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Electronic Signatures and Infrastructures (ESI);
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Part 2: Test suites for interoperability testing of Electronic Registered Delivery Service Providers

Reference

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Electronic Signatures and Infrastructures (ESI).

The present document is part 2 of a multi-part deliverable. Full details of the entire series can be found in part 1 [i.1].

Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the ETSI Drafting Rules (Verbal forms for the expression of provisions).

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1 Scope

The present document defines:

1) A test suite for supporting interoperability tests within the field of Electronic Registered Delivery Services (ERD services or ERDS hereinafter) as specified in ETSI EN 319 522 parts 1 [1], 2 [2], 3 [3] and 4 [4], [5] and [6]. The test suite defines test cases for the following environments:

   - Environments that correspond to the basic model as defined in ETSI EN 319 522-1 [1] where sender and all the entities at receiving side are subscribed to the same ERDS.

   - Environments that correspond to the 4-corner model as defined in ETSI EN 319 522-1 [1] where sender is subscribed to one ERDS and the entities at receiving side are subscribed to another one, and no intermediate ERDS is required for relaying ERD messages between them.

   - Environments that correspond to the extended model as defined in ETSI EN 319 522-1 [1] where sender is subscribed to one ERDS and the entities at receiving side are subscribed to another one, and intermediate ERDSs are required for relaying ERD messages between them.

2) A mechanism for documenting new test cases and expanding the aforementioned test suite.

2 References

2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at https://docbox.etsi.org/Reference/.

NOTE: While any hyperlinks included in this clause were valid at the time of publication, ETSI cannot guarantee their long term validity.

The following referenced documents are necessary for the application of the present document.

[1] ETSI EN 319 522-1: "Electronic Signatures and Infrastructures (ESI); Electronic Registered Delivery Services; Part 1: Framework and Architecture".

[2] ETSI EN 319 522-2: "Electronic Signatures and Infrastructures (ESI); Electronic Registered Delivery Services; Part 2: Semantic contents".

[3] ETSI EN 319 522-3: "Electronic Signatures and Infrastructures (ESI); Electronic Registered Delivery Services; Part 3: Formats".

[4] ETSI EN 319 522-4-1: "Electronic Signatures and Infrastructures (ESI); Electronic Registered Delivery Services; Part 4: Bindings; Sub-part 1: Message delivery bindings".

[5] ETSI EN 319 522-4-2: "Electronic Signatures and Infrastructures (ESI); Electronic Registered Delivery Services; Part 4: Bindings; Sub-part 2: Evidence and identification bindings".

[6] ETSI EN 319 522-4-3: "Electronic Signatures and Infrastructures (ESI); Electronic Registered Delivery Services; Part 4: Bindings; Sub-part 3: Capability/requirements bindings".

[7] ETSI EN 319 532-3: "Electronic Signatures and Infrastructures (ESI); Registered Electronic Mail (REM) Services; Part 3: Formats".

[8] OASIS Standard (January 2013): "AS4 Profile of ebMS 3.0 Version 1.0".

2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

[i.1] ETSI TS 119 524-1: "Electronic Signatures and Infrastructures (ESI); Testing Conformance and Interoperability of Electronic Registered Delivery Services; Part 1: Testing conformance".

[i.2] OASIS Standard (October 2007): "ebXML Messaging Services Version 3.0: Part 1, Core Features".

NOTE: Available at http://docs.oasis-open.org/ebxml-msg/ebms/v3.0/core/ebms_core-3.0-spec.pdf.

3 Definition of terms, symbols and abbreviations

3.1 Terms

For the purposes of the present document, the terms given in ETSI EN 319 522-1 [1] apply.

3.2 Symbols

Void.

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ACC_REJ_EXP	ACCeptance REJection EXPiry
AS4	Applicability Statement 4
CONS_ACC	CONSignment ACCeptance
CONS_NOT	CONSignment NOTification
CONS_NOT_FAIL	CONSignment NOTification FAILure
CONS_REJ	CONSignment REJection
CONT_CONS	CONTent CONSignment
CONT_CONS_FAIL	CONTent CONSignment FAILure
CONT_HAND	CONTent HANDover
CONT_HAND_FAIL	CONTent HANDover FAILure
ebMS	ebXML Messaging Services
ebXML	Electronic Business using eXtensible Markup Language
ERD	Electronic Registered Delivery
ERDS	Electronic Registered Delivery Service
EV_SET	Evidence - SET
IERDS	Intermediate Electronic Registered Delivery Service
NOT_F_ACC	NOTification For ACCceptance
OASIS	Organization for the Advancement of Structured Information Standards
REC_F_NERDS	RECeived From Non ERDS
REL_ACC	RELay ACCeptance
REL_FAIL	RELay FAILure
REL_REJ	RELay REJection
REL_T_NERDS	RELay To Non ERDS
REL_T_NERDS_FAIL	RELay To Non ERDS FAILure

REM	Registered Electronic Mail
REMS	Registered Electronic Mail Service
RERDS	Recipient's Electronic Registered Delivery Service
SCN_ID	Scenario IDentifier
SERDS	Sender's Electronic Registered Delivery Service
SUB_ACC	SUBmission ACCeptance
SUB_REJ	SUBmission REJection
URI	Universal Resource Identifier
XML	eXtensible Mark-up Language

4 Technical approach

4.1 Components of test cases and their identifiers

As it has been mentioned before the present document defines:

1) A test suite for supporting interoperability tests within the field of Electronic Registered Delivery (ERD hereinafter) as specified in as specified in ETSI EN 319 522 parts 1 [1], 2 [2], 3 [3] and 4 [4], [5] and [6].

2) A mechanism for documenting new test cases and expanding the aforementioned test suite.

The present document follows a layered approach for building the definition of the test cases in the test suite, which can be summarized as follows:

1) Clause 5 defines a number of parameterized scenarios. A scenario consists of a number of entities, namely: sender, one or more ERDSs, and the entities at receiving side (one or more recipients and/or one or more recipients' delegates), which exchange different ERD messages with time. Each scenario corresponds to one of the three models presented in ETSI EN 319 522-1 [1]. This clause presents a template for defining one scenario, in a way that resembles to some templates used for defining use cases scenarios in software engineering.

   This template:

   - Includes the enumeration of the original message and all the ERD messages exchanged by the participating entities. This list of exchanged ERD messages is one of the parameters of the scenario.

   - Also includes a list of ERDS evidence sets, which, in the scenario, are incorporated in some ERD messages.

   One scenario may be used for defining several test cases depending on:

   - The specific components of each exchanged ERD message (suppressing or adding an optional metadata component, or changing the value of a certain metadata component results in a different ERD message and consequently a different test case).

   - The entities at receiving part (for instance, changing one recipient by one recipient's delegate, or two recipients and one recipient's delegate results in a different the test case).

   - A named set of additional requirements (for instance details of the original message, like whether it contains or not attachments, is signed, is encrypted, etc.).

   This means that one test case corresponds to one scenario where all the exchanged ERD messages have been completely defined in terms of their components, all the participating entities have been established, and all the additional requirements have also been defined. Taking the functional notation this can be expressed as follows:

   TestCase#i = Scenario_id(,<Receiving side identifier>, <ERD message 1 details>, <ERD message 2 details>, …, <ERD message N details>, <additional requirements set identifier)

   Where:

   - <Receiving side identifier> is the identifier assigned to a certain set of entities at receiving side;

- <message identifier I> is the identifier of a specific instantiation of the aforementioned message, defined in clauses 6.3, 6.4 and 6.5. These clauses define specific instantiations of ERD payloads, ERD receipts and ERD dispatches respectively.

- <additional requirements set identifier> is the identifier of a named set of additional requirements. Clause 7.2 defines a number of these named sets.

2) Clauses 6.3, 6.4 and 6.5 define specific instantiations of ERD payloads, ERD receipts and ERD dispatches respectively. Each type of ERD message is composed by several components, with their metadata components and payloads as specified in ETSI EN 319 522-4-1 [4] and ETSI EN 319 522-4-2 [5]. The present document defines a number of combinations of metadata components in clauses 6.2.2 and 6.2.3, and assigns to each one a unique identifier. This allows to use again the functional notation, and define one instantiation of a certain type of ERD message as follows:

   ERD message instance = Sequence(Metadata(<AS4 profiled metadata combination details>, <payload for ERDS relay metadata combination details>) <payload for User Content>* <payload for ERDS Evidence>*)

   Where '*' stands for 0 or more occurrences of the payload.

NOTE: The payloads for user content and for ERDS evidence can be present at certain types of ERD messages but are forbidden in other types.

3) Clauses 6.2.2 and 6.2.3 define named combinations of metadata components defined in OASIS: "AS4 Profile of ebMS 3.0 Version 1.0" [8] and profiled in ETSI EN 319 522-4-1 [4] and ETSI EN 319 522-4-2 [5], and the relay metadata components defined in ETSI EN 319 522-3 [3] respectively. Each clause define different instances of the aforementioned components and assigns them unique identifiers that are used for defining specific instances of the different ERD messages as shown above. Once this level is reached, the specific test case is fully defined as: a scenario where fully defined, ERD messages are exchanged between a specific set participating entities, and where a specific set of additional requirements are imposed.

4.2 Adding new test cases to the test suite

The strategy followed for building the definitions of the test cases makes it easy to expand the test suite by incorporation of new test cases.

For defining a new test case the following steps are required:

1) Identify the **set of receiving entities**. If none of the predefined set of entities at the receiving side is the one required, assign a name to this set (**<RECEIVING_ENTITIES >**) and incorporate it to the repertoire of named sets as specified in clause 7.3). The sender is always present by default.

2) Define the ERDSs that will participate in the test case.

3) If the set of participating ERDSs is not equal to none of the scenarios already identified in the present document, the new scenario will require to be defined in a new template.

4) Identify the **sequence of actions** performed by each actor and their order of occurrence and assign a new unique identifier (**<SCN_ID >)** to the scenario.

5) Identify **all the ERD messages** generated by the actors as they go through the sequence of actions. For each message:

   a) Identify its ebMS payloads, e.g. the parts of the user content or XML document with relay meta-data.

   b) Check if the combinations of metadata components have already been defined in the present document. If not, add the required combination of metadata components to the repertoire of named combinations to the corresponding clause (clause 6.2.2 or 6.2.3).

   c) List all the ERD messages exchanged as parameters of the scenario.

   d) Identify the ERDS evidence format and the set of ERDS evidence for each ERD message including them and add the names of the ERDS evidence sets to the Var section of the template.

6) Identify and define any other additional requirement for completely define the test case. If the set of requirements is different than all the sets already define, assign a name to it (**<ADD_REQ_COMB>)** and add it to the repertoire of named sets of additional requirements in Table 12 (clause 7.2).

5 Scenarios

5.1 Introduction

The present clause defines a number of selected scenarios that will be used in clause 8.

Clause 5.3 defines scenarios where sender and recipient(s) are subscribed to the same ERDS (black-box model described in ETSI EN 319 522-1 [1]).

Clause 5.4 defines scenarios where the sender and the recipient(s) are subscribed to different ERDSs and there are not intermediate ERDSs between them (4-corner model described in ETSI EN 319 522-1 [1]).

Clause 5.5 defines scenarios where sender is subscribed to a ERDS and the recipient(s) is(are) not subscribed to the same ERDS and there are one or more intermediate ERDSs (extended model described in ETSI EN 319 522-1 [1]).

Figure 1 of clause 4 of ETSI EN 319 522-2 [2] shows three structures being exchanged between ERD-UAs and ERDSs, namely:

1) The structure {submission metadata, user content}, which receives the name of original message in Table 1 of clause 4 of ETSI EN 319 522-2 [2].

2) The structure {ERDS handover metadata, ERDS evidence} for allowing access to ERDS evidences to users.

3) The structure {ERDS handover metadata, user content, ERDS evidence} for allowing the R-ERDS the submission of the user content (and optionally ERDS evidences) to the recipient.

Because of that the following decisions have been adopted for building the scenarios:

1) Neither S-ERDS nor R-ERDS will submit {ERDS handover metadata, ERDS evidence} structures to their users, except when the ERDS evidence is an evidence of some kind of relevant rejection by the ERDS (see the first scenario, for instance). Identical scenarios including the submission of such structures can be easily defined and used in interoperability test events.

2) The scenarios will show the R-ERDS submitting {ERDS handover metadata, user content, ERDS evidence} or {ERDS handover metadata, user content} structures to the receiving side.

3) The acronym hndvMet is used for ERDS handover metadata.

Table 1 shows the template for defining one scenario.

Table 1: Template for the tabular definition of one scenario

Scenario id: <SCN_ID>				Purpose
Parameter: <ERDS_receipt>_with_XML_SUB_REJ *<Parameter 1 that helps to fully the scenario. Their number depends on the specific scenario>*		Var SET_EV#1 = {…, …} *Named sets of ERDS evidence used in the definition of the scenario.*		
Parameter: *<Parameter 2>*		Var SET_EV#2 = {… …}		
Parameter: *<Parameter N>*		Var SET_EV#N = {… …}		
Sequence of actions				
<SEQUENCE OF ACTIONS. THERE IS ONE COLUMN PER PARTICIPATING ACTOR>				
#	**Sender**	**ERDS**	**Receiving side**	
The sequence is composed of a number of numerated steps, when the actors perform certain actions as shown below. Some frequent actions: send original message, accept submission, reject submission, consign, generate one ERDS evidence, generate one ERD message, etc.				
1	Sender sends original message			
2		Rejects submission. Generates XML_SUB_REJ ERDS evidence		
3		Generates <ERDS_receipt>_with_XML_SUB_REJ		
4		Sends <ERDS_receipt>_with_XML_SUB_REJ		
5	Receives <ERDS_receipt>_with_XML_SUB_REJ			

Each scenario is assigned a unique identifier <SCN_ID>. The reasons why the scenario has been defined are shown in column "Purpose".

The definition of each scenario requires that parties exchange a number of ERD messages, which appear listed as parameters in the rows immediately below the headers row. Its number depends on the specific scenario.

Below the list of parameters, the table shows a sequence of actions performed by different involved entities, which results in that a set of ERD messages is generated and exchanged.

The definition of each scenario also can use a number of named ERDS evidence sets, which are listed in cells started with Var. Each ERDS evidence set is given a name EV_SET#<i>, being <i> a non-negative integer number.

The involved entities are sender (or sender's delegate, the scenario definition does not make any distinction between them), one or more ERDSs, and the entities at the receiving side (for the same scenario there may be different sets of entities, for instance one recipient, one recipient's delegate, one or more recipients, or one or more recipients and one or more recipients' delegates).

Each step is assigned a positive integer number. The actions performed include: submission of messages, generation of ERD messages, generation of ERDS evidence, acceptance of ERD messages, rejection of ERD messages, consignment of ERD messages, retrieval of ERD messages by entities at receiving side, failures, etc.

5.2 Abbreviations used in tables defining scenarios

This clause shows some abbreviations (which have already been anticipated in clause 3.3) used in the tables that define the scenarios.

Table 2 shows the abbreviations used for the different ERDS evidence.

Table 2: ERDS evidence abbreviations

ERDS Evidence name	ERDS Evidence abbreviation
SubmissionAcceptance	SUB_ACC
SubmissionRejection	SUB_REJ
RelayAcceptance	REL_ACC
RelayRejection	REL_REJ
RelayFailure	REL_FAIL
NotificationForAcceptance	NOT_F_ACC
NotificationForAcceptanceFailure	CONS_ACC
ConsignmentAcceptance	CONS_REJ
ConsignmentRejection	CONT_CONS
AcceptanceRejectionExpiry	ACC_REJ_EXP
ContentConsignment	CONT_CONS
ContentConsignmentFailure	CONT_CONS_FAIL
ConsignmentNotification	CONS_NOT
ConsignmentNotificationFailure	CONS_NOT_FAIL
ContentHandover	CONT_HAND
ContentHandoverFailure	CONT_HAND_FAIL
RelayToNonERDS	REL_T_NERDS
RelayToNonERDSFailure	REL_T_NERDS_FAIL
ReceivedFromNonERDS	REC_F_NERDS

ETSI EN 319 522-1 [1] specify a XML format for ERDS evidence, but also allows that ERDS Evidences are signed PDF documents. The notation defined in the present document makes it clear that all the test cases are defined for XML ERDS Evidence using the **XML** prefix for the ERDS evidence abbreviations.

EXAMPLE: The abbreviation for the XML SubmissionAcceptance ERDS evidence will be **XML_SUB_ACC**.

NOTE: In case some format for PDF ERDS Evidence is defined and ERDS providers need to test interoperability with them, it is always possible to replace the test cases defined in the present document by identical test cases where PDF ERDS Evidences are generated and exchanged instead XML ERDS Evidences.

The tables defining the Scenarios use the following abbreviations for the different participating ERDSs:

- **SERDS** stands for the ERDS serving the sender, in the scenarios where it is different than the ERDS serving the entities at receiving side.
- **RERDS** stands for the ERDS serving the entities at receiving side, in the scenarios where it is different than the ERDS serving the sender.
- **IERDS** stands for a ERDS that does not directly serves neither to the sender nor to the recipient(s)/recipient's delegate, but instead is an intermediate ERDS that relies ERD messages from SERDS to RERDS and from RERDS to SERDS.

5.3 Black-box model scenarios

5.3.1 Introduction

The present clause defines scenarios where the sender and the entities at the receiving side are subscribed to the same ERDS and consequently the user content is not relayed between different ERDSs.

Clause 5.3.2 defines scenarios where the ERDS operates in Store and Forward style.

Clause 5.3.3 defines scenarios where the ERDS operates in Store and Notify style.

5.3.2 Scenarios without notification for acceptance

Table 3 defines a number of scenarios for the case where sender and the entities at the receiving side are subscribed to the same ERDS and the ERDS does not send notification for acceptance to the entities at the receiving side.

Table 3: Scenarios for intra-ERDS without notifications for acceptance (1/8)

Scenario id: ERDS_BB_NO_NOT_F_ACC#1				Purpose
Parameter: {hndvMet,XML_SUB_REJ}				The simplest scenario: the ERDS rejects the original message submitted by the sender and sends back a {ERDS handover metadata, XML_SUB_REJ} structure SubmissionRejection ERDS evidence.
Sequence of actions				
#	**Sender**	**ERDS**	**Receiving side**	
1	Sender sends original message			
2		Rejects submission. Generates XML_SUB_REJ ERDS evidence		
3		Sends {hndvMet, XML_SUB_REJ} structure to the sender		
4	Receives {hndvMet, XML_SUB_REJ} structure			

Table 3a: : Scenarios for intra-ERDS without notifications for acceptance (2/8)

Scenario id: ERDS_BB_NO_NOT_F_ACC#2				Purpose
Parameter: {hndvMet, user content}				The simplest successful scenario. The ERDS: 1. Accepts the submission of the original message. 2. Generates the SubmissionAcceptance ERDS evidence, and stores it. 3. Aggregates the user content to ERDS handover metadata and performs as many consignments as required by the number of entities in the receiving side. 4. Generates the ContentConsignment ERDS evidence.
Parameter: XML_SUB_ACC				
Parameter: XML_CONT_CONS				
Sequence of actions				
#	**Sender**	**ERDS**	**Receiving side**	
1	Sender sends original message			
2		Accepts submission		
3		Generates and stores XML_SUB_ACC ERDS evidence		
4		Generates {hndvMet, user content} structure		
5		Consigns {hndvMet, user content} structure to the N entities at the receiving side		
6			{hndvMet, user content} structure correctly consigned to the N entities at the receiving side	
7		Generates and stores XML_CONT_CONS ERDS evidence		