



## D-4.1.4 End-to-End Switching Arrangements Non Functional Requirements

### **Overview:**

This document sets out the end-to-end non-functional requirements for Central Data Services and Market Participant systems in the new Switching Arrangements.

The document is based on the list of non-functional system characteristics described in the standard ISO-IEC 25010. Performance and reliability requirements are given for the Central Data Services, with expected average and peak switch volumes defined. Further non-functional requirements are described for CSS at a high level. A more detailed definition of the non-functional requirements for CSS and its interfaces will be delivered as part of the detailed CSS design phase.

## Associated documents

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- [1] D-4.1.5 E2E Solution Architecture
- [2] D-4.1.1 DLS E2E Design Assumptions
- [3] D-4.1.6 E2E Operational Choreography
- [4] D-4.10.1.2 E2E Security Requirements
- [5] D-4.1.2 E2E Detailed Design Models (the Switching Design Repository, held in ABACUS)
- [6] D4.2 CSS Design

## Contents

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<b>Executive Summary</b>	<b>3</b>
<b>1. Introduction</b>	<b>4</b>
<b>2. Non-Functional Requirement Categories</b>	<b>5</b>
Performance Efficiency	5
Compatibility	5
Usability	5
Reliability	6
Maintainability	6
Portability	6
Description of non-functional requirement categories	7
<b>3. Switching Non-Functional Requirements</b>	<b>10</b>

## Executive Summary

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The End-to-End (E2E) Non-Functional Requirements is one of a number of products which contribute to the end-to-end design of the new Switching Arrangements.

The non-functional requirements defined in this document are based on the categories in the quality framework ISO-IEC 25010 (which forms the basis for other industry best practice methodologies such as Agile and ITIL).

The requirements described for a service or system within the new Switching Arrangements depend on the role of that service.

For Market Participants' systems, a requirement is described for:

- **Response times** for acknowledging receipt of invitation to object to a loss from CSS.

For Central Data Services other than CSS, requirements are described for:

- **Response times** for messages and files received from CSS;
- **Response times** for messages received from Market Participants;
- **Volumes of switches**, both average and peak, as well as a “peak of peaks” associated with a Supplier of Last Resort (SoLR) event or a large collective switch; and
- **Availability and recoverability.**

For CSS, requirements will be defined for the characteristics listed below. Most are defined in this document, but some will be covered in the detailed CSS design (where this is the case, the reason is explained in this document). The categories are:

- **Performance efficiency**, which covers both response times and throughput (volume of switches), as well as capacity (the number of MPxNs and associated data that the system is expected to support);
- **Compatibility**, which covers the way in which CSS exchanges information with other systems and services;
- **Usability**, which includes operability of the service;
- **Reliability**, which includes items such as availability and recoverability;
- **Maintainability**, which covers the degree to which the service can be modified; and
- **Portability**, which covers the degree to which the system can be transferred to a different hardware or software platform.

Security considerations are covered in the D-4.10.1.2 E2E Security Requirements<sup>[4]</sup>.

# 1. Introduction

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1.1. This document sets out at a high level the end-to-end non-functional requirements for the new Switching Arrangements. Further detail will be provided during the detailed CSS design. Each requirement must be testable and all systems and services must provide facilities for demonstrating that they meet the requirements, for example the provision of appropriate logging which allows measurement of response times.

1.2. The intended audience is any stakeholder responsible for a system or service which will operate in the new Switching Arrangements. See D-4.1.5 E2E Solution Architecture, Figure 1 - E2E Switching Data Services Landscape and the associated text.

1.3. Section 2 describes the ISO standards on which the Switching requirements have been based and Section 3 describes the specific Switching Arrangements E2E non-functional requirements in the form of an Excel spreadsheet. This spreadsheet assumes that the new Switching Arrangements go live in 2020 and contains requirements which relate to the first year of operation. It is expected that these requirements will be reviewed during the first year and adjustments made accordingly to the services and systems.

## 2. Non-Functional Requirement Categories

2.1. The diagram below shows the categories and sub categories from the ISO-IEC 25010 framework on which this document is based. This section describes the requirement categories.



**Figure 2 Non-functional characteristics identified by ISO-IEC 25010**

### Performance Efficiency

2.2. Performance efficiency is performance relative to the amount of resources used under stated conditions. Note that resources can include other software products, the software and hardware configuration of the system, and materials (e.g. print paper, storage media).

### Compatibility

2.3. Compatibility is the degree to which a product, system or component can exchange information with other products, systems or components, and/or perform its required functions, while sharing the same hardware or software environment.

### Usability

2.4. Usability is the effectiveness, efficiency and satisfaction in a specified context of use. Usability can either be specified or measured as a product quality characteristic in terms of its sub-characteristics, or specified or measured directly by measures that are a subset of quality in use.

2.5. Usability is covered in the CSS Detailed Design documentation, rather than in this document. Usability requirements only affect CSS and are better defined in conjunction with more detailed design work.

### **Reliability**

2.6. Reliability is the degree to which a system, product or component performs specified functions under specified conditions for a specified period of time. Note that wear does not occur in software. Limitations in reliability are due to faults in requirements, design and implementation, or due to contextual changes.

2.7. Dependability characteristics include availability and its inherent or external influencing factors, such as availability, reliability (including fault tolerance and recoverability), security (including confidentiality and integrity), maintainability, durability, and maintenance support.

### **Maintainability**

2.8. Maintainability is the degree of effectiveness and efficiency with which a product or system can be modified by the intended maintainers. Modifications can include corrections, improvements or adaptation of the software to changes in environment, and in requirements and functional specifications. Modifications include those carried out by specialized support staff, and those carried out by business or operational staff, or end users. Maintainability includes installation of updates and upgrades. Maintainability can be interpreted as either an inherent capability of the product or system to facilitate maintenance activities, or the quality in use experienced by the maintainers for the goal of maintaining the product or system.

2.9. Maintainability is covered in the CSS Detailed Design documentation, rather than in this document. Maintainability requirements only affect CSS and are better defined in conjunction with more detailed design work.

### **Portability**

2.10. Portability is the degree of effectiveness and efficiency with which a system, product or component can be transferred from one hardware, software or other operational or usage environment to another.

2.11. Portability is covered in the CSS Detailed Design documentation, rather than in this document. Portability requirements only affect CSS and are better defined in conjunction with more detailed design work.

## Description of non-functional requirement categories

Category	Description	Where Requirement is Covered
<b>Performance Efficiency</b>		
Time behaviour	degree to which the response and processing times and throughput rates of a product or system, when performing its functions, meet requirements	This document
Resource utilization	degree to which the amounts and types of resources used by a product or system, when performing its functions, meet requirements	This document
Capacity	degree to which the maximum limits of a product or system parameter meet requirements	This document
<b>Compatibility</b>		
Co-existence	degree to which a product can perform its required functions efficiently while sharing a common environment and resources with other products, without detrimental impact on any other product	This document
Interoperability	degree to which two or more systems, products or components can exchange information and use the information that has been exchanged	This document
<b>Usability</b>		
Appropriateness recognizability	degree to which users can recognize whether a product or system is appropriate for their needs	D4.2 CSS Design <sup>[6]</sup>
Learnability	degree to which a product or system can be used by specified users to achieve specified goals of learning to use the product or system with effectiveness, efficiency, freedom from risk and satisfaction in a specified context of use	D4.2 CSS Design <sup>[6]</sup>
Operability	degree to which a product or system has attributes that make it easy to operate and control	D4.2 CSS Design <sup>[6]</sup>
User error protection	degree to which a system protects users against making errors	D4.2 CSS Design <sup>[6]</sup>
User interface aesthetics	degree to which a user interface enables pleasing and satisfying interaction for the user NOTE This refers to properties of the product or system that increase the pleasure and satisfaction of the user, such as the use of colour and the nature of the graphical design.	D4.2 CSS Design <sup>[6]</sup>
Accessibility	degree to which a product or system can be used by people with the widest range of characteristics and capabilities to achieve a specified goal in a specified context of use	D4.2 CSS Design <sup>[6]</sup>
<b>Reliability</b>		
Maturity	degree to which a system, product or component meets needs for reliability under normal operation	This document
Availability	degree to which a system, product or component is operational and accessible when required for use NOTE Externally, availability can be assessed by the proportion of total time during which the system, product or component is in an up state. Availability is therefore a combination of maturity (which governs the frequency of failure), fault tolerance	This document

#### D-4.1.4 End-to-End Switching Arrangements Non Functional Requirements

Category	Description	Where Requirement is Covered
	and recoverability (which governs the length of down time following each failure).	
Fault tolerance	degree to which a system, product or component operates as intended despite the presence of hardware or software faults	This document
Recoverability	degree to which, in the event of an interruption or a failure, a product or system can recover the data directly affected and re-establish the desired state of the system NOTE Following a failure, a computer system will sometimes be down for a period of time, the length of which is determined by its recoverability.	This document
<b>Maintainability</b>		
Modularity	degree to which a system or computer program is composed of discrete components such that a change to one component has minimal impact on other components	D4.2 CSS Design <sup>[6]</sup>
Reusability	degree to which an asset can be used in more than one system, or in building other assets	D4.2 CSS Design <sup>[6]</sup>
Analysability	an intended change to one or more of its parts, or to diagnose a product for deficiencies or causes of failures, or to identify parts to be modified NOTE Implementation can include providing mechanisms for the product or system to analyse its own faults and provide reports prior to a failure or other event.	D4.2 CSS Design <sup>[6]</sup>
Modifiability	degree to which a product or system can be effectively and efficiently modified without introducing defects or degrading existing product quality NOTE 1 Implementation includes coding, designing, documenting and verifying changes. NOTE 2 Modularity and analysability can influence modifiability. NOTE 3 Modifiability is a combination of changeability and stability.	D4.2 CSS Design <sup>[6]</sup>
Testability	degree of effectiveness and efficiency with which test criteria can be established for a system, product or component and tests can be performed to determine whether those criteria have been met	D4.2 CSS Design <sup>[6]</sup>
<b>Portability</b>		
Adaptability	degree to which a product or system can effectively and efficiently be adapted for different or evolving hardware, software or other operational or usage environments NOTE 1 Adaptability includes the scalability of internal capacity (e.g. screen fields, tables, transaction volumes, report formats, etc.). NOTE 2 Adaptations include those carried out by specialized support staff, and those carried out by business or operational staff, or end users.	D4.2 CSS Design <sup>[6]</sup>



#### D-4.1.4 End-to-End Switching Arrangements Non Functional Requirements

Category	Description	Where Requirement is Covered
	NOTE 3 If the system is to be adapted by the end user, adaptability corresponds to suitability for individualization	
Installability	degree of effectiveness and efficiency with which a product or system can be successfully installed and/or uninstalled in a specified environment	D4.2 CSS Design <sup>[6]</sup>
Replaceability	<p>degree to which a product can replace another specified software product for the same purpose in the same environment</p> <p>NOTE 1 Replaceability of a new version of a software product is important to the user when upgrading.</p> <p>NOTE 2 Replaceability can include attributes of both installability and adaptability. The concept has been introduced as a sub-characteristic of its own because of its importance.</p> <p>NOTE 3 Replaceability will reduce lock-in risk: so that other software products can be used in place of the present one, for example by the use of standardized file formats.</p>	D4.2 CSS Design <sup>[6]</sup>

**Table 1 - Description of non-functional requirement categories**

## 3. Switching Non-Functional Requirements

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3.1. The specific requirements that apply to the E2E Switching Arrangements are stated in the accompanying spreadsheet:



Switching  
Non-Functional Requi

### Table 2 - List of Switching non-functional requirements

3.2. Note that at this stage, only broad requirements have been stated regarding the network over which CSS will communicate with the other systems and services in Switching. More detailed requirements will be described during the CSS detailed design.

3.3. Where a requirement is stated for DES or for ECOES, it is assumed that a future MIS would be subject to the same requirement.

3.4. The following aspects of the E2E Switching Arrangements are not included within the scope of this document:

- Threshold Anomaly Detection;
- Consumer Enquiry Centre;
- Service Management; and
- Reporting/Business Information/Management Information.

3.5. Response and throughput statistics exclude the times when relevant part(s) of the E2E Switching Arrangements are unavailable.