel to another system providing the same service
- Orange: system in test mode.
- Red : system turned off and in the process of being dismantled.

4.2 PHASE 1 - LINES 1&2

4.2.1 CUSTOMER PERSPECTIVE

On line 1&2, the old MT gates and TOM will progressively be replaced by new dual gates and TOMs. However, there will be no change in the fare policy, no change in the usage of the metro, no change in the sale and services.

On line 1&2 CSC only gates and TOM, there will be no change.

On line 3, there will be no change.

4.2.2 PERSONNEL PERSPECTIVE

New equipment (gates , TOMs) will be deployed. New LCUs/SCUs will also be installed.

However the transition is assumed to be facilitated by the fact that the solutions will be very similar to the ones already deployed on line 3.

4.2.3 STRATEGY

4.2.3.1 Preparation

During the preparation phase the new LCU will be installed and configured.

The installation of the new equipment and SCUs will be prepared. However, no existing equipment will be phased out

Pre-tests will be performed with a SCU and a set of equipment.

4.2.3.2 Pre-Test

The test phase will consist in a limited set of new equipment put in service.

4.2.3.3 Roll-out (Station installation and commissionning)

The roll-out will consist in the progressive deployment of the new gates and TOMs and the decommissioning of the old ones.

It is assumed that during this phase :

- The CCU AV2 SAM infrastructure will be used for generating the new AV2 SAM and managing also the quotas of the TOM SAMs.
- The CCU security infrastructure will be used for generating the certificates required by the TOM.
- The TOM will be connected to the CCU
- The new LCU will be connected to the CCU.

A number of old equipment pieces (TOM and gates) will remain in service after the full roll-out. The LCU and the required SCUs will remain in place.

4.3 PHASE 2 - CBO

4.3.1 CUSTOMER PERSPECTIVE

Since the changes are related to the back-office there will be no change from the customer perspective except for the deployment of the PVU that comes with phase 2.

4.3.2 PERSONNEL PERSPECTIVE

There will be no change at the equipment, the SCU and the LCU except for the deployment of the PVU.

The CBO is a complete new system and the personnel will have to be trained.

In addition the interfaces between the CBO and the external systems will have to be validated.

4.3.3 DEPLOYMENT

4.3.3.1 Preparation

The preparation phase includes the following activities

- Installation of the CBO IT including the set-up of the network connections
- Configuration of the communication network
- First retrieval of the customer and card records from the CCU in order to populate the CBO database. It is assumed that the tools (or the result of the extraction) will be provided by Cairo Metro.
- Preparation of the installation of the PVUs.

4.3.3.2 Pre-test

During the pre-test phase, the CBO is not in production, the purpose of the pre-test phase being the validation of the CBO before the switch to production.

The pre-test phase includes the following activities:

- Loading of the configuration data into the CBO. (data extracted from the CCU and delivered by NAT)
- Test of Thales TOM connection to the CBO
- Test of Thales LCU connection to the CBO
- Test of CCU connection to CBO
- Test of 3rd party TOM connection to the CBO
- CBO regression testing

4.3.3.3 Roll-out (Cut-over)

The roll-out will be a switch of all LCUs and TOMs to the CBO.

The roll-out will include the following activities:

- De-activation of Thales LCU and TOM connection to CCU
- De-activation of 3rd party TOM connection to CCU
- Final extraction of customer and card data from the CCU
- Full loading of the CBO configuration data
- Connection of all LCU (1, 2, 3) to the CBO
- Final connection of the CCU to the CBO
- Progressive connection of all Thales TOM to the CBO.
- Progressive connection of all 3rd party TOM to the CBO.

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5. APPENDICES

5.1 APPENDIX 1 - ABBREVIATIONS

AFC	Automatic Fare Collection
AG	Automatic Gate
API	Application Programmable Interface
AR	Anomaly Report
AR	Audit Register
ASN.1	Abstract Syntax Notation One
AV2 SAM	Ticketing Security Access Module
BO	Back Office
BR	Business Rule
BRT	Bus Rapid Transit
BSN	Blocking Sequence Number
CA	Certification Authority
CBO	Central Back Office
CCB	Configuration Control Board
CDRL	Contractual Data Requirement List
CI	Check-In (so-called Tag-On)
CI	Card Issuer
CIPS	Card Initialization and Personalization System
CO	Clearing Operator
CO	Check-Out (so-called Tag-Off)
CP	Card Producer
CPS	Central Processing System
CPU	Central Processor Unit
CR	Change Request
CRL	Certificate Revocation List
CSC	Contactless Smart Card
CSC-A	Anonymous CSC
CSC-P	Personalized CSC
CSV	Comma Separated Value
CT	Contactless Ticket

DES, 3DES	Data Encryption Standard
DF	Dedicated file
DIS	Detailed Interface Document
DN	Distinguished name
DPS	Depot Processing System
DR	Delivery Review
E2E	End To End
EC	Electrical Cabinet
ECR	Engineering Change Request
EF	Elementary File
EFT	Electronic Fund Transfer
EMI	Electro-Magnetic Interference
EMC	Electro-Magnetic Compatibility
EOD	Equipment Operating Data
EPROM	Erasable-Programmable-Read-Only Memory
ERP	Enterprise resource planner
ETL	Extraction Transformation and Loading
FAT	Factory Acceptance Test
FED	Front-End Device
FMCS	Field Maintenance Computer System
FO	Front Office
FT	Fait Technique (Problem Report)
FTP	File Transfer Protocol
FTP	Foiled Twisted Pair
GIS	Global Interface Specification
GSM	Global System for Mobile communication
GUI	Graphical User Interface
HRS	Hardware requirement Specification
HSM	Hardware Security Module
IADT	Inspection, Analysis, Demonstration, Test
ICD	Interface Control Document
IDD	Interface Data Document
IFM, IFMS	Integrated Fare Management System (Level 0 to 4)
IFS	Integrated Fare System (Level 0 to 3)
ITC	Ignore Time Check
ITF	Integrated Test Facility

IVVQ	Integration, Verification, Validation & Qualification
IVVQ-E	Integration, Verification, Validation & Qualification of Equipment/Subsystem
IVVQ-S	Integration, Verification, Validation & Qualification of System
Kab	3DES R/W keys used for mutual authentication of R/W vs. the controller part of equipment
KCK	3DES Infrastructure Key used as transportation key
KEK	3DES Key Encryption Key used as transportation key
Keq, K'eq	RSA public and private key pair
KMS	Key Management System
KPI	Key Progress Indicator
Ksession	Key created during a communication session
KTR	3DES Transport Key used as a transportation key
LAN	Local Area Network
LCU	Line Control Unit
LDAP	Lightweight Directory Access Control
LREF	List of Reference
LRU	Line Replaceable Unit
MAC	Message Authentication Code
MD5	Message-Digest version 5
MF	Master File
MMI	Man Machine Interface
MCBF	Mean Cycles Between Failures
MSN	Multi-Services Network
MT	Magnetic Ticket
MTBF	Mean Time Between Failures
MTTR	Mean Time To Repair
NOC	Network Operational Centre
NTP	Notice To Proceed
NTP	Network Time Protocol
OTP	One time programming
PAT	Partial Acceptance Test
PCR	Problem/Change Report
P-CSC	Personalized Card
PER	Packed Encoding Rule
PID	Passenger Information Display
PIN	Personal Identification Number
PKCS	Public Key Cryptographic Standard
PKI	Public Key Infrastructure

PKI SAM	Public Key Infrastructure Security Access Module
PM	Project Manager
POS	Point Of Sales
POST	Point Of Sale Terminal
PROM	Programmable-Read-Only Memory
PSTN	Public Switched Telephone Network
PTO	Public Transport Operator
PVU	Portable Verifying Unit
QR	Quality Review
R/W	Reader/Writer
RA	Registration Authority
RAM	Random Access Memory
RAMS	Reliability, Availability, Maintainability and Safety
RFU	Reserved for future use
RLAN	Remote Local Area Network
ROM	Read-Only Memory
RSA	Asymmetric Encryption algorithm
RSS	Remote Station Server
SAM	Security Access Module
SAPP	System Assurance Program Plan
SAT	Site Acceptance Tests
SCR	Station Controller Room
SCU	Station Control Unit
SDR	System Design Review
SF	Station Failure
SFTP	Secure File Transfer Protocol
SP	Service Provider
SPS	Station Processing System (or call also SCU)
SQL	Structured Query Language
SL	Submittal List
SRR	System Requirements Review
SRT	Single Ride Ticket
SSDD	System/Subsystem Design Document
SSS	System/Subsystem Specification
STP	Shielded Twisted Pair
SVT	Stored Value Ticket
TBD	To Be Defined

TBC	To Be Confirmed
TCF	Ticket Checking File
TCP/IP	Transmission Control Protocol / Internet Protocol
TLS	Transport Layer Security
TP	Ticket Processing
TPB	Test Procedures Book
T-Purse	Transport Purse linked to a Transport Application on a contactless card
TRB	Test Results Book
TRR	Test Readiness Review
TSN	Transaction Sequence Number
TVM	Ticket Vending Machine
UD	Usage Data
UPS	Uninterruptible Power System
USN	Unblocking Sequence Number
UTP	Unshielded Twisted Pair
VAL	Validator
VCF	Validator Concentration Function
VDU	Visual Display Unit
VLAN	Virtual Local Area Network
VPN	Virtual Private Network
XDR	External Data Representation
xPS	Means CPS or SPS or DPS
WAN	Wide Area Network

5.2 APPENDIX 2 – BUSINESS PROCESSES & RULES MAPPING

The following table maps the business process and rules document reference 63370449-305 to the end to end use cases in the present document. Note that the mapping starts with chapter 3 of the business process and rules document, chapter 2 (framework description) being limited to the definition of roles.

Business processes and rules		End to end use cases
3.	FARE MEDIA CHARACTERISTICS & RELATED PROCESSES	
3.1	GENERAL CHARACTERISTICS	
3.2	CARD ISSUANCE	
3.2.1	Card Procurement	UC-MM01 - Reception of a batch of CSCs from the CIS at the CBO

3.2.2	Delivery of Cards	UC-MM03 - Distribution of media stocks
3.2.3	Card Retailing	UC-SA01 - Issuing of a CSC-P at the TOM UC-SA03 - Issuing of a CSC-A at the TOM
3.3	T-PURSE MANAGEMENT	
3.3.1	T-Purse Add value	UC-SA04 - Reloading of an existing CSC at the TOM
3.3.2	T-Purse Clearing	NA
3.4	CUSTOMER SERVICES	
3.4.1	Declaration of card loss or steal	UC-AS09 - Disabling of a CSC at the TOM
3.4.2	Card Replacement	UC-AS08 - Reconstruction of a CSC at the TOM
3.4.3	Customer Data Management	UC-CM01 - Creation of a customer record at the TOM UC-CM02 - Check/update of a customer record at the TOM UC-CM03 - Attachment of a CSC-A to a customer at the TOM
3.4.4	Customer Profile Management	UC-CM01 - Creation of a customer record at the TOM UC-CM02 - Check/update of a customer record at the TOM
3.4.5	Card Refund	UC-AS06 - Refund of a transport product or a CSC at the TOM
3.4.6	Card Un-Blocking	UC-AS10 - Unblocking of a CSC at the TOM
4.	PRODUCT CHARACTERISTICS & RELATED PROCESSES	
4.1	COMMON SPECIFICATION	
4.2	COMMON PROCESS ON EQUIPMENT	
4.2.1	Card & Product Sales Process	UC-SA01 - Issuing of a CSC-P at the TOM UC-SA03 - Issuing of a CSC-A at the TOM UC-SA02 - Issuing of a MT at the TOM
4.2.2	Product Renewal Process	UC-SA04 - Reloading of an existing CSC at the TOM
4.2.3	Product suspension Process	Pending clarification on web site.
4.2.4	Customer Information Process	UC-AS01 - Providing of information on a CSC with the PVU UC-AS02 - Providing of information on a MT at the TOM UC-AS04 - Providing of information on a CSC at the TOM (CSC is placed on the reader)
4.2.5	Validation Process	UC-TR02 - Journey with CSC
4.2.6	Refund Administration	UC-AS06 - Refund of a transport product or a CSC at the TOM
4.2.7	Blacklisting Process	UC-TR02 - Journey with CSC UC-AS10 - Unblocking of a CSC at the TOM UC-BM02 - Insertion of a CSC in blacklist at the CBO UC-BM01 - Triggering of blacklist distribution at the CBO
4.2.8	Action List Process	Pending clarification on web site.
4.2.9	Clearing Process	NA

5.3 APPENDIX 3 – TICKETING RULES MAPPING

The following table maps the ticketing rules document reference 63370448-305 to the end to end use cases in the present document. Note that the mapping starts with chapter 8, the previous chapters being dedicated to the presentation of the concepts.

Ticketing rules specification		End to end use cases
8.	PRODUCT TEMPLATE CREATION CAPABILITIES	
8.1	PRODUCT GLOBAL DEFINITION SETTING UP	
8.1.1	Product Name determination	UC-PM03 - Configuration of the CSC fare and time parameters at the CBO
8.1.2	Product Associated Business roles determination	UC-PM03 - Configuration of the CSC fare and time parameters at the CBO
8.1.3	Product family determination	UC-PM03 - Configuration of the CSC fare and time parameters at the CBO
8.1.4	Product Transport Modes determination	UC-PM03 - Configuration of the CSC fare and time parameters at the CBO
8.1.5	Product Logical Support determination	UC-PM03 - Configuration of the CSC fare and time parameters at the CBO
8.1.6	Product Customer Groups capabilities determination	UC-PM03 - Configuration of the CSC fare and time parameters at the CBO
8.1.7	Product Surcharge capabilities determination	UC-PM03 - Configuration of the CSC fare and time parameters at the CBO
8.1.8	Product Priority Attribution	UC-SA04 - Reloading of an existing CSC at the TOM
8.1.9	Product Sale Operations determination	UC-PM03 - Configuration of the CSC fare and time parameters at the CBO
8.1.10	Product refund determination	UC-PM03 - Configuration of the CSC fare and time parameters at the CBO
8.1.11	Product Payment Means determination	UC-PM03 - Configuration of the CSC fare and time parameters at the CBO
8.2	PRODUCT GEOGRAPHICAL BEHAVIOUR DETERMINATION	UC-PM03 - Configuration of the CSC fare and time parameters at the CBO UC-PM04 - Configuration of the MT fare parameters at the CBO
8.3	PRODUCT TEMPORAL BEHAVIOUR DETERMINATION	
8.3.1	Product Fixed Validity Period determination	UC-PM03 - Configuration of the CSC fare and time parameters at the CBO UC-PM04 - Configuration of the MT fare parameters at the CBO
8.3.2	Product Sliding Validity Period determination	UC-PM03 - Configuration of the CSC fare and time parameters at the CBO UC-PM04 - Configuration of the MT fare parameters at the CBO
8.4	PRODUCT JOURNEYS ASSOCIATED BEHAVIOUR DETERMINATION	UC-PM03 - Configuration of the CSC fare and time parameters at the CBO
8.5	PRODUCT PRICING BEHAVIOUR DETERMINATION	
8.5.1	Fare Methods and Associated Products	UC-PM03 - Configuration of the CSC fare and time parameters at the CBO

8.5.2	Fare Methods	UC-PM03 - Configuration of the CSC fare and time parameters at the CBO
8.5.3	Card Holder Profile determination	UC-PM03 - Configuration of the CSC fare and time parameters at the CBO
9.	SET OF CONTRACT TARIFFS CREATION CAPABILITIES	
9.1	SET OF CONTRACT TARIFFS DETERMINATION	UC-PM03 - Configuration of the CSC fare and time parameters at the CBO
9.2	SET OF VERSION DATES DETERMINATION	UC-PM03 - Configuration of the CSC fare and time parameters at the CBO UC-PM01 - Distribution of the parameters to the equipment from the CBO
9.3	CONTRACT TARIFF DETERMINATION	UC-PM03 - Configuration of the CSC fare and time parameters at the CBO
9.4	FARE SET DETERMINATION	UC-PM03 - Configuration of the CSC fare and time parameters at the CBO
9.5	INITIAL FEE DETERMINATION	UC-PM03 - Configuration of the CSC fare and time parameters at the CBO
10.	PRE-PROCESSING OPERATIONS	Not mapped. However, the pre-processing is performed every time a CSC is processed. This includes: check of validity, check of expiration, check of status (application, t-purse), check of blacklist, check of test ticket.
11.	SALE OPERATION	
11.1	CARD SALE	UC-SA01 - Issuing of a CSC-P at the TOM UC-SA03 - Issuing of a CSC-A at the TOM
11.2	T-PURSE RELOADING	
11.2.1	T-Purse limitation values	UC-SA04 - Reloading of an existing CSC at the TOM UC-TR02 - Journey with CSC
11.2.2	T-Purse limitation reload values	UC-SA04 - Reloading of an existing CSC at the TOM
11.3	PRODUCT SALE	
11.3.1	Product sale	UC-SA04 - Reloading of an existing CSC at the TOM
11.3.2	Product renew	UC-SA04 - Reloading of an existing CSC at the TOM
11.3.3	Exit ticket	NA. Capability cancelled.
11.3.4	Conflict determination rules at sale	UC-SA04 - Reloading of an existing CSC at the TOM
11.4	REFUND MANAGEMENT	UC-AS06 - Refund of a transport product or a CSC at the TOM
12.	MANAGEMENT OPERATION	
12.1	BLACKLISTING MANAGEMENT	
12.1.1	Blocking operations	UC-TR02 - Journey with CSC
12.1.2	Unblocking operations	UC-AS10 - Unblocking of a CSC at the TOM
12.2	CARD MANAGEMENT	NA. Capability cancelled.
12.3	CARD REPLACEMENT	UC-AS10 - Unblocking of a CSC at the TOM
13.	USAGE OPERATION	
13.1	CHECK-IN OR CHECK-OUT DETERMINATION	UC-TR02 - Journey with CSC

13.2	NORMAL / ABNORMAL SEQUENCE DETECTION	UC-TR02 - Journey with CSC
13.3	CHECK-IN PROCESSING	UC-TR02 - Journey with CSC
13.4	CHECK-OUT PROCESSING	UC-TR02 - Journey with CSC
13.5	FEE MANAGEMENT	UC-TR02 - Journey with CSC
13.6	TRANSFER MANAGEMENT	NA. Capability cancelled.
13.7	FARE MODE MANAGEMENT	UC-AD01 – Monitoring and control of the front-end equipment
13.8	MULTI VALIDATION IN CHECK-IN / CHECK-OUT MODE	UC-TR02 - Journey with CSC
13.9	BEHAVIOUR IN CASE OF ABNORMAL SEQUENCE OF VALIDATION	UC-TR02 - Journey with CSC
13.10	ACTION LIST	Pending clarification on web site.
13.10.1	Product suspension	Pending clarification on web site.
14.	INSPECTION MANAGEMENT	
14.1	INSPECTION MANAGEMENT BASIS	UC-EN01 - Control of a CSC with the PVU UC-EN02 - Issuing of a penalty with the PVU
15.	INFORMATION MANAGEMENT	
15.1	CARD / PRODUCT INFORMATION MANAGEMENT	UC-AS01 - Providing of information on a CSC with the PVU UC-AS02 - Providing of information on a MT at the TOM UC-AS04 - Providing of information on a CSC at the TOM (CSC is placed on the reader)

5.4 APPENDIX 4 – SCALABILITY

This appendix includes technical memo 273 related to system scalability. This memo was part of phase 2 FAT that took place in November 2017.

CONFIDENTIAL

Technical memo

Identification	
ID	GREATER_CAIRO/LB/273
Origin	NAT request for clarifications on CBO scalability
Short description	The CBO is designed to support the growth of the Greater Cairo fare collection system. This is achieved through a scalable architecture. The purpose of this memo is to detail and demonstrate the CBO scalability. This memo is structured as follows 1. Introduction 2. Reminder of CBO technical design 3. CBO vertical scalability 4. CBO horizontal scalability
Classification	Technical memo
Related documents	<ul style="list-style-type: none"> • SSS CBO ref 63248533-306 • HRS CBO ref 63369663-306. • Technical memo – CBO Performance Tests. ref GREATER_CAIRO/LB/285.

History	
Date	Comments
11/10/2017	Complete version



2. Reminder of CBO technical design

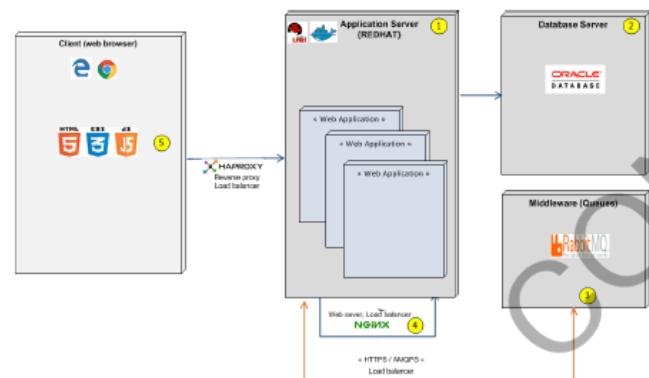
Note: this section is a broad overview of the CBO technical design (software and hardware) detailed in the project documents: SSS CBO ref 63248533-306 and HRS CBO ref 63369663-306.

2.1 Software design

The CBO is broken down into

- The CBO application software that manages all AFC functions: media management, customer management, list management, unified interface, external interfaces, ..
- The business intelligence solution
- Dedicated application software tools such as the IT monitoring and the SAM supervision.

The CBO application software design is based on a N-tier architecture and make use of the Web Oriented Architecture (WOA) guide lines. The principles are illustrated in the figure below.



1. Application level
 - The application level (i.e. the software that implements the processing) is packaged into independent components (e.g. customer management, media management).
 - These applications are deployed as web applications meaning especially that they communicate via web services.
 - The web applications are stateless. Several instances of each application can be deployed.



2. Database

- Oracle RAC is used for the storage tier.

3. Middleware (queuing)

- Queues are used for the asynchronous communication between the applications.
- The RabbitMQ broker is used for this. It implements the AMQP (Advanced Message Queuing Protocol). The broker can be deployed as a cluster on several nodes.

4. Internal load balancing

- The web service exchanges between the applications go through an internal load balancer (NGINX) that allows distributing the load when the applications are deployed on several nodes.

5. Clients

- The clients tier consists of web browser.
- HTML5 technology is used meaning that the MMI processing is on the client side (i.e. the increase of the number of clients will limit the increase of the load on the server)
- The access to the applications goes through a reverse proxy and a load balancer. HAProxy is used for this)

The Business Intelligence solution is based on the Qlik Sense platform used in server mode. The client tier is a standard web browser. The client application is a full HTML5 application. The architecture is illustrated in the figure below.



The other software applications (SAM Supervisor, IT monitoring) are the following

The SAM Supervisor is an application developed by Thales.

- The core of the SAM Supervisor is a PayShield 9000 HSM.
- The front end (that interfaces the HSM with the client applications) is a Java application.
- The client tier consists of a web browser.

The IT monitoring is based on Nagios XI that is configured for the product

- The Nagios server is deployed in the CBO data center
- As for the other CBO applications, the client tier consists of a web browser

2.2 Hardware design

The table below summarizes the hardware design of the CBO (production platform)

Item	
Servers	<p>The configuration consists of 9 PowerEdge R430 servers.</p> <p>The choice of servers of the same series fosters the maintenance and also the evolution of the system (the applications could be redistributed on the servers when needed).</p> <p>The server dedicated to the Business Intelligence is configured with an higher RAM capacity.</p> <p>Note that the R430 are secured servers with redundant power supply, network connection and RAID disks.</p>
SAN	The SAN is a DELL Power Vault MD3820i with a combination of HDD and SSD drives. It is used for the storage of the business data for any application
NAS	The NAS is DELL NX430. It is dedicated to data archiving
Switches	<p>2 types of switches are used :</p> <ul style="list-style-type: none"> Production switched used for the communication network between the CBO servers and the external systems : DELL Networking N3024 Storage switches used for the connection between the SAN and the servers : DELL Networking N4032 <p>2 switches of each type are used for redundancy</p>
UPS	UPS DELL Smart-UPS SRT 8000VA with batteries
Workstations	2 workstations DELL OPTIPLEX are delivered

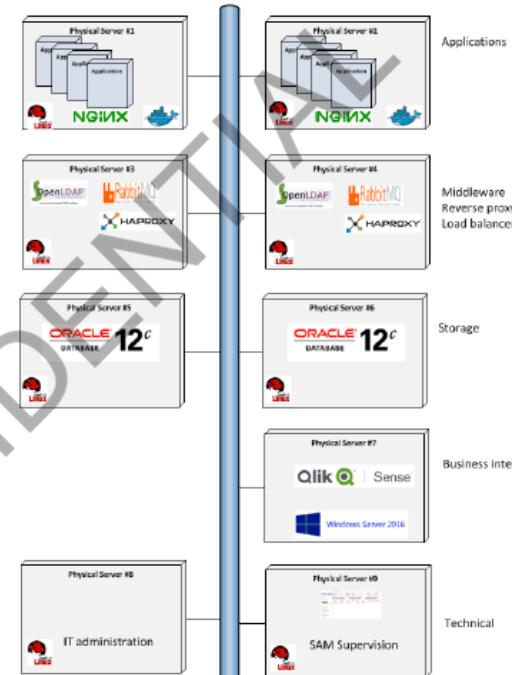
2.3 Deployment

The deployment is the distribution of the software introduced in section §2.1 on to the hardware presented in section §2.3.

The guidelines for the selected deployment are especially to offer optimal performances and availability.

Note that this is the deployment that will be used at when the system will go into production. This deployment could be amended when the system will grow (refer to §4)

The deployment is illustrated in the figure below.



Servers #1 & #2 – Applications

The CBO applications are deployed on the 2 servers.

Active-active mode is used: most of the applications are active on both nodes and the load balancer is used to distribute the queries



Servers #3 & #4 – Middleware

Servers #3 and #4 are used for the deployment of the infrastructure services: queue broker, reverse proxy and load balancer.

Active-active mode is used. Especially the queue broker is deployed as a cluster on both nodes.

Servers #5 & #6 – Storage

Oracle RAC is deployed on servers #5 and #6 in active- active mode.

Server #7 – Business Intelligence

The Business Intelligence is housed on the server #7. The data is securely stored on the SAN

Server #8 & 9 – Technical

Servers #8 and #9 house the supporting technical applications: IT administration & SAM supervision.



3. Vertical scalability

The vertical scalability is the capacity to increase the capacity of the hardware (i.e. scale up).

The table below refers to section §2.2 and details per hardware component its vertical scalability

Item	
Servers	<p>CPU</p> <ul style="list-style-type: none"> The DELL R430 is a 2 socket server. The CPU capacity can be increased by the addition of a second processor. <p>Memory</p> <ul style="list-style-type: none"> Each server is delivered with 32Gb RAM (except for the business intelligence server that is delivered with 96 Gb) The capacity can be increased up to 382 Gb
SAN	<p>The DELL Power Vault MD3820 is delivered with 24 readers. 17 disks are provided, so there is a spare for 7 additional disks.</p> <p>In case the storage need were to exceed the 7 additional slots, a storage expansion could be used, typically a Power Vault MD1220</p>
NAS	<p>The archiving capacity can be increased by the addition of external disks to the DELL NX430.</p> <p>The alternative is to provide a second NAS (the form factor is limited to 1U and the NAS is simply connected to the network switches, so no cabling issue).</p>
Switches	<p>A number of free ports are available on the switches.</p> <p>In case additional ports were to be needed, additional switches would be added and uplinked to the existing ones. They would be in the same VLAN.</p> <p>Additional battery packs can be added when needed.</p>
UPS	<p>Further expansion can be achieved by the addition of another UPS.</p>
Rack enclosure	<p>The existing enclosure includes free shelves. If needed, an additional enclosure could be added and linked to the existing one.</p>
Workstations	<p>No capacity issue is expected for the DELL OPTIPLEX since the client applications are web based.</p> <p>The expansion would be the addition of new workstations for the additional users.</p>

4. Horizontal scalability

The horizontal scalability (i.e. scale out) is the capacity of the system to grow by adding more servers. The interest of the horizontal scalability compared to the vertical scalability is that the growth of the system is no more limited by the capacity of the computers.

The capability to scale out relies on the ability of the application software to be deployed on several nodes.

This chapter refers to the CBO software architecture presented in section 2.1 and details per component its scalability.

- CBO applications
- CBO middleware
- Oracle database
- CBO web clients
- Business Intelligence

Note that there is no need of horizontal scalability for the following components:

- SAM supervisor: the load is limited since related to the processing of the ceiling requests sent by the equipment. The critical part of the processing resides in the HSM that can be easily upgraded if needed in order to increase the performance (TPS, Transactions Per Second).
- IT monitoring: the number of CBO nodes to monitor will remain limited.

The chapter ends with a section describing different CBO deployment cases of Thales put in place for especially testing purpose.

4.1 CBO applications

Design

As detailed in section 2.1, the CBO applications (media management, customer management, ...) are deployed as web applications.

The CBO applications are fully stateless: there is no data or state stored internally, the Oracle database being used for any storage.

As a result, several instances of each application can be deployed in order to manage the load when needed.

The communications (between the applications and between the clients and the application) are implemented via REST web service. In case of several instances of an application are deployed, the requests go through the load balancers (HAProxy, NGINX) that distribute the requests (round robin logic is used)

Horizontal scalability

In the proposed deployment for the production (refer to § 2.3), the applications are deployed on 2 servers (#1 and #2). The load is balanced between the 2 servers.

In case the load would exceed the capacity of the 2 servers, additional servers could be added to support the CBO applications (3, 4 servers,)

A manual configuration would be required (server installation, configuration of the load balancers, ...). However there would be no redesign of the system.

4.2 CBO middleware

Design

In addition to web services, the CBO applications make use of queues for internal asynchronous communication.

Each queue can be associated with multiple readers and writers (i.e. several instances of the same application can read the same queue)

The RabbitMQ message broker (implementing the AMQP standard) is used.

Horizontal scalability

In the proposed deployment for the production (refer to § 2.3), the broker is used in cluster mode on 2 servers (#3 & #4).

In case the load were to exceed the capacity of the servers, additional servers could be added to the cluster. A manual configuration would be required.

4.3 Oracle database

Design

Oracle Database (Enterprise version) is used in RAC (Real Application Cluster) mode.

In addition, each CBO application uses an independent database scheme allowing the use of multiple database instance when needed (there no unique monolithic database).

Horizontal scalability

In the proposed deployment for the production (refer to § 2.3), Oracle RAC is deployed on 2 servers (#4 & #5) in active – active mode.

In case the load were to exceed the capacity of the servers, the base approach would be to add additional servers to the RAC Cluster.

As each application uses an independent data base schema, the alternative would be to use several Oracle clusters and to distribute the database instances between the clusters.

4.4 CBO web clients

Design

The implementation of the web client is based on HTML5. This design uses the concept of 'rich client': the processing of the MMI is managed at the browser. The server is no more in charge of producing the dynamic HTML elements as this was the case with the previous thin client concept.

As a result, the server load is limited to the transfer of the HTML/Javascript elements that then run into the client browser. The network traffic is also limited by the fact that only data is transmitted, not the complete HTML content.

Horizontal scalability

As the MMI load is on the client side, the design offers a native horizontal scalability (i.e. when new workstations will be connected to the CBO, they will manage most of the additional load)

4.5 Business intelligence**Design**

The Qlik Sense platform on which the Business Intelligence solution is based can be deployed in multi-nodes (i.e. several servers) in order to distribute the workload

Horizontal scalability

In case the load were to exceed the capacity of the proposed server, additional nodes could be added in order to increase the performance of the system.

The business intelligence solution includes batch processes (the ETL) and interactive processes (report display). Both processes can be distributed on different nodes

4.6 Deployment cases

Apart from the deployment proposed for the production environment (refer to §2.3), Thales uses other deployment configurations for testing purpose.

- **Development and functional testing environment:** for such environments, Thales uses a single node configuration. The components deployed on the 6 servers (refer to §2.3) are grouped into a single node. This highlights the fact that the software architecture is not linked to a specific deployment.
- **Performance testing:** for such environment, Thales uses a deployed on Thales data center. Thales data center is an internal cloud solution that houses all test systems at Thales plant. This again highlights the fact that the CBO is not linked to dedicated hardware architecture. The deployment used in the performance environment is detailed in the CBO Performance Test Memo ref GREATER_CAIRO/LB/285.

6. COMMENTS SPREADSHEET

6.1 UPDATE TRACKING VERSIONS A, B, C

N°	Reader (company)	Page	Chapter	Comment	Date		State	Update tracking
						Answer		
1	NAT		General	You sent one hard and 1 electronic copy of the dicument, although the contract states that "the contractor shall submit to the organization, for approval, 5 (five) hard and 3 electronics so you are requested to follow the contract	23/06/16	Will be fixed for the next submission. [2016/08/10]. NAT - Thales. -> Agreed		NA
2	NAT		General	The document must contain abbreviation list	23/06/16	Will be added in the next submission. [2016/08/10]. NAT - Thales. -> Agreed.		Appendix 1.
3	NAT		General	It should be presented and clarified the role of this document in the system development and software design, implementation, vérification and documentation (V-cycle) with reference to computer aide software engineering standards CASE and traceability tools as referenced in tender documents	23/06/16	[2016/08/10] NAT- Thales -> Agreed. - The SSS is an introductory document. There will be more detailed documents delivered (SSS CBO as an example). - Thales will refer to the documents that will be provided and especially where the information required by NAT will be available..		Section 1.1
4	NAT		General	The document should be cross-referenced to the existing business rules and ticketing rules specifications.	23/06/16	[2016/08/10] NAT - Thales -> Agreed - NAT is requiring to have a cross-reference to the ticketing and business rules only. - Thales has to check the documents (any technical memo has been included, this is aligned with interoperability tests).may be revise them and do the cross reference.		Appendices 2 & 3.

5	NAT	General	The document must include use cases of multi-operator supporting PPP concept.	23/06/16	<p>[Thales preliminary answer] The reference here to PPP is unclear to us.</p> <p>There are several PPP approaches :</p> <ol style="list-style-type: none"> 1. PPP full turn key (where the PPP company is solely paid by their AFC revenue) 2. PPP based of fixed fee (where the actual transport authority retributate the PPP company on an agreed monthly fee with bonus/malus based on quality of service) 3. Mixed PPP model. 4. ... <p>Depending on the chosen model, the AFC infrastructure might require a CCHS (first and 3rd models) which is out of the current of the present contract (item 2.b, clarification 19/04/15).</p> <p>[20160810] NAT - Thales -> Agreed</p> <ul style="list-style-type: none"> - Thales position is that the definition of the Unified interface is open and will allow the connection of additional lines. - NAT is asking to have a view of PPP operation based on the functionalities available at the CBO (no additional function). This could be done via platform test during the SAT of the system. There will be a set of dedicated tests. 	Section 1.3.3. [Release -B] Section 3.6 (interoperability use cases)
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6	NAT		General	The document must include use cases of multi-modal, i.e. interoperability with other transportation service (LRT, Tram, Bus, .. Etc.), clarifying the provided system capability and readiness in this concern and defining the needed components and actions to complete implementation and activation.	23/06/16	<p>It was mentioned during the negotiation (item 3, clarification 22/04/15) that the CBO functions will be available for other operators that will connect their system through the unified interface.</p> <p>However, we underline that, in the frame of the contract, this is based on the following</p> <ul style="list-style-type: none"> - The CBO functions remain unchanged. - The go-alive of such connections (tests, upgrade of CBO capacities, ...) is not in scope. - In addition, the interoperability might require a CCHS which is out of scope. <p>[20160810] NAT + Thales</p> <p>- Thales proposal : the definition of the unified interface will allow the connection of other transportation service, the existing CBO functionalities remaining unchanged. Tests could be conducted during the FAT based on the unified interface.specification in order to demonstrate the capability. This will be done with simulators. Bus case would be preferred.</p>		Section 1.3.3. [Release -B] Section 3.6 (interoperability use cases)
7	NAT		General	The document must clarify that the design of the interoperability scheme can be achieved in the present system through the presently contracted CBO or through external Central Clearing House System (CCHS)	23/06/16	<p>We confirm that depending on the interoperability model that might be deployed, it could be either managed by the sole CBO or by the CBO + a CCHS (out of the current scope)</p> <p>[20161118]. NAT + Thales</p> <ul style="list-style-type: none"> - Thales needs answer from Nat on the desired model. - Thales will share the slides 'Introduction to Interoperability' - Thales says that the CBO can manage integrated fare in interoperability model.. This is provided the payment of the operators in done through frame agreement. This is subject to extra cost (increase capacity, connection tests 		[Release -C]. §1.3.3.3. Same as CBO SSS #4. CCHS is out of scope, however Thales provides a memo describing the possible future interface to an external CCHS.

						and possible additional functionalities (e.g. apportionment)		
8	NAT		General	The document must clarify that the design of the Business Model of the system capable to work in both modes of AFC compatibility (i.e. no fare integration with other transport services) and interoperability (full fare integration with other transport services)	23/06/16	<p><u>AFC compatibility</u> is understood as the following:</p> <ul style="list-style-type: none"> - Several transport operators are working in parallel with their own AFC system - Such AFC systems are sharing the same fare media (contact-less media only) - The AFC systems are working in a silo mode without any integrated service <p>The Thales proposed design is compatible with the above. However, since there is no integrated service, the CBO will be limited to the management of its AFC perimeter (lines 1, 2, 3 integrated AFC).</p> <p><u>AFC interoperability</u>, see point 7 above.</p> <p>[20161118] NAT + Thales Thales recommends to use the interoperability model that is achievable with the CBO.</p>	No update needed.	

9	NAT		General	The document must include use cases managing external customer services (web site and external Point of Sale POS, ... etc), clarifying the provided system capability and readiness in this concern and defining the needed components and actions to complete implementation and activation.	23/06/16	<p>The CBO architecture is open to the addition of such services provided they comply with the openness protocol.</p> <p>For sake of clarity, we remind that web sales or external POS are out of the scope of the present contract.</p> <p>[20161118] NAT + Thales See point 22.</p>		[Release -B] Section 3.6 (interoperability use cases)
10	NAT		General	The CIS machine supply is an option as mentioned in line 3 phase 3 specifications and you have to prepare a use case for using it.	23/06/16	<p>We confirm that the CBO could be interfaced with the optional CIS machine proposed in Line 3 phase 3. Anyway, it is out of the current scope and to be discussed in the frame of Line 3 phase 3.</p> <p>[20161118] Thales position <ul style="list-style-type: none"> - CIS is OUT OF SCOPE for the current contract - Note that L3 ph3 requests an optional CIS - We anyway confirm that CBO could manage the proposed L3 ph3 - optional CIS (at no cost impact on Contract 73). - Note that existing CIS (from third party vendor) could be integrated (no additional cost) to CBO, provided that Indra complies with our set of interfaces. <p>{08/12/16} Thales + NAT There is no request to provide a CIS , just the use case that does exist in the document.</p> </p>		No update needed.

11	NAT	General	The document must include use cases managing other SAM's and other CSC's clarifying the provided system capability and readiness in this concern and defining the needed components and actions to complete implementation and activation.	23/06/16	<p>The type of media is the cornerstone of interoperable fare systems. We cannot prepare use cases aiming at managing any type of media.</p> <p>[20161118] NAT + Thales The reader supports other CSC (type A, B, C). However the implementation of the management of another card (e.g. Calypso type B with Intercode layout) is out of scope of the current contract.</p> <p>[08/12/2016] NAT + Thales NAT requires to have a memo describing the impacts of changing the card.</p> <p>[12/06/17]. Thales Following CBO SSS review, this topic will be included in the workshop organized by Thales commercial team in order to discuss the roadmap towards these functions.</p>	No update needed.
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12	NAT	General	The document must include use cases managing mobile ticketing, clarifying the provided system capability and readiness in this concern and defining the needed components and actions for complete implementation and activation.	23/06/16	<p>Concerning mobile ticketing there are many different schemes (card emulation on mobile, reloading of CSC with a mobile, ...).</p> <p>The CBO could manage some Mobile Ticketing schemes, however it is out of the current scope of the contract.</p> <p>[20161118] NAT + Thales The impact depends on the integration model that will be selected (DESFire SIM based emulation, HCE,) The reader is NFC compatible. The implementation is out of the scope of the current contract.</p> <p>[08/12/2016] NAT + Thales - NAT would like to have some details on the m-Topup solution for information. Thales will share the commercial leaflet. - NAT want to have a precision on the impacts of card emulation. This will be in technical memo.</p> <p>[12/06/17]. Thales Following CBO SSS review (#6), this topic will be included in the workshop organized by Thales commercial team in order to discuss the roadmap towards these functions.</p>	No update needed.
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13	NAT		General	The document must include use cases managing EMV in ticketing, clarifying the provided system capability and readiness in this concern and defining the needed components and actions for complete implementation and activation	23/06/16	<p>There are many different schemes for the use of EMV in ticketing (from standard payment at the equipment to centralized fare processing at the back-office).</p> <p>The CBO could manage some EMV schemes, however it is out of the current scope of the contract and might require some important add-ons.</p> <p>[20161118] NAT + Thales The gate reader is EMV ready. However, implementation and certification are out of scope of the current contract.</p> <p>[08/12/16] NAT + Thales NAT asks to have more details on EMV integration. Thales proposes to share a marketing leaflet on this.</p> <p>[12/06/17]. Thales Following CBO SSS review (#7), this topic will be included in the workshop organized by Thales commercial team in order to discuss the roadmap towards these functions.</p>		No update needed.
14	NAT		General	You are requested to add a use case for adding new type of AFC equipment, presently not existing in this contract but will exist in the projects contracting (Line 3 phase 3, Line 4 phase 1), such as TVM, FAD and CERM.	23/06/16	<p>As mentioned in our offer, the CBO architecture is open.</p> <p>We confirm that the CBO could be interfaced with the TVM and CERM. Anyway, it is out of the current scope and to be discussed in the frame of Line 3 phase 3.</p> <p>Can you please clarify what FAD is ?</p> <p>[20161118] NAT + Thales Integration of new equipment is feasible as</p>		[Release -C]. Section 3.6.3.

						soon as there is no functional impact on the CBO.		
15	NAT		General	The document doesn't mention anything about Mass Production TOM.	23/06/16	[20160811] NAT + Thales Will be added in the next submission.		Section 3.2.2.6
16	NAT		General	The use cases must include topology management use cases such as : add AFC equipment in new stations, add AFC equipment in new metro line either native equipment or from other vendors.	23/06/16	[20160811] NAT + Thales Thales will add more details on UC 3.5.2.2		Section 3.5.2.1
17	NAT		General	The use case must include fare creation / fare description cases to edit create new application, new fare structure, new product, new profiles, etc ...	23/06/16	This is addressed in chapter 3.4.2. The details will be in CBO SSS. [12/06/17]. Thales As per discussion on CBO-SSS #10, operational use cases added in CBO-MMI document.		No update needed.
18	NAT		General	The use cases must include customer relation service management capable of working with interoperable partner and organization for mass operation such as importing/exporting customer database files for CSC personalization, ... etc	23/06/16	The need is understood as a CBO interface allowing the importation of customer records from external systems (e.g. administration, private companies). Such an interface is not included in the contract. [20161118] NAT + Thales See point 22.		No update needed.

19	NAT		General	The use cases must include use cases for CT management.	23/06/16	<p>We confirm that the CBO could manage CT media (being understood that there is a cost impact) but this is out of the current scope (refer to item 3, clarification 20/10/15)..</p> <p>[20161118] NAT + Thales CT option was removed from the last line 3-phase 3 offer. Implementation is out of scope.</p>		No update needed.
20	NAT		Ch.1	The offer is based on the reuse of line 3 solutions "This statement need clarifications"		<p>[Thales initial answer] We confirm that this will be the same type of equipment but upgraded in order to follow the state of the art according to the Line 1 & 2 contract.</p> <p>[20160810] NAT - Thales -> Agreed. The sentence will be removed.</p>		Chapter 1
21	NAT		Ref 1.1, page 7 & Ref 2.2 page 11	<p>This list of documents does not follow the list of documentation required in the tender documentation (General condition item 15.1 "Software requirements") so you must add the following documents :</p> <ul style="list-style-type: none"> - Projet Management Plan - CBO HRS. - LCU-SCU HRS - PVU HRS 	23/06/16	<p>[20160810]. NAT - Thales -> Agreed.</p>		Sections 1.1.1, 1.1.2, 1.1.3 Chapter 2 (reference to CDRL)

22	NAT	Cha 1.2, page 9	<p>1. The presented architecture neither functional architecture nor system/equipment architecture, both architecture should be presented.</p> <p>2. The architecture does not clearly include :</p> <ul style="list-style-type: none"> a- External link to Clearing house b- External link to bank c- External link to other application or other transportation service (Tram, bus, LRT, etc ...) d- External customer services (web site and external Points of Sales POS, ... etc.) e- The security management in case of native equipment and equipment connected from other supplier either metro line 4 or other transportation service (Tram, bus; LRT, etc ...) 	23/06/16	<p>[20160810] Thales + NAT</p> <p>Point 1 : This is an overall functional architecture. The detailed architecture (functional, technical) will be in the SSS, especially the CBO SSS -> Agreed.</p> <p>Point 2</p> <ul style="list-style-type: none"> -a - <u>Interface with CCHS</u> -> Not Agreed - NAT insists on having technical details on the CCHS interface. . However Thales position is that the implementation and testing of such an interface is out of scope. - Action Thales to come back. b- <u>Interface between CBO and bank.</u> -> Not Agreed - NAT is raising the need of having electronic payment reconciliation at the CBO. This is related to EFT payment. The bank would send a statement file that will be reconciled with the sale transactions. - Thales says that the function is understood. But this interface is not in scope. c- <u>Interface to other transportation service</u> will be via the Unified Interface. See remark 6. -> Agreed. d-- <u>Concerning external customer service</u>, -> To be clarified. - NAT requirement is to connect TOM from 3rd party vendors to Thales SCU. - Action Thales to check whether the documents between SCU and TOM can be delivered. - NAT and Thales agree on the fact that the testing and go alive of such connections is out of scope. -> To be clarified. e- <u>Security management of the CBO connection</u> will be part of the Unified interface. -> Agreed. 	<p>b. See item 48.</p> <p>[Release -B] d. Addition of Section 3.6 (interoperability use cases)</p> <p>[Release -C]. a. § 1.3.3. Thales has provided a memo describing the principle of the potential future CCHS interface (ref GREATER CAIRO /RV/0101)</p> <p>d. Concerning SCU/TOM interface, as per remark #1 on LCU-SCU SSS, it is confirmed that the open architecture will be preserved and the ICD document (4020_19863 A) issued for line 3 will still be valid for the 850 gates project.</p>
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					[20161118] NAT + Thales - CCHS interface : Thales agrees on providing a document describing the principle of the interface with the data structure. - Bank : the interface is limited to e-payment (EFT). The solution will depend on the bank (likely use bank payment platform). The interface is at device level (TOM & PVU to EFT). The e-commerce payment at the web site is supposed to be managed at Indra (use of payment page provided by the bank) - External customer service. Integration via UIA is the best integration model. Anyway CBO services are needed	
23	NAT		Ch. 1.2, page 7 & 1.3 page 9	Remove the sentence "This solution (equipment, SCU&LCU) is identical to the one already provided by Thales for line 3 of Metro" because this contract reference is line 3 phase 3 not phase 1&2 and the equipment hardware and software must be most recent technology.	23/06/16 See point 20. [20160810] NAT + Thales -> Agreed. Sentence removed	Chapter 1
24	NAT		Ref 3.1, End to	Introduction should include a complete exhaustive list of the use cases.	23/06/16 [20160810] NAT + Thales -> Agreed. - Will be added in the next submission.	Section 3.1

			End use cases				
25	NAT		Ref 3.2.1.2, page 19	Add step 5 for CBO acknowledge to give the feedback of the process (Pass/Fail)	23/06/16	[20160810] NAT + Thales -> Agreed. - Will be added in the next submission.	Section 3.2.1.2
26	NAT		Ref 3.2.1.4, page 22	After the CBO created the claim record, the CBO must send notification to the CBO operator then the open channel should be created between the customer and the system till the customer be satisfied of the claim feedback.	23/06/16	[20160810] NAT + Thales -> Agreed. - NAT requirement is that the closure of the claim at the CBO shall not be permitted before a certain time (parameter) after resolution. -> Agreed.	Sections 3.2.1.3, 3.2.1.5. [[Release -C]. § 3.2.1.5, inhibition of the capability to modify claims at the CBO according to CBO SSS point #52.
25-bis	NAT		Ref 3.2.2.2, page 30	The events, shift data, transactions, claims of the old TOM must be managed by CBO in phase 2, i.e, when CBO put into service	23/06/16	[General comment from Thales] - there is no automaitic data transfer with old line 1 TOMs, so line 1 TOMs will be managed only if available. - the data coming from the old line 2 TOMs via the SCU does not include these items (no transaction, no claim, etc ...) [20160811] NAT + Thales -> Agreed. The available data will be transferred to the CBO. No more. The format will remain unchanged as this is at the line 3. LCU.	Section 3.2.2.2.

27	NAT		Ref 3.2.2.5 page 36	PVU works also through wireless (GPRS, Wifi and bluetooth)	23/06/16	<p>[Initial answer from Thales]</p> <ul style="list-style-type: none"> - The PVU proposed in Thales offer includes the GPRS communication interface. - However, it is possible to add WiFi and Bluetooth as an option. <p>[20160810] NAT + Thales -> Not Agreed</p> <ul style="list-style-type: none"> - NAT is saying that in their requirements the PVU shall support GPRS, WIFI and bluetooth. NAT says that Ethernet connection is a problem for the SCU connection - Thales offer for line 3-3 docking station includes Ethernet, RS232, USB. No WiFi. - The repartition of PVU in stations is unknown up to now. - Action Thales to come back on this. 		Thales position is that WIFI is an option.
28	NAT		Ref 3.3.1.1 page 52	In the frame of the 850 gates project, MT Fare rules may be changed	23/06/16	<p>[20160810] NAT + Thales.</p> <ul style="list-style-type: none"> - Thales says that Changes will be limited to the capacity of the existing MT fare tables (linear floating zones). - NAT requirement is especially to modify the number of stations per zone (floating). - Thales says this is ok for the new gates (line 3, line 1-2) and can be configured. However, on old gates, old TOM (line1-2) this is hard coded. - NAT asks to have the limitation of old gates in the document in order to have a clear view on the limitations. Action Thales on this. - NAT asks to have the description of the existing MT layout and fare tables. Action Thales on this <p>[20161118] NAT + Thales</p> <p>Thales position</p> <ul style="list-style-type: none"> - Changing the MT fare rules to fixed zonal system (e.g. center / radius) will require to 		See memo GREATER_CAIRO/LB/0053 for existing MT layout and fare tables.

						change the layout and the management of the tickets at sale and usage - This is technically feasible with the new gates but out of the scope of the current contract. - However, Thales is ready to assist NAT in the definition of these future rules. NAT will study the issue.	
29	NAT		Ref 3.3.1.1 page 54, Alternative B	The MT transactions of an old gate must be transferred to the CBO.	23/06/16	[General comment from Thales] - There is no automatic data transfer from old line 1 gates. So line 1 transactions will be reported to CBO if available.. - Concerning old line 2 gates the old SCU are uploading only traffic counters. [20160811] NAT + Thales -> Agreed. - The available data will be transferred to the CBO. No more. The format will remain unchanged as this is at the line 3. LCU. - The magnetic EOD will be prepared at the CBO (this is using the format used at present at line 3 LCU for MT EOD)	Section 3.3.1.1.

30	NAT		Ref 3.3.1.2 page 55	In the frame of the 850 gate projects, fare rules may be changed.	23/06/16	<p>[20160811] NAT + Thales</p> <ul style="list-style-type: none"> - Concerning CSC, there is no issue. NAT is happy with the existing fare table and ticketing rules capabilities. This is part of the interoperability. -> Agreed. - The issue is on MT, refer to point 28. -> Not Agreed. 		Refer to item 28.
31	NAT		Ref 3.3.1.2, page 57	Reason for refusing should be indicated in VGA display during passenger check-in / check-out.	23/06/16	<p>[20160811] NAT + Thales -> Agreed. Will be added in the next submission. Information is already on the gate.</p>		Section 3.3.1.2.
32	NAT		Ref 3.4.1.1, page 62	The device management use case is missing from the document	23/06/16	<p>[20160811] NAT + Thales -> Agreed</p> <ul style="list-style-type: none"> - NAT remark is related to device CRL managed at Thales CA. This will be added. 		Section 3.5.2.4.
33	NAT		Ref 3.5.3.3, page 123	All front end equipment must have T.S and if the action list applied on the gates the SAM Quota and purchasing through the web would be applied.	23/06/16	<p>[20160811] NAT + Thales</p> <ul style="list-style-type: none"> - The design of the gate SAM profile as defined by the AV2 SAM provider (Indra) and approved by ECM does not include the T.S keys. - For phase 1, the contract (clarification 3) clearly says that Thales provides blank SAMs. - NAT says they want to have the action list deployed on Thales gates even if not available at Indra. - Action on NAT to request to Indra the change of the gate SAM profile for phase 1. Action A Thales to make the requirement clear so that NAT can push the requirement to Indra. - For the future extensions (line 3 phase 3, 4) SAM initialization could be performed at a manufacturer. This is a standard process used by Thales. Action B on Thales to come back on this process. - Thales says that the support for integrating Indra web portal and go-alive is not in scope. NAT disagree. <p>[20161118] NAT + Thales</p>		Thales actions A, B : see memo GREATER_CAIRO /LB/0054.

						- 1st issue is the change of gate SAM AV2 profile (3rd party responsibility) - 2nd issue is that the action list is not managed in the existing interoperability model - 3rd issue is the global operation model (Web portal is not in Thales scope of work) Issues shall be discussed between ECM and NAT. [08/12/16] - Thales agrees on the implementation of action list at equipment. - NAT asks Thales whether it is possible to provide support to ECM for the issuing of the SAM with T.S keys. (CIS is now under ECM management). Action C Thales to come back. [12/06/17]. Thales Action C is not possible within the context of the project (take over CIS, modify it, ...)	
34	NAT		Ref 3.5.3.4 page 125	The SAM blacklisting must include all font-end equipment (gate, TOM/CIPS, PVU, ...)	23/06/16	[20160811] NAT + Thales -> Agreed. - Thales explains that the AV2 SAM blacklist is for blocking the cards that have been reloaded fraudulently with the blacklisted SAM. - Not really realistic that gate can be stolen and used for reloading cards. - Of course SAM blacklisting can be extended to TVM (line 3 phase 3). Says all sales equipment.	No update needed.
35	NAT		Ref 3.5.4, page 131	The use cases must include use cases to upgrade the system software (Win, Database, etc ...) to proof software portability and other use cases to extend transaction processing power and storage capacity and the capability to add	23/06/16	[20160811] NAT + Thales - Major upgrades are excluded but minor upgrades are included. - CBO scalability will be detailed in the CBO SSS (architecture chapter)	Refer to CBO SSS §3.1.6, §4

				new functional modules to proof system scalability (application and software)			
36	NAT	Ref 4.4.1.1, page 63	In case of downloading blacklist file, the system must have two type of blacklist file : Primary blacklist file that will be automatically downloaded once a day. The Secondary blacklist automatically downloaded several times upon reception from the CBO.	23/06/16	[20160811] NAT + Thales <ul style="list-style-type: none"> - NAT that the requireemnt is 100,000 for the blacklist size. Action Thales to check. - Thales says that the secondary blacklist is not in the existing CCU interface so they probably do not implement it. This is to be confirmed. Anyway no sense to implement it if this is not managed at Indra. - Action NAT to raise the point to Indra. [08/12/2016] NAT + Thales <ul style="list-style-type: none"> - Size is ok. 100,000. - NAT asks for the secondary blacklist. To be managed at Thales and future vendors. This is to do more frequent updates. Thales to come back. 		Thales confirms that that blacklist size is 100,000. [Release -C]. Secondary blacklist. Point left open according to item #56 on SSS CBO.
37	NAT	Ref 3.4.1.2, page 64	PVU must have the ability to put any required card in the blacklist	23/06/16	[20160811] NAT + Thales <ul style="list-style-type: none"> - The implementation is feasible (same as putting a card in blacklist from the TOM which exists). - The need from the PVU is to put illegal cards in blacklist. 		Section 3.4.1.5.
38	NAT	Ref 3.4.7.1 page 79	The MT reports of old gates and TOMs must be maintained at the CBO	23/06/16	[20160811] NAT + Thales <ul style="list-style-type: none"> - Same as 25-bis and 29. 		Same as 25-bis and 29.
39	NAT	Ref 3.4.3.2 page 82	The BI on-line data storage capacity must be 5 years and offline archiving capacity 10 years	23/06/16	[20160811] NAT + Thales According to the contract, the storage capacity is 1 year online and 5 years archiving. <ul style="list-style-type: none"> - Extended storage capacity was an option (refer to Thales answers 19/04 point 103) 		No update needed.

						- The option was disregarded (refer to final clarification 20/10 item #3)		
40	NAT		Ref 3.5.3.1 page 119	The fare gate issuing a 'AG' AV2 SAM that contains T.V but if the action list activated it must contain T.S	23/06/16	[20160811] NAT + Thales Same as point 33.		See point 33.
41	NAT		Ref 3.5.3.5, page 127	The Root CA and Subordinate CA should be supplied by Thales and managed at the CBO.	23/06/16	[20160811] NAT + Thales <ul style="list-style-type: none"> - The scenario expected by NAT is like this : for step 2, Thales will provide a new root CA, subordinate CA for its equipments. Indra will continue using its subordinate CA. A future vendor (e.g. line 4) will come with its sub CA. - Thales says that the main issue is related to the migration where all certificates will have to be resigned. - NAT says they are building for future so no problem if the transition is complex. - Thales says new Root CA, subordinate CA is not in scope. Action on Thales to come back on this. 		Pending point [Release -B] Agreed. Included in section 3.5.3.5
42	NAT		Ref 4.2.1 page 139	1. The old magnetic tickets equipment TOM & Gates in line 1&2. 2. Contact-less cards existing equipment including the supplied by Indra must be managed at the CBO.	23/06/16	[20160811] NAT + Thales <ul style="list-style-type: none"> 1. The management of old equipment at the CBO is not included. See points 25-bis, 29. -> Agreed. 2. The management of existing equipment (line 3 + Indra) is included according to 3.5.2 use cases. 		No update needed.
43	NAT		Ref 4.2.3.3 page 139	New LCU's Must be connected to CCU in phase 1 and then will be connected to new CBO through unified interface in phase 2 according to item 2.3.1.2 in Deployment & Migration plan document in the technical offer	23/06/16	Will be corrected in the next submission		Section 4.2.3.3

44	NAT		Ref 4.3.3.1 page 140	What about tools that will be provided by Cairo Metro for the retrieval of the customer and card records from the CCU.	23/06/16	[20160811] NAT + Thales - Indra has a commitment to support the migration and especially to extract the data. - Thales will have to define the requirements in the migration plan.		No update needed. [Release -C] Included in deployment and migration plan -A §4.1.2, §4.3, §4.5, §4.7, §5
45	NAT		Ref 4.3.3.2	Performance of the CBO Database should be tested by special software for load testing like Oracle Real Application Testing (RAT) and Oracle Application Testing suite.	23/06/16	[20160811] NAT + Thales Performance tests will be addressed in the test plan and the test procedure. .		No update needed.
46	NAT		Ref 4.3.3.3 page 141	AV2 SAM production syste and Certification authorities should be managed from the CBO.	23/06/16	[20160811] NAT + Thales See point 41 for CA. See point 33 for AV2 SAM. [08/12/16] NAT + Thales - Left open of AV2 SAM. See point 33.		See 41 and 33.
47	NAT		Ref 4.3.3.2 page 141	What about the implementation of a copy mechanism ? And this is the first time to implement it.	23/06/16	[20160811] NAT + Thales This will be addressed in the migration plan..		[Release -C] Chapter 4 updated with latest version of deployment and migration plan, ref 63248433-312 A)
48	NAT + Thales			NAT is requiring to have a complete vision of the CBO including the functions currently in scope and also out of scope and the interfaces. This is for "clarifying the provided system capability and readiness in this concern and defining the needed components and actions to complete implementation and activation"	07/12/16	Thales to come back on this. This could a dedicated workshop on interoperability. The base of the workshop could be the white paper provided by Thales for LRT.		[20161116]. Workshop held in France.

C1	Consultant	General remark 1	<p>1. This document called SSS System (sub-systems) specification needs to introduce the solution proposed to the project of Toll equipment upgrade for Cairo metro lines 1 & 2.</p> <p>2. The document gives a light overview of the system, including few definitions, some basic items and uses cases are described. Unfortunately the basic rules list of a ticketing system are not exhaustive and several important items are missing.</p> <p>3. The description of the requested system is written in two pages (from 10 to 12) chapter "System Overview" (with a schema called "architecture") and the interoperability in a unique page (cf. page 13).</p> <p>4. This is very minimal information which cannot allow the customer to understand how the solution proposed will work in the specific environment of Cairo Metro.</p>	07/12/16	<p>[08/12/16] Thales</p> <p>1. The solution is presented in chapter 1.3. As underlined in chapter 1.2, the purposes are 'to focus on the business requirements, to capture the needs and expectations and especially to make clear the role of each sub-system in the global solution'. The details are in the sub-system specifications</p> <p>2. The business and ticketing rules are addressed in documents 63370449-305 (business process and rules) and 63370448-305 (ticketing rules). Note that the rules are mapped to use cases in the appendices.</p> <p>3. The system design is not limited to this document. Refer to section 1.1.2. The details are provided in the sub-system and interface documents.</p> <p>4. This is the very objective of the operational description (the major part of this document) to describe the use of the system from the customer perspective. Refer to sections 1.1.1 and 3.1.1</p>	
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C1	Consultant	General remark 1 (cont)	<p>5. Each subsystem, as part of the global whole system, shall be defined and explained with a minimum information including Ticketing basic rules for each.</p> <p>6. Macro functions shall be listed and explained as the security, the safety, the integrity of data, as for all the equipment, for the storage and the whole list of the different activities, separately for each of them and between the different equipment.</p> <p>7. Why the migration strategy is explained in this document which is a specification?</p> <p>8. In any case, a specific detailed document about installation and migration plan shall to be produced and reviewed for acceptance.</p>	07/12/16	<p>[08/12/16] Thales</p> <p>5. The sub-systems are detailed in the subsystem specification documents. The ticketing rules are described in the ticketing rules document. Note that due to the interoperability and the integration of 3rd party vendors, Thales does not provide the specifications of all subsystems.</p> <p>6. Except for the Unified Interface, there is no change to the general security measures applied on the system. The fare media security is unchanged because the proposed solution is integrated into the existing interoperable scheme. The unified interface security is described in the unified interface specification. The sub-system security is described in the sub-system specifically. Section 3.5.3 provides the operational view of the different security domains. The operational functions of the equipment are shown along the use cases. The detailed functions of the equipment are described in the subsystem use cases.</p> <p>7. This is because the migration strategy leads to design constraints that justify the proposed solution. Chapter 4 is just an overview. There is a deployment and migration plan.</p> <p>8. Confirmed that there is dedicated document for deployment and migration.</p>	
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C2	Consultant	General remark 2	What about the data and their exchanges? A dedicated chapter shall be added explaining how the system and subsystems shall work (ticketing basic rules) including the exhaustive list of data identified and their definition. Data flow charts shall be added to introduce the heart of the system. Because a ticketing system is a system exchanging different types of data (financial data, event data, statistic data, etc.), an explanation of and how each subsystem is managed needs to be provided.	07/12/16	[08/12/16] Thales The purpose of the use cases is especially to illustrate the data flows between the sub systems. We have here 200 pages of use cases that cover the operational usage of the system. The detailed definition of the data is in the interface specification documents.	
C3	Consultant	General remark 3	What about interfaces between the subsystems (Network, power supply, Civil work, fire protection system, etc.) and the other systems of the Metro (in the final environment)? Please clarify how this will work. A dedicated chapter shall be added giving the exhaustive list of interfaces identified, their definition and explaining according a general point of view, for each, how it will be solved.	07/12/16	[08/12/16] Thales The interfaces on which the interoperable scheme is based are the subject of dedicated documents : unified interface, fare media electrical layout. The sub-system specifications include the definition of the associated interfaces or the reference to the applicable interface documents. Thales is not in charge of communication network, fire protection, .. Thales is not in charge of the internal interfaces of the 3rd party systems.	
C4	Consultant	General remark 4	The life cycle of the card shall be introduced and globally described to show how the proposed solution will work.		[08/12/16] Thales The card life cycle is detailed in the business process and rules document reference 63370449-305	

C5	Consultant	General remark 5	The interoperability shall be detailed with at minimum the basic rules and the exhaustive list of functions the proposed solution will get.	[08/12/16] Thales The business rules are described in the business process and rules document reference 63370449-305. The ticketing rules are described in the ticketing rules document reference 63370448-305. The interoperable fare media and its security are described in fare media electrical layout document, the security design document managed by a 3rd party provider. The unified interface is the subject of a dedicated document.	
C6	Consultant	General remark 6	The list of standards and norms the system is compliant with shall be introduced.	[08/12/16] Thales The applicable standard and norms are listed per subsystem in the subsystem specifications. The applicable standard and norms for the media are listed in the fare media electrical layout documents. Interoperability standards are referenced in the business process and rules document.	
C7	Consultant	Chapter 1.1.1	"Thanks to this common.....". Is this sentence for congratulations linked to a specific request in the technical documents of the contract? Please clarify	[08/12/16] Thales This is verbatim the official presentation of the Thales corporate reference system, Chorus 2.0. This section was added to explain the position of the document within the design process.	

C8	Consultant		Chapter 3.2.2.6	The acronym/abbreviations list is not exhaustive, for example "PID" acronym to be added in abbreviations list chapter 5, this list shall be exhaustive according to all acronyms and abbreviations used into the document.	[08/12/16] Thales The abbreviation list will be checked.		
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6.2 UPDATE TRACKING VERSION D

N°	Reader (company)	Page	Chapter	Comment	Date		State	Update tracking
						Answer		
9	NAT		General	The document must include use cases managing external customer services (web site and external Point of Sale POS, ... etc), clarifying the provided system capability and readiness in this concern and defining the needed components and actions to complete implementation and activation. [27/07/17] The tests for these functions must be performed on the test platform	27/07/17	Agreed. Test is part of FAT phase 2.		Test IVVP_CBO_EXT_CS (§2.15.1) in FAT Phase 2 test book reference 63519946-206

14	NAT		General	<p>You are requested to add a use case for adding new type of AFC equipment, presently not existing in this contract but will exist in the projects contracting (Line 3 phase 3, Line 4 phase 1), such as TVM, FAD and CERM.</p> <p>[27/07/17] Concerning the TVM equipment it must be implemented in phase 3 and fines 18.2 So this USE case must be tested</p>	27/07/17	<p>Agreed. According to FAT phase 2 test report reference ref 63534831279, page 3, there will be a test showing the connection of a TVM simulator (data exchanges with the CBO)</p>		FAT Phase 2 test book reference 63519946-206 (to be updated)
15	NAT		General	<p>Concerning the number of tickets to be issued by TOM mass production it must be parametrised (50, 100, 150, 200)</p>	27/07/17	<p>Refer to item #17 open point workshop held 21 to 23 November 2017. Point closed. Number of tickets is set to 100.</p>		No update.
18	NAT		General	<p>The use cases must include customer relation service management capable of working with interoperable partner and organization for mass operation such as importing/exporting customer database files for CSC personalization, ... Etc</p> <p>[27/07/17] This interface must be added in the document.</p>	27/07/17	<p>Agreed. New use case created. 3.6.2.3</p>		3.6.2.3

22	NAT	Cha 1.2, page 9	<p>1. The presented architecture neither functional architecture nor system/equipment architecture, both architecture should be presented.</p> <p>2. The architecture does not clearly include .</p> <ul style="list-style-type: none"> a- External link to Clearing house b- External link to bank c- External link to other application or other transportation service (Tram, bus, LRT, etc ...) d- External customer services (web site and external Points of Sales POS, ... etc.) e- The security management in case of native equipment and equipment connected from other supplier either metro fine 4 or other transportation service (Tram, bus; LRT, etc <p>[20160810] Thales + NAT</p> <p>Point 1 : ok</p> <p>Point 2</p> <ul style="list-style-type: none"> -a - It will be closed after receiving Thales memorandum which describing the principle of the potential future CCHS interface b- Interface between CBO and bank. -> This interface must be defined by Thales according to the cooperation between Thales and the bank . c- ok d— Concerning external customer service, -> Nok for Thales answer. e- ok 	27/07/17	<p>-2.a : CCHS interface memo has been delivered. ref GREATER_CAIRO/RV/0101</p> <p>-2.b : Refer to comment registered on 18/11/16. the interface is limited to e-payment (EFT). The solution will depend on the bank (likely use bank payment platform). The interface is at device level (TOM & PVU to EFT).</p> <p>-2.d : Refer to #25 on phase 2 test book. As per agreed remark #5 on SSS CBO, Thales will present a test showing such type of integration. Refer also to comment 18.</p>	3.6.2.3.
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27	NAT		Ref 3.2.2.5 page 36	PVU works also through wireless (GPRS, Wifi and bluetooth)	27/07/17	Open point pending decision on PVU, solution that shall be addressed with the bank. On going decision process. Will be reflected in PVU HRS.		PVU HRS.
33	NAT		Ref 3.5.3.3, page 123	All front end equipment must have T.S and if the action list applied on the gates the SAM Quota and purchasing through the web would be applied.	27/07/17	<p>T.S keys. The change of gate AV2 SAM profile is not under Thales responsibility. However, when the gate SAM will have T.S keys, they will be able to be supervised.</p> <p>Web portal. Refer to point #15, open point workshop held 21 to 23 November 2017. Point closed. When Indra site interface is available, Thales will quote the implementation.</p>		3.5.3.2, 3.5.3.3, 3.5.3.4
34	NAT		Ref 3.5.3.4 page 125	<p>The SAM blacklisting must include all font-end equipment (gate, TOM/CIPS, PVU, ...)</p> <p>[20160811] NAT + Thales -> Agreed. & approved as noted comment</p> <ul style="list-style-type: none"> - Thales explains that the AV2 SAM blacklist is for blocking the cards that have been reloaded fraudulently with the blacklisted SAM. - Not really realistic that gate can be stolen and used for reloading cards. - Of course SAM blacklisting can be extended to TVM (fine 3 phase 3). Says all sales equipment 	27/07/17	<p>Agreed that any SAM registered at the SAM supervisor can be blacklisted.</p> <p>The SAM blacklist is downloaded to any equipment.</p>		Included in 3.5.3.4..

35	NAT		Ref 3.5.4, page 131	<p>The use cases must include use cases to upgrade the system software (Win, Database, etc ...) to proof software portability and other use cases to extend transaction processing power and storage capacity and the capability to add new functional modules to proof system scalability (application and software)</p> <p>[20160811] These use cases must be added in the document</p>	27/07/17	<p>System software upgrades are addressed in the maintenance manual.</p> <p>Scalability is addressed in the CBO scalability memo delivered during the phase 2 FAT.</p>		Maintenance manual ref 63244825-194 Scalability memo ref GREATER_CAIRO/LB/273
36	NAT		Ref 4.4.1.1, page 63	<p>In case of downloading blacklist file, the system must have two type of blacklist file : Primary blacklist file that will be automatically downloaded once a day. The Secondary blacklist automatically downloaded several times upon reception from the CBO.</p>	27/07/17	<p>Refer to point #12, open point workshop held 21 to 23 November 2017. Point closed.</p> <p>Decision as recorded in meeting memo dated 3-4 October 17. The list will be sent every 1 or 2 hours</p>		3.4.1.1
39	NAT		Ref 3.4.3.2 page 82	<p>The BI on-line data storage capacity must be 5 years and offline archiving capacity 10 years</p> <p>[27/07/17] It is mentioned in the contract that the on-line data storage capacity must be 5 years and offline archiving capacity 10 years</p>	27/07/17	<p>According to the contract, the storage capacity is 1 year online and 5 years archiving.</p> <ul style="list-style-type: none"> - Extended storage capacity was an option (refer to Thales answers 19/04 point 103) - The option was disregarded (refer to final clarification 20/10 item #3) 		
40	NAT		Ref 3.5.3.1 page 119	<p>The fare gate issuing a 'AG' AV2 SAM that contains T.V but if the action list activated it must contain T.S</p>	27/07/17	<p>Refer to point 33.</p>		3.5.3.2, 3.5.3.3, 3.5.3.4

			[20160811] NAT + Thales Same as point 33.				
42	NAT	Ref 4.2.1 page 139	1. The old magnetic tickets equipment TOM & Gates in line 1&2. [20160811] 1. The management of old equipment at the CBO is not included. The objective of the CBO is to manage both magnetic and contactless equipment (Old + New)	27/07/17	Refer to points 25 bis & 29 - The old magnetic data (TOM & gate) is uploaded to the CBO with the existing format. - The old magnetic EOD is downloaded from the CBO through the line 3 LCU.		3.3.1.1 , old magnetic data, (unchanged) 3.4.2.1. Old MT EOD.
46	NAT	Ref 4.3.3.3 page 141	AV2 SAM production system and Certification authorities should be managed from the CBO. [20160811] NAT + Thales See point 41 for CA. See point 33 for AV2 SAM.	27/07/17	Point 41, agreed. It is confirmed that the new Root CA is included. Refer to 3.5.3.5 Refer to point 33.		3.5.3.5 (unchanged) 3.5.3.2, 3.5.3.3, 3.5.3.4
48	NAT + Thales		NAT is requiring to have a complete vision of the CBO including the functions currently in scope and also out of scope and the interfaces. This is for "clarifying the provided system capability and readiness in this concern and defining the needed components and actions to complete implementation and activation" Thales to come back on this. This could be a dedicated workshop on interoperability. The base of the workshop could be the white paper provided by Thales for LRT.	27/07/17	Workshop held in France in November 2016. Supporting document was delivered to NAT		Introduction to operability presentation delivered November 2016.

C8				The acronym/abbreviations list is not exhaustive, for example "PID" acronym to be added in abbreviations list chapter 5, this list shall be exhaustive according to all acronyms and abbreviations used into the document	27/07/17	Agreed		5.1
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6.3 UPDATE TRACKING VERSION E

N°	Reader	Page	Chapter	Comment	Date	Answer	Update tracking
3	NAT		General	<p>It should be presented and clarified the role of this document in the system development and software design, implementation, vérification and documentation (V-cycle) with reference to computer aide software engineering standards CASE and traceability tools as referenced in tender documents.</p> <p>NEW: You mentioned in your answer that the refence documents in tranceability matrix are your technical offer , this is not correct, NAT Line 3 Phase 3 technical specifications is also a reference for the project .</p>	19/02/18	Section 1.1 has been updated with traceability to project documents. Line 3 Phase 3 references when applicable have been discussed during the review of the specifications of each subsystem and incorporated in those specifications when applicable. Precision is added in section 1.1.	1.1.3
11	NAT		General	The document must include use cases managing other SAM's and other CSC's clarifying the provided system capabiity and readiness in this concern and defining the needed components and actions to complete implementation and activation.	19/02/18	The management of other cards than the Cairo CSC and its application AID 818000 is out of the scope of delivery of the project. Our proposal is to address this topic in a separate presentation addressing future roadmaps such as the unified card.	

12	NAT		General	The document must include use cases managing mobile ticketing, clarifying the provided system capability and readiness in this concern and defining the needed components and actions for complete implementation and activation.	19/02/18	Mobile ticketing is out of the scope of delivery of the project. Our proposal is to address this topic in a separate presentation addressing future roadmaps such as the unified card	
13	NAT		General	The document must include use cases managing EMV in ticketing, clarifying the provided system capability and readiness in this concern and defining the needed components and actions for complete implementation and activation	19/02/18	EMV ticketing is out of the scope of delivery of the project. Our proposal is to address this topic in a separate presentation addressing future roadmaps such has the unified card	
16	NAT		General	<p>The use cases must include topology management use cases such as : add AFC equipment in new stations, add AFC equipment in new metro line either native equipment or from other vendors.</p> <p>New: In sections 3.5.2.2 & 3.5.2.1 nothing exist concerning the required function , you have to complywith the requirement Why t he equipment management functionality at L1&L2. This is not applicable.</p>	19/02/18	As per the Unified Interface, the equipment is configured at LCU level and uploaded to the CBO. Precisions is added.	3.5.2
17	NAT		General	<p>The use case must include fare creation / fare description cases to edit create new application, new fare structure, new product, new profiles, etc ...</p> <p>New: After checking the CBO SSS and CBO MMI there is nothing added for this requirement , you have to comply with the requirement.</p>	19/02/18	Precisions are added.	3.4.2.3

18	NAT		General	<p>The use cases must include customer relation service management capable of working with interoperable partner and organization for mass operation such as importing/exporting customer database files for CSC personalization, ... etc</p> <p>New: This interface is included in the unification document item 3.1.5.3.</p>	19/02/18	Customer record importation is available at the CBO. Precision is added in the document	3.2.1.1
22	NAT		Cha 1.2, page 9	New: When the CCHS interface document will be submitted?	19/02/18	CCHS interface will be delivered within the context of project phase 2 documents final update.	
27	NAT		Ref 3.2.2.5 page 36	PVU works also through wireless (GPRS, Wifi and bluetooth)	19/02/18	Limitation is removed from System SSS. Details of PVU processing are addressed in PVU SSS.	3.5.2.2.5, 3.5.1.7, 3.5.3.2
35	NAT		Ref 3.5.4, page 131	The use cases must include use cases to upgrade the system software (Win, Database, etc ...) to proof software portability and other use cases to extend transaction processing power and storage capacity and the capability to add new functional modules to proof system scalability (application and software)	19/02/18	<p>1. Scalability memo has been presented and reviewed in FAT. Memo is appended to the document.</p> <p>2. COTS versions are specified in the HRS. Upgrade plan is part of the maintenance.</p>	Appendix 4
36	NAT		Ref 4.4.1.1, page 63	In case of downloading blacklist file, the system must have two type of blacklist file : Primary blacklist file that will be automatically downloaded once a day. The Secondary blacklist automatically downloaded several times upon reception from the CBO.	19/02/18	Referring to open points memo dated 3-5 April 2018, item #12, this point has been closed. The full blacklist is made available several times a day. Precision is added	3.4.1.1
39	NAT		Ref 3.4.3.2 page 82	The BI on-line data storage capacity must be 5 years and offline archiving capacity 10 years	19/02/18	Referring to open points memo dated 3-5 April 2018, item #18, this point is closed. On line storage is 13 months of detailed data and 5 years archiving.	3.4.3.2

48	NAT + Thales			NAT is requiring to have a complete vision of the CBO including the functions currently in scope and also out of scope and the interfaces. This is for "clarifying the provided system capability and readiness in this concern and defining the needed components and actions to complete implementation and activation"	19/02/18	Our proposal is to address this topic in a separate presentation addressing future roadmaps such as the unified card.
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6.4 UPDATE TRACKING VERSION E

N°	Chapter	Comment	Thales answer	NAT feedback	Thales reply
11	General	The document must include use cases managing other SAM's and other CSC's clarifying the provided system capability and readiness in this concern and defining the needed components and actions to complete implementation and activation.	The management of other cards than the Cairo CSC and its application AID 818000 is out of the scope of delivery of the project. Our proposal is to address this topic in a separate presentation addressing future roadmaps such as the unified card.	Submit the mentioned presentation include NAT request	<p>A presentation gathering:</p> <ul style="list-style-type: none"> - SAM management - Mobile ticketing - EMV - requirement to add a new line - interface with CCHS - CBO roadmap <p>will be presented but is out of scope of this project and document.</p> <p>Commitment from Thales to do it in the frame of Phase 2 but it should not be a blocking remark for the approval of this document</p>

N°	Chapter	Comment	Thales answer	NAT feedback	Thales reply
12	General	The document must include use cases managing mobile ticketing, clarifying the provided system capability and readiness in this concern and defining the needed components and actions for complete implementation and activation.	Mobile ticketing is out of the scope of delivery of the project. Our proposal is to address this topic in a separate presentation addressing future roadmaps such as the unified card	Submit the mentioned presentation include NAT request	see 11
13	General	The document must include use cases managing EMV in ticketing, clarifying the provided system capability and readiness in this concern and defining the needed components and actions for complete implementation and activation	EMV ticketing is out of the scope of delivery of the project. Our proposal is to address this topic in a separate presentation addressing future roadmaps such as the unified card	Submit the mentioned presentation include NAT request	see 11
16	General	The use cases must include topology management use cases such as : add AFC equipment in new stations, add AFC equipment in new metro line either native equipment or from other vendors. New: In sections 3.5.2.2 & 3.5.2.1 nothing exist concerning the required function , you have to comply with the requirement Why the equipment management functionality at L1&L2. This is not applicable.	As per the Unified Interface, the equipment is configured at LCU level and uploaded to the CBO. Precisions is added.	Clarify the needed configuration for adding new line at CBO level.	see 11

N°	Chapter	Comment	Thales answer	NAT feedback	Thales reply
17	General	<p>The use case must include fare creation / fare description cases to edit create new application, new fare structure, new product, new profiles, etc ...</p> <p>New: After checking the CBO SSS and CBO MMI there is nothing added for this requirement , you have to comply with the requirement.</p>	Precisions are added.	Open	Answered in previous version
22	Cha 1.2, page 9	New: When the CCHS interface document will be submitted?	CCHS interface will be delivered within the context of project phase 2 documents final update.	Document to be submitted	see 11
48		<p>NAT is requiring to have a complete vision of the CBO including the functions currently in scope and also out of scope and the interfaces. This is for "clarifying the provided system capability and readiness in this concern and defining the needed components and actions to complete implementation and activation"</p>	<p>Our proposal is to address this topic in a separate presentation addressing future roadmaps such as the unified card.</p>	<p>Presentation to be provided</p>	see 11

END