



**Electronic Signatures and Infrastructures (ESI);
Registered Electronic Mail (REM);
Part 6: Interoperability Profiles;
Sub-part 2: REM-MD BUSDOX Interoperability Profile**

Reference

DTS/ESI-000069-3

Keywords

e-commerce, electronic signature, email, security,
trust services

ETSI

650 Route des Lucioles
F-06921 Sophia Antipolis Cedex - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C
Association à but non lucratif enregistrée à la
Sous-Préfecture de Grasse (06) N° 7803/88

Important notice

Individual copies of the present document can be downloaded from:

<http://www.etsi.org>

The present document may be made available in more than one electronic version or in print. In any case of existing or perceived difference in contents between such versions, the reference version is the Portable Document Format (PDF). In case of dispute, the reference shall be the printing on ETSI printers of the PDF version kept on a specific network drive within ETSI Secretariat.

Users of the present document should be aware that the document may be subject to revision or change of status. Information on the current status of this and other ETSI documents is available at

<http://portal.etsi.org/tb/status/status.asp>

If you find errors in the present document, please send your comment to one of the following services:

http://portal.etsi.org/chaicor/ETSI_support.asp

Copyright Notification

No part may be reproduced except as authorized by written permission.
The copyright and the foregoing restriction extend to reproduction in all media.

© European Telecommunications Standards Institute 2011.
All rights reserved.

DECT™, **PLUGTESTS™**, **UMTS™** and the ETSI logo are Trade Marks of ETSI registered for the benefit of its Members.
3GPP™ and **LTE™** are Trade Marks of ETSI registered for the benefit of its Members and
of the 3GPP Organizational Partners.
GSM® and the GSM logo are Trade Marks registered and owned by the GSM Association.

Contents

Intellectual Property Rights	4
Foreword.....	4
Introduction	4
1 Scope	5
2 References	5
2.1 Normative references	5
2.2 Informative references.....	6
3 Definitions and abbreviations.....	6
3.1 Definitions.....	6
3.2 Abbreviations	7
4 Mapping of terms and definitions	7
5 Functional GAP analysis between REM and BUSDOX.....	9
6 Covered Scenarios.....	9
6.1 REM+BUSDOX to pure BUSDOX.....	10
6.2 Pure BUSDOX to REM+BUSDOX.....	10
7 Profiles specifications.....	11
7.1 Common specifications	11
7.1.1 Identifiers.....	11
7.1.1.1 REM-MD Participant Identifiers.....	12
7.1.1.2 Document Identifiers for REM-MDs	13
7.1.1.3 Process Identifiers for REM-MDs.....	13
7.2 REM+BUSDOX to pure BUSDOX	14
7.2.1 Sender's original message profile.....	14
7.2.2 SML and SMP profiling	16
7.2.2.1 URL to access to SMP composition.....	17
7.2.2.2 Service Metadata Retrieval from SMP.....	18
7.2.2.3 BUSDOX Headers and REM Headers/Metadata.....	19
7.2.3 LIME Profile.....	20
7.2.4 BUSDOX message composition.....	21
7.2.5 Generating REM-MD message.....	21
7.2.6 Evidence	21
7.3 BUSDOX to REM-MD+BUSDOX	22
7.3.1 SML and SMP Profiling	25
7.3.1.1 URL to access to SMP composition.....	25
7.3.1.2 REM-MD Service Metadata store to SMP.....	26
7.3.1.3 Service Metadata Retrieval from SMP.....	26
7.3.1.4 BUSDOX Headers and REM Headers/Metadata.....	27
7.3.2 LIME Profile.....	27
7.3.3 Generating REM-MD message.....	27
7.3.4 Evidence	27
History	28

Intellectual Property Rights

IPRs essential or potentially essential to the present document may have been declared to ETSI. The information pertaining to these essential IPRs, if any, is publicly available for **ETSI members and non-members**, and can be found in ETSI SR 000 314: "*Intellectual Property Rights (IPRs); Essential, or potentially Essential, IPRs notified to ETSI in respect of ETSI standards*", which is available from the ETSI Secretariat. Latest updates are available on the ETSI Web server (<http://ipr.etsi.org>).

Pursuant to the ETSI IPR Policy, no investigation, including IPR searches, has been carried out by ETSI. No guarantee can be given as to the existence of other IPRs not referenced in ETSI SR 000 314 (or the updates on the ETSI Web server) which are, or may be, or may become, essential to the present document.

Foreword

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

The present document is part 6, sub-part 2 of a multi-part deliverable. Full details of the entire series can be found in part 1 [1].

Introduction

The summarised scope of each part and sub-part can be found in part 1 [1] of this multi-part deliverable.

1 Scope

The present document specifies requirements for achieving interoperability between the Registered Electronic Mail systems that are compliant with TS 102 640 (REM henceforth) specification [1] to [5] and systems that are compliant with "Business Document Exchange Network service metadata and transport specification" (BUSDOX henceforth) [6] to [11].

The approach used for this purpose is to define all the necessary mappings between the two specifications taking into account also the objective to maintain and preserve the main advantages and positive features present in both the realities as pursued in the Technical Specifications.

The present document is structured as follows:

- Clause 4: Mapping of terms and definitions.
- Clause 5: Functional GAP analysis between REM and BUSDOX.
- Clause 6: Covered Scenarios: REM+BUSDOX to BUSDOX and BUSDOX to REM+BUSDOX.
- Clause 7: Profile specification for the interaction scenarios defined in clause 6.

2 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 reference document (including any amendments) applies.

Referenced documents which are not found to be publicly available in the expected location might be found at <http://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.

2.1 Normative references

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

- [1] ETSI TS 102 640-1: "Electronic Signatures and Infrastructures (ESI); Registered Electronic Mail (REM); Part 1: Architecture".
- [2] ETSI TS 102 640-2: "Electronic Signatures and Infrastructures (ESI); Registered Electronic Mail (REM); Part 2: Data requirements, Formats and Signatures for REM".
- [3] ETSI TS 102 640-3: "Electronic Signatures and Infrastructures (ESI); Registered Electronic Mail (REM); Part 3: Information Security Policy Requirements for REM Management Domains".
- [4] ETSI TS 102 640-4: "Electronic Signatures and Infrastructures (ESI); Registered Electronic Mail (REM); Part 4: REM-MD Conformance Profiles".
- [5] ETSI TS 102 640-5: "Electronic Signatures and Infrastructures (ESI); Registered Electronic Mail (REM); Part 5: REM-MD Interoperability Profiles".
- [6] BUSDOX START: "Secure Trusted Asynchronous Reliable Transport (START) v 1.0.0 WP8 2009-12-22".
- [7] BUSDOX METADATA PUB: "Service Metadata Publishing v 1.0.0 WP8 2009-12-23".
- [8] BUSDOX METADATA LOC: "Service Metadata Locator Profile v 1.0.0 WP8 2009-12-21".
- [9] BUSDOX LIME: "Lightweight Message Exchange Profile v 1.0.0 WP8 2009-12-22".

- [10] BUSDOX PEPPOL: "PEPPOL Identifier Schemes v 1.0.0 WP8 2009-12-23".
- [11] BUSDOX COMMON DEFINITIONS: "Business Document Exchange Network - Common Definitions v 1.0.0 WP8 2009-11-27".
- [12] W3C WS-Transfer: "Web Services Transfer (WS-Transfer)" - W3C Working Draft 5 August 2010.
- NOTE: Available at <http://www.w3.org/TR/2010/WD-ws-transfer-20100805>.
- [13] W3C WS-Addressing: "Web Services Addressing (WS-Addressing)" - W3C Member Submission 10 August 2004.
- NOTE: Available at <http://www.w3.org/Submission/2004/SUBM-ws-addressing-20040810>.

2.2 Informative references

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 102 640-6-1: "Electronic Signatures and Infrastructures (ESI); Registered Electronic Mail (REM); Part 6: Interoperability Profiles; Sub-part 1: REM-MD UPU PRem Interoperability Profile".
- [i.2] ETSI TS 102 640-6-3: "Electronic Signatures and Infrastructures (ESI); Registered Electronic Mail (REM); Part 6: Interoperability Profiles; Sub-part 3: REM-MD SOAP Binding Profile".
- [i.3] IETF RFC 5321: "Simple Mail Transfer Protocol".
- [i.4] IETF RFC 5322: "Internet Message Format".
- [i.5] IETF RFC 5751: "Secure/Multipurpose Internet Mail Extensions (S/MIME) Version 3.2 Message Specification".
- [i.6] IETF RFC 3986: "Uniform Resource Identifier (URI): Generic Syntax".
- [i.7] ISO/IEC 27001:2005: "Information technology -- Security techniques -- Information security management systems -- Requirements".
- [i.8] ETSI TS 102 231: "Electronic Signatures and Infrastructures (ESI); Provision of harmonized Trust-service status information".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TS 102 640-1 [1] and the following apply:

REM/BUSDOX Gateway: set of technical and physical components, policies and processes that provide the gateway service among REM network and BUSDOX network

NOTE: A REM/BUSDOX Gateway may be a sub-service/module of a REM-MD or to be separated service.

Throughout the present document a number of verbal forms are used, whose meaning is defined below.

- **shall, shall not:** indicate requirements strictly to be followed in order to conform to the present document and from which no deviation is permitted.
- **should, should not:** indicate that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required, or that (in the negative form) a certain possibility or course of action is deprecated but not prohibited.

- **may, need not:** indicate a course of action permissible within the limits of the present document.

3.2 Abbreviations

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

AP	BUSDOX Access Point
EPR	BUSDOX EndPoint Reference
LC	BUSDOX LIME Client
LIME	BUSDOX LIghtweight Message Exchange Profile
SML	BUSDOX Service Metadata Locator
SMP	BUSDOX Service Metadata Publishing

4 Mapping of terms and definitions

Business Document Exchange Network (BUSDOX) specifies a document exchange infrastructure. BUSDOX Access Points communicate in a peer-to-peer model across the internet to form the BUSDOX infrastructure.

BUSDOX provides a specification, which may be instantiated in concrete implementations. For example, an instance of BUSDOX is the PEPPOL infrastructure, which includes governance models, certificate rules, identifier formats, and other profiling. This part is outside BUSDOX specification but included in PEPPOL.

In Table 1 a mapping among the main terms and definitions used in REM Technical specifications TS 102 640-1 [1] to TS 102 640-5 [5], and equivalent terms used in BUSDOX [6] to [11] specifications is provided. An empty cell means that the corresponding specification does not define an equivalent term of the one shown in the same row and defined in the other specification.

Table 1: Mapping of definitions

ETSI REM definitions (TS 102 640-1 [1], clause 3.1)	BUSDOX definitions [11]
REM-MD	Access Point (AP)
Sender's REM-MD	Source Access Point (SrcAP)
Recipient's REM-MD	Destination Access Point (DestAP)
	Secure Trusted Asynchronous Reliable Transport (START)
	Lightweight Message Exchange Transport (LIME)
	Lightweight Client or LIME Client (LC)
	Lightweight Profile Access Point (LIME-AP)
	Message Channel (MC)
	Inbound/Outbound Message Channel (InMC/OutMC)
	Endpoint Reference (EPR)
	Channel Identifier (ChannelID)
	Service Metadata Locator service (SML)
	Service Metadata Publisher (SMP)
	Service Metadata Consumer (SMC)
	Participant Identifier (participantID)
	Document Identifier (documentID)
	Process Identifier (processID)
certification authority	
information security policy	
Information Security Management System	
long term storage	
message archive	
original message	Business message
REM-MD repository	
Registered E-Mail	
REM dispatch	
REM Management Domain	BUSDOX Access Point
REM-MD envelope	SOAP Envelope
REM-MD evidence	
REM-MD Evidence Provider	
REM-MD Evidence Verifier	
REM-MD Message	BUSDOX Message
REM-MD Message Gateway	
REM-MD Message Transfer Agent	
REM-MD Repository Retrieval Interface	
REM-MD Sender Message Submission Interface	LIME Interface
REM-MD Third Party Evidence Retrieval Interface	
REM Message Store	
REM Object	
REM Objects Relay Interface	START Interface
REM User Agent (REM-UA)	
REM Policy	
REM Policy Domain	
REM Policy Domain Authority	
REM Recipient	(Recipient) LIME Client
REM Sender	(Sender) LIME Client
REM Third Party	
Signature Creation Server	
Time-Stamping Authority	
Time-Stamp Token	

5 Functional GAP analysis between REM and BUSDOX

The main differences between the functional aspects of ETSI REM and BUSDOX will be identified in the present clause by comparing, when possible, the similar aspects of the two systems under analysis. In particular the following aspects will be considered in the GAP REM versus BUSDOX:

- Main scopes
- Trust models
- Formats
- Evidence

A mapping between high level functions is identified in Table 2. The attention is concentrated to the boundary functions that are involved in the gateway among REM and BUSDOX systems, and to some other remarkable feature providing a more general view.

Table 2: GAP Analysis

ETSI REM	BUSDOX
The main scope of ETSI REM technical specification is to provide a reliable transport of messages enriched with a full set of evidence for the Sender and the Recipients regarding the exchanged messages.	The main purpose of the BUSDOX technical specification is to define a messaging infrastructure for secure and reliable exchange of electronic documents.
The Trust model of ETSI REM is based on the specifications of the Electronic Signatures and Infrastructures (ESI) and in particular on the TSL (Trusted List of supervised/accredited certification service providers in accordance with TS 102 231 [i.8]).	Trust model of BUSDOX is mainly based on the Secure Trusted Asynchronous Reliable Transport (START) infrastructure that is based on standards like SOAP, WS-Addressing [13], WS-Security, WS-Transfer [12], WS-ReliableMessaging and SAML.
The format of the exchanged messages in the REM model to which the present document refers is based on the MIME standard (RFC 5751 [i.5]) enriched with a set of typical Headers of the SMTP (RFC 5321 [i.3]) messaging protocol.	The format of exchanged messages in BUSDOX model is based on the standards used in the protocols (mainly SOAP, WS-Transfer [12]).
The evidence generated in a REM system is composed of specific signed information, created within a REM-MD, which proves that a certain event has occurred at a certain time.	BUSDOX does not have an analogue concept to the REM Evidence anyway, as indicated in the next clauses of the present document, the interaction with REM gives the possibility to have some evidence for both REM and BUSDOX users.

6 Covered Scenarios

In the present document two scenarios will be covered:

- REM+BUSDOX to pure BUSDOX - In this scenario the information flows from the REM network to the BUSDOX network.
- Pure BUSDOX to REM+BUSDOX - In this scenario the information flows from BUSDOX network to the REM network.

In both cases the contact points between the two networks is a new special network element acting as the gateway (REM/BUSDOX Gateway henceforth) among REM and BUSDOX.

The profile to use between the REM Sender and the REM/BUSDOX Gateway (through the REM-MD and the REM-UA) **shall** be the "REM-MD Interoperability Profiles" defined in TS 102 640-5 [5] REM technical specification. To simplify the description the terms REM Sender and REM Recipient **shall** be used in the present document without an explicit mention of the REM-UA role that is always present in the middle to such type of interactions. Similarly REM "Senders" and "Recipients" are generic terms that **shall** mean any entity like Process Applications, human users without any other explicit mention.

6.1 REM+BUSDOX to pure BUSDOX

An interesting scenario may take place when one of the endpoints implements the REM stack. The picture below shows a REM+BUSDOX sender communicating with a pure BUSDOX recipient through the REM/BUSDOX Gateway functions specified in the present document.

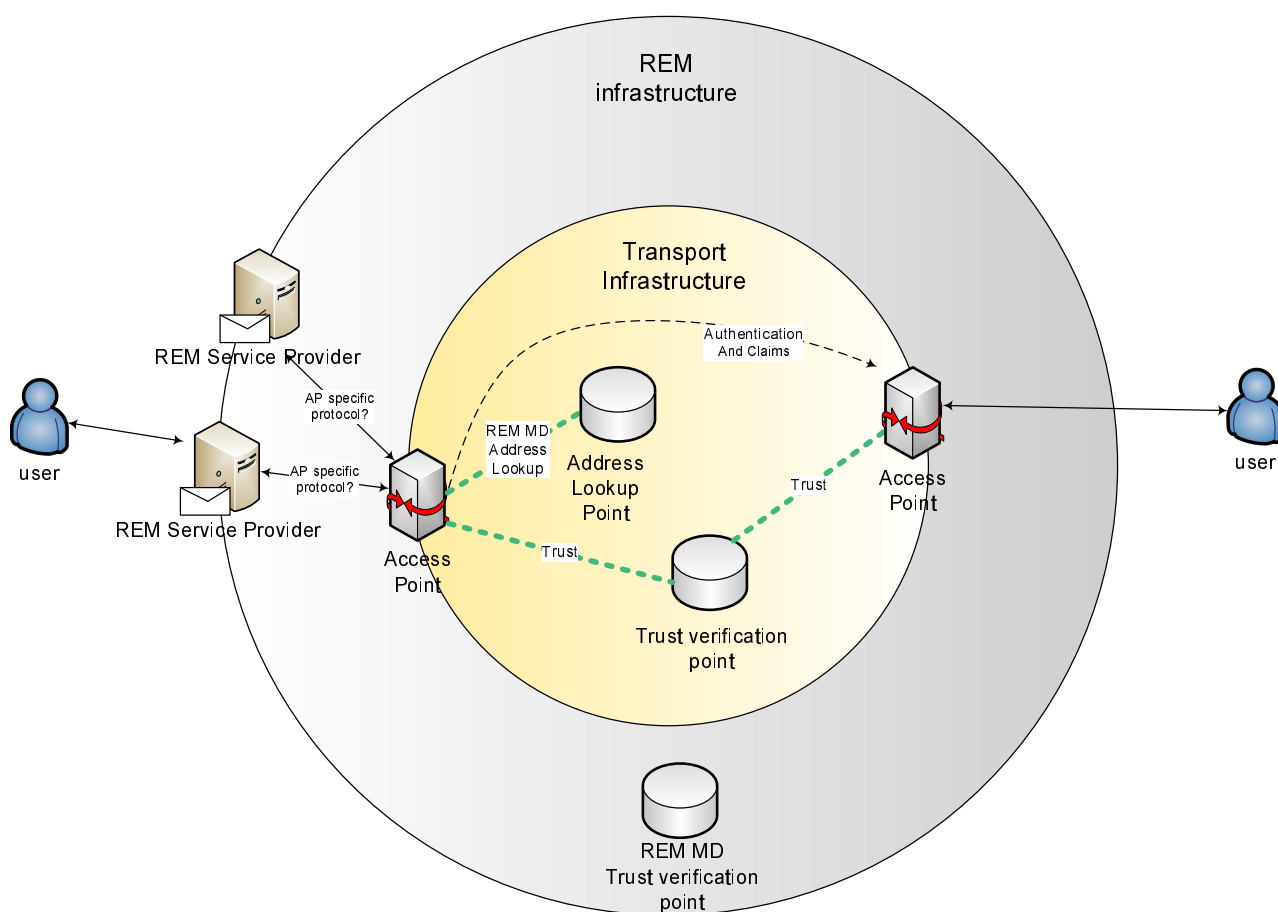


Figure 1

REM would normally consider this case in the same way as sending a message to a non-REM system (like ordinary mail). However, trust is established at the AP level and a proof of relay of the message is provided at the AP level, in the form of a `wsse:SignatureConfirmation`.

This proof **shall** be managed by the Sender's REM/BUSDOX Gateway in order to produce a set of evidence as defined in clause 7.2.6. Note that some of this is somehow weaker than a **RelayToREMMDAcceptanceRejection** evidence, which it is produced (and signed) by the Recipient's REM-MD.

6.2 Pure BUSDOX to REM+BUSDOX

Similarly to the previous scenario defined in clause 6.1, the following picture shows the flow of a pure BUSDOX sender communicating with a REM+BUSDOX recipient.

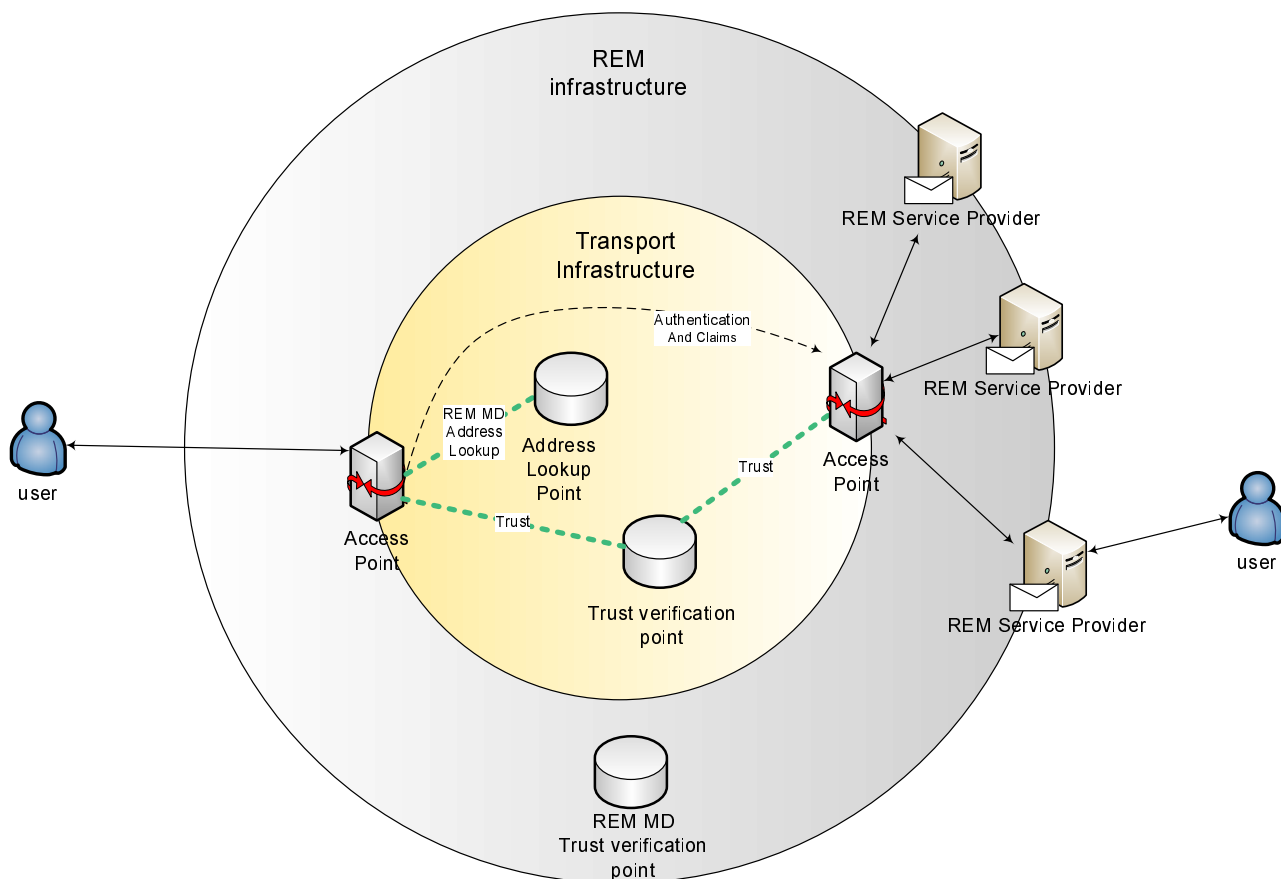


Figure 2

REM would normally consider this case in the same way as receiving a message from a non-REM system (like ordinary mail), since no REM envelope is arriving to the Recipient's side. But, the introduction of the REM/BUSDOX Gateway **should** produce the necessary information and formats to submit to the REM system and the REM Evidence feedback for the BUSDOX system as defined in clause 7.3.4. For this purpose the REM/BUSDOX Gateway **may** also leverage the trust established at the AP level and some information like the proof of relay of the message (in the form of a wsse:Signature). This proof **should** be used by the Recipient's REM/BUSDOX Gateway to produce the evidence of Submission of the message to the REM network. Note that this is somehow weaker than a **SubmissionAcceptanceRejection** evidence, which it is produced (and signed) by the Sender's REM-MD.

7 Profiles specifications

The present clause contains specifications that cover the two interaction scenarios described in clause 6.

Clause 7.1 and its clauses contain specifications that are used in both scenarios.

Clause 7.2 and its clauses contain specifications that are used in the REM+BUSDOX to pure BUSDOX scenario.

Clause 7.3 and its clauses contain specifications that are used in the pure BUSDOX to REM+BUSDOX scenario.

7.1 Common specifications

7.1.1 Identifiers

The current clause defines new identifiers schemes for the already identified scenarios. It also defines new identifiers to be used within them. These identifiers are used by the full identification of the participants, the documents and the processes.

7.1.1.1 REM-MD Participant Identifiers

The current clause provides specifications for the participant identifiers that are required in the REM-MD – BUSDOX scenario.

In the REM-MD – BUSDOX scenario the participants that need a BUSDOX participant identifier are:

- 1) The Sender's REM-MD, when it is the actual participant in the BUSDOX instantiation.
- 2) The REM Sender or the REM Recipient, when the BUSDOX knowledge it is extended at REM Sender/Recipient level.
- 3) The BUSDOX participant who is the purported Recipient (BUSDOX recipient henceforth) of the message submitted by the REM Sender. This is a regular BUSDOX participant served by one Access Point as remarked in clause 6.1, and in consequence she operates with her own Participant Identifier, whose structure and semantics are defined in the corresponding BUSDOX instantiation.

The present profile defines a new scheme for participant identifiers in BUSDOX instantiations that are REM-MDs or REM Senders/Recipients. The details of the new scheme are shown in the paragraphs below.

The domain value **shall** be 'etsi'.

The subject area value **shall** be 'actorid'.

The value of the scheme identifier type **shall** be 'ts102640pis' (i.e. Technical Specification 102640 Participant Identifier Scheme).

So the Scheme Identifier of the participant identifier in REM-MD – BUSDOX scenario **shall** be:

"etsi-actorid-ts102640pis"

The definition of aforementioned Scheme fully identifies the specification of the participant identifier format.

The participant identifier format **shall** be composed of two parts, namely identifier type and identifier value, which **shall** follow the following rules:

- 1) The identifier type part **shall** be 'rfc5322' (this identifier refers to the RFC 5322 [i.4] Internet Message Format standard).
- 2) The identifier value **shall** be the email address of the participant.
- 3) The two parts **shall** be concatenated by the ':' string.

This is a non-normative example, of the participant identifier corresponding to a purported REM Sender whose email address is 'emailaddr-one-rem-md-sender@one-rem-md.domain.com':

etsi-actorid-ts102640pis::rfc5322:emailaddr-one-rem-md-sender@one-rem-md.domain.com

It obeys to the standard rules defined in "BUSDOX COMMON DEFINITIONS" [11] that are:

Participant id = {identifier scheme}::{id}

id = {type identifier}:{participant identifier value}

The first part (the scheme identifier) and also the "type identifier" part are fixed for the purpose of the present document and **should** be entirely managed in the BUSDOX Environment and by the REM/BUSDOX Gateway).

The rationale of such definition is that when the flow of the information is at BUSDOX side the entire Participant Identifier **shall** be used. When the flow of the information is at REM-MD (or at REM/BUSDOX Gateway) side the email address part of the participant identifier **shall** be used: the Internet domain part (to the right of '@') **shall** identify the REM-MD and the local part (to the left of '@') **shall** identify either the REM Sender or the REM Recipient (according to the scenario).

All the percent encoding form defined in "BUSDOX COMMON DEFINITIONS" [11] **shall** be used for the participant identifier when it is used in some URL.

7.1.1.2 Document Identifiers for REM-MDs

The present profile defines the new document identifier scheme. The details of the new scheme are shown in the paragraphs below.

The domain value **shall** be 'etsi'.

The subject area value **shall** be 'docid'.

The value of the preferred scheme identifier type **shall** be 'ts102640dis' (i.e. Technical Specification 102640 Document Identifier Scheme).

So the Scheme Identifier of the Document Identifier in REM-MD – BUSDOX scenario **shall** be:

"etsi-docid-ts102640dis"

The definition of aforementioned Scheme fully identifies the specification of the document identifier format.

The document identifier format **shall** be composed of two parts, namely identifier type and identifier value, which **shall** follow the following rules:

- 1) Document Id = {identifier scheme}::{id}.
- 2) {id} = {type identifier}:{document identifier value}.
- 3) The identifier type part **shall** be 'rfc5751' (this identifier refers to the RFC 5751 [i.5] MIME standard).
- 4) The identifier value **shall** be 'mime'.
- 5) The two parts scheme and id **shall** be concatenated by the ':' string.
- 6) The two parts type and value **shall** be concatenated by the '.' string.

So, the full Document Identifier to use during the interchanges, applying the present profile, **shall** be in consequence: **'etsi-docid-ts102640dis::rfc5751:mime'**.

In particular cases outside the scope of the present technical specification (e.g. agreements among REM/BUSDOX Gateway providers and BUSDOX users) other type of documents **may** be accepted by REM/BUSDOX Gateway provided that they are enveloped and forwarded to REM-MD (and in consequence delivered to REM Recipients), according to the formats specified in TS 102 640-5 [5]. In such cases the value of the scheme identifier type **should** be 'ts102640adis' (i.e. Technical Specification 102640 Any Document Identifier Scheme) or **may** also be any of the types associated with the document identifier schemes valid in the BUSDOX instantiations. In the first case the full identification string **shall** be:

"etsi-docid-ts102640adis"

and the Document Identifier **shall** assume the following format:

- 1) The identifier type part **shall** be absent.
- 2) The identifier value **shall** be 'anydocumenttype'.

The full Document Identifier **shall** be in this case: **'etsi-docid-ts102640adis::anydocumenttype'**.

Interchangers **may** also, according to this profile, use any other document identifier as long as that document identifier is aligned with one of the document identifier schemes defined in the BUSDOX instance where the purported Recipient is subscribed. Such practice **should** be transparent to the REM Senders or REM Recipients (according to the scenario) and **should** be subject to particular agreements involving the implementation/configuration of the REM/BUSDOX Gateway.

7.1.1.3 Process Identifiers for REM-MDs

The present profile does not define any new process identifier scheme.

Sender subscribed to REM-MD **may** use the process scheme identifier specified in "BUSDOX COMMON DEFINITIONS" [11] when the document sent is not sent under any named process.

Sender **may** also, according to this profile, use any other process identifier as long as that process identifier is aligned with one of the process identifier schemes defined in the BUSDOX instance where the purported Recipient is subscribed.

7.2 REM+BUSDOX to pure BUSDOX

The present clause provides specifications for the REM+BUSDOX to pure BUSDOX scenario. In this scenario a normal REM-MD user (the REM Sender) needs to send a REM-MD message to a pure BUSDOX user (the Recipient). The Recipient **shall** be identified by the Sender using her BUSDOX instantiation participant identifier. The Recipient **shall** be registered to the SMP service using the same BUSDOX instantiation participant identifier exchanged with the Sender. It is out of the scope of the present document to specify how the Sender gains access to this identifier.

Below follows a detailed description of the interactions between the different entities that collaborate in ensuring a successful exchange of messages between the Sender subscribed to a REM-MD and the Recipient who is a BUSDOX instantiation participant. A reference to the clause of the present document that specifies requirements for the corresponding interaction is included:

- 1) The Sender composes a regular electronic mail as specified in clause 7.2.1 of the present document. After this step, the Sender's original message is stored in the REM-MD spool areas.
- 2) Before forwards the Sender's payload to the BUSDOX Access Point, the REM/BUSDOX Gateway **shall** implement the discovery process of the metadata required for ensuring a successful transfer of the message, as specified in the BUSDOX Service Metadata Locator Profile (SML henceforth) [8] and further profiled in clause 7.2.2 of the present document.
- 3) The Sender's REM-MD then gains access to the Service Metadata Publisher that contains the metadata of the purported Recipient, as specified in the BUSDOX Service Metadata Publishing (SMP henceforth) [7] protocol and further profiled in clause 7.2.2.2 of the present document.
- 4) The Sender's REM-MD **shall** act as a regular BUSDOX instantiation participant (on behalf of the REM Sender and through a REM/BUSDOX Gateway) and **shall** interact with a BUSDOX Access Point. This interaction **shall** be performed according to the Lightweight Message Exchange Profile (LIME henceforth) [9] and further profiled in clause 7.2.3 of the present document.
- 5) The REM-MD's Access Point then takes the Sender's payload as received from the REM-MD and forwards it to the Access Point of the BUSDOX instantiation purported Recipient using the Secure Trusted Asynchronous Reliable Transport (START henceforth) [6].
- 6) Once the message is got by the Recipient's Access Point, the purported Recipient **may** gain access to the message using any BUSDOX supported access protocol (for example the LIME access protocol).

7.2.1 Sender's original message profile

The present document defines four new extra MIME headers for the electronic mail message sent by the Sender to her REM-MD in this scenario.

X-REM-Busdox-recipientId. The Sender's REM-UA **should** include this extra header in the electronic mail message. Its value **shall** contain the full participant identifier of the BUSDOX instantiation purported Recipient of the message.

X-REM-Busdox-senderId. The Sender's REM-UA **should** include this extra header in the electronic mail message to allow the reply to the message sent. Its value **shall** contain the full participant identifier of the REM Sender of the message. In Figure 3 there is a non-normative example of this flow.

In case of particular agreements with the Sender the REM/BUSDOX Gateway providers **may** compose the participant identifiers of the Recipient and the Sender (to use in the LIME envelope) using part of the email addresses specified by the Sender and some other information part of the agreement. In such case **shall** not be mandatory for the Sender to specify the aforementioned headers and **shall** not be mandatory for the Sender to be registered to SMP with a specific participantID. Always in this case only the REM/BUSDOX Gateway **shall** have a participantID and **shall** be registered on SMP. In Figure 4 there is a non-normative example of these flows.

X-REM-Busdox-docType. The Sender's REM-UA **may** include this extra header in the electronic mail message. When present, its value **shall** contain a document identifier as specified in clause 7.1.1.2 (and, in case of particular agreements, it is aligned with one some document identifier defined in BUSDOX). It is out of the scope of the present document to deal with the means by which the Sender may gain access to this value and how it can be managed.

X-REM-Busdox-processId. The Sender's REM-UA **may** include this extra header in the electronic mail message. When present, its value **shall** contain a process identifier aligned with one of the process identifier schemes defined in the BUSDOX instance where the purported Recipient is subscribed. It is out of the scope of the present document to deal with the means by which the Sender **may** gain access to this value and how it can be managed.

The "To:" header value **shall** be composed with an email address according to some agreement between the Sender and the REM/BUSDOX Gateway providers.

These are non-normative examples explaining a possible mapping among addresses (subject to the agreements between the REM Sender (and the REM/BUSDOX Gateway providers):

The REM Sender **may** specify as virtual recipient a particular mailbox (one of a set of 1..N gateway mailboxes for scalability purposes) of the REM/BUSDOX Gateway. E.g.:

'busdoxgateway1@rem-md-gateway-domain'

In such case, the entire Recipient's participantID **shall** be managed by the REM/BUSDOX Gateway using the X-REM-Busdox-recipientId header specified by the Sender. In Figure 3 there is an example of this flow.

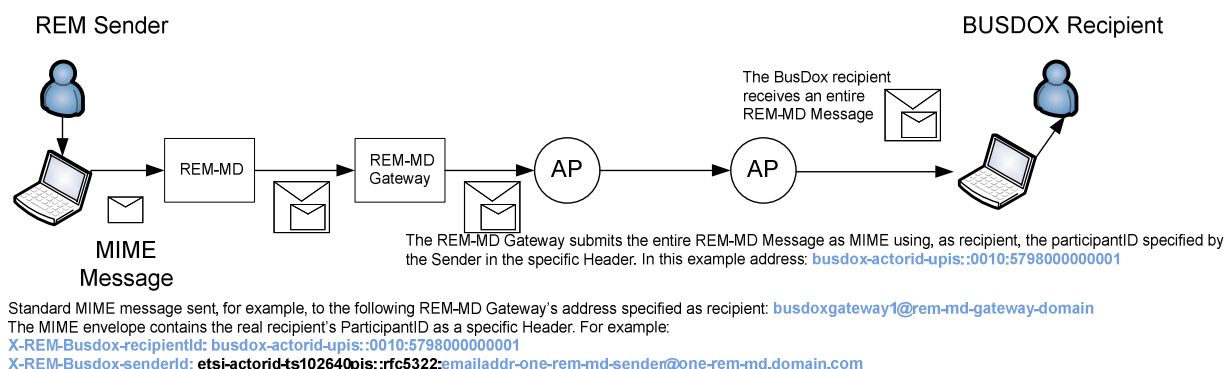


Figure 3

Alternatively, the REM Sender **may** use the variable part of the Recipient's participantID (the value part) to compose the "To:" fields of the regular email to send. The domain part of this address **should** be a managed domain of the REM/BUSDOX Gateway (and so be subject to an agreement between the Sender and the REM/BUSDOX Gateway providers).

E.g. if the Participant Identifier of the BUSDOX recipient user is:

'busdox-actorid-upis:0010:5798000000001'

the REM Sender **shall** compose a regular email having the following "To:" email address:

'5798000000001@rem-md-gateway-domain'

whereas, the fixed parts of the Recipient's participantID ('busdox-actorid-upis:0010:') **shall** be fully managed by the REM/BUSDOX Gateway.

Other mappings are possible for the "To:" MIME header and subject to particular agreements with REM/BUSDOX Gateway providers. E.g.

'5798000000001@0010.rem-md-gateway-domain'

In Figure 4 there is an example of this flow.

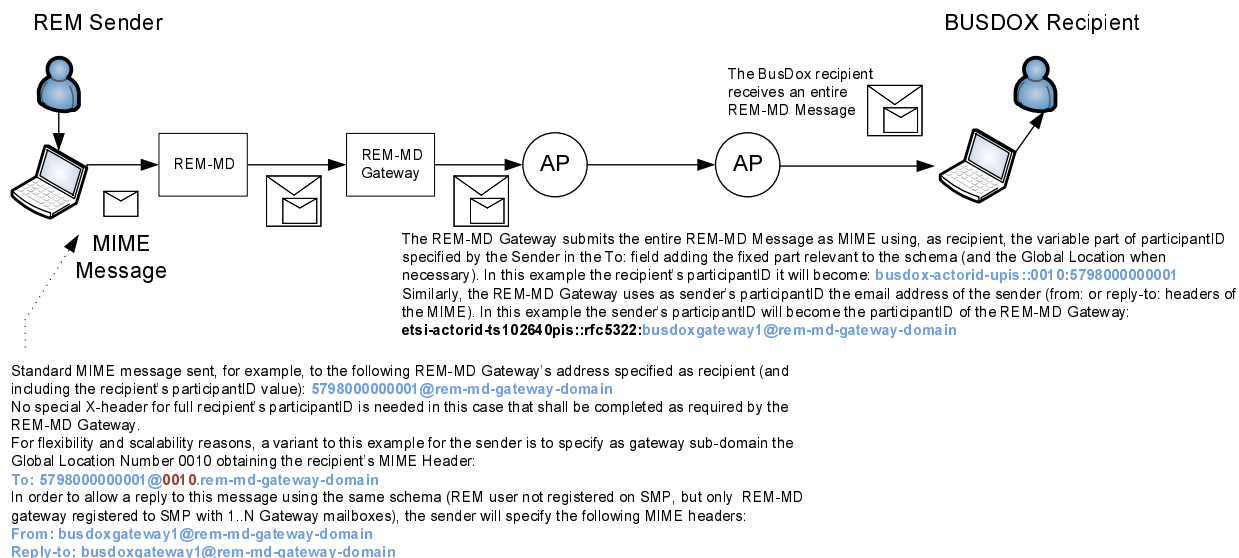


Figure 4

In this case, other than the REM/BUSDOX Gateway managed domain there is a sub-domain (0010) corresponding to the Recipient's participantID type. This could give some more indication to the REM/BUSDOX Gateway for the composing of the final BUSDOX recipient participantID and for the routing

Furthermore, the Recipient **may** answer to the Sender using the participantID set by the REM/BUSDOX Gateway as `etsi-actorid-ts102640pis::rfc5322:busdoxgateway1@rem-md-gateway-domain`.

It is important to outline that in this flow, is not necessary the REM Sender to be registered to SMP.

Some detailed example of this opposite (answer/reply) flow is defined in Figure 6.

The four new REM extra headers **shall** be preserved also in the external REM-MD envelope as defined in clause 7.2.5.

No further requirements are specified for the Sender's original message.

At the arrival of any electronic mail arrived from one of its subscribers having a previous agreed email address as value in the "To" header and/or the X-REM-Busdox-recipientId extra header the REM/BUSDOX Gateway **shall** process it as specified in the present document.

7.2.2 SML and SMP profiling

The submission of a message through an AP requires the REM/BUSDOX Gateway to compile some parameters such as the identity and other Recipient's properties.

As established in the Service Metadata Publishing (SMP) Technical Specification [7], the discovery of the necessary parameters to transmit a message, using the BUSDOX service, happens through the lookup interface to the Service Metadata Publisher (SMP).

The SMP access address is provided through the Service Metadata Locator (SML) specification [8] that is a formalism that allows to compose a URL based on standard DNS names.

Every "participant" of the BUSDOX system (and therefore also every particular Recipient like a BUSDOX user) is recorded to one and only one SMP.

Under these considerations the necessary sequence of steps that the Sender's REM/BUSDOX Gateway needs to implement **shall** be the following:

- The REM/BUSDOX Gateway (client of BUSDOX AP) composes the access URL, to the SML in order to discover the access URL of the SMP provider for the specific Recipient, according to the Service Metadata Locator (SML) specification [8].

- The REM-MD requires to SMP the Service Metadata relevant to the Recipient of the REM-MD message using the URL composed according to the previous point.
- The REM-MD, using the Service Metadata received from the SMP answer, compiles the correct BUSDOX message to submit to the AP.

Clauses below specify in detail how the aforementioned steps **shall** be performed.

7.2.2.1 URL to access to SMP composition

As specified in Service Metadata Locator (SML) specification [8], the format of the URL for the lookup to SMP has the following syntax:

```
http://<hash over recipient's participantID>.<schemeID>.<SML domain>/<recipient's
participantID>/services/<documentType>
```

Where:

- The HASH of the Recipient's participantID is composed of the string "B-" followed by the MD5 hash of the participantID (the recipientID in this case). The purported Recipient's participant identifier **shall** be extracted by the REM/BUSDOX Gateway from the Sender's original message extra header X-REM-Busdox-recipientId (or in any of the agreed method as described in clause 7.2.1).
- The schemeID **shall** be the scheme under which the Recipient's participantID has been generated . Its value **shall** be extracted by the REM/BUSDOX Gateway from the Sender's original message extra header X-REM-Busdox-recipientId (or in any of the agreed method as described in clause 7.2.1).
- The SML internet domain is a fixed starting domain that **may** be configured at start-up time in the REM/BUSDOX Gateway. It is out of the scope of the present document to specify how the REM/BUSDOX Gateway may gain access to this information.
- Concerning the document type, if the Sender's original message does not contain the extra header X-REM-Busdox-docType, then the document identifier defined in clause 7.1.1.2 **shall** be used. Otherwise, the document type identifier contained in that field **shall** be used in the URL. It is out of the scope of the present document to deal with the means by which the Sender may gain access to the document types that the Recipient may deal with.

The present document does not provide further profiling of BUSDOX Service Metadata Locator (SML) specification [8].

This is a non-normative example that shows the composition of the URL to access to SMP.

To send a message from a REM Sender to a BUSDOX recipient identified by the following Participant Identifier

```
busdox-actorid-upis::0010:5798000000001
```

the REM/BUSDOX Gateway needs to compose the URL to access to SMP with the following format:

```
http://<hash over recipientID>.<schemeID>.<SML domain>/<recipientID>/services/<documentType>
```

using the following fields:

```
<hash Recipient's participantID type/value part> = "B-"md5("0010:5798000000001") = "B-b9a942eecd58557d2739a06eb2c07fa1"
```

```
<schemeID> = "busdox-actorid-upis"
```

```
<SML domain> = "serviceMetadata.eu" (This is an example for SML internet domain address configured in the REM/BUSDOX Gateway and obtained during the registration of the particular REM-MD as participant of a BUSDOX environment)
```

```
<full Recipient's participantID> = "busdox-actorid-upis::0010:5798000000001" (Full scheme-id + Type/Val)
```

```
<Recipient's participantID> = "0010:5798000000001" (Type/Val)
```

```
<documentType> = "etsi-docid-ts102640dis::rfc5751:mime"
```

so one of the URL that REM/BUSDOX Gateway **may** use for the SMP discovery, for this example is:

```
http://B-b9a942eecd58557d2739a06eb2c07fa1.busdox-actorid-upis.serviceMetadata.eu/busdoxdomain.eu/busdox-actorid-upis::0010:5798000000001/services/etsi-docid-ts102640dis::rfc5751:mime
```

Due to reserved words the URL above needs to be percent encoded to be compliant with the specification "Uniform Resource Identifier (URI): Generic Syntax" (RFC 3986 [i.6]), as required in the Service Metadata Publishing Technical Specification [7] (where a full description of discovery process may be found), and it becomes:

```
http://B-b9a942eecd58557d2739a06eb2c07fa1.busdox-actorid-upis.serviceMetadata.eu/busdoxdomain.eu/busdox-actorid-upis%3A%3A0010%3A5798000000001/services/etsi-docid-ts102640dis%3A%3Arfc5751%3Amime
```

7.2.2.2 Service Metadata Retrieval from SMP

The present document profiles a new type of contents for the ServiceInformation element specified in SMP Technical Specification [7], namely the one that associates the BUSDOX instantiation participant identifier of the purported Recipient with the document type identifier defined in clause 7.1.1.2.

Table 3 specifies the contents of such new ServiceInformation element.

Table 3: Metadata contents

Element/attribute	Mandatory/Optional	Number of occurrences	Additional Requirements
DocumentIdentifier	M	1	The preferred document identifier profiled to be used in REM – BUSDOX context shall be the following: 'rfc5751:mime' In such case the scheme attribute value shall be: 'etsi-docid-ts102640dis' In cases of particular agreements implemented at REM/BUSDOX Gateway level, the document identifier should be: 'anydocumenttype' In such case the scheme attribute value shall be: 'etsi-docid-ts102640adis' Always under particular agreements implemented at REM/BUSDOX Gateway level the document identifier may be any of the values aligned with the document identifier schemes valid in the BUSDOX instantiation with a relevant value Further details are defined in clause 7.1.1.2
DocumentIdentifier/ @scheme	M	1	The preferred scheme attribute value shall be: 'etsi-docid-ts102640dis' It may also be any of the values that identify a document identifier scheme valid in the BUSDOX instantiation under the conditions expressed in clause 7.1.1.2. If the value 'etsi-docid-ts102640dis' is present in this attribute, the DocumentIdentifier element value shall be 'rfc5751:mime'

The present document does not impose other additional requirements to the Document Identifier elements profiled in Table 3.

7.2.2.3 BUSDOX Headers and REM Headers/Metadata

One of the tasks of the REM/BUSDOX Gateway is to fill the minimum set of BUSDOX Headers starting from the information present in the REM-MD message coming from the Sender and other data owned at REM/BUSDOX Gateway level.

The mandatory headers to evaluate as specified in the section 4.2 of BUSDOX LIME Technical Specification [9] are listed in Table 4.

Table 4: Metadata Headers

Header	Mandatory/Optional	Number of occurrences	Additional Requirements
SenderIdIdentifier	M	1	This header shall be compiled according to the specifications of clause 7.1.1.1 using the email address of the Sender as parameter.
RecipientIdentifier	M	1	This header shall be compiled according to the specifications of clause 7.1.1.1 using the participant identifier of the Recipient as parameter. In case of multi-recipient email, coming from the REM Sender, this process shall be iterated for each Recipient (To: or Cc:) producing a BUSDOX message for each Recipient. Each iteration shall be a full BUSDOX sending phase including CREATE and PUT (it shall be a BUSDOX "Entry" of the PageList during the GET Phase).
DocumentIdentifier	M	1	This header shall be compiled according to the specifications of clause 7.1.1.2 using the document identifier of the Recipient as parameter.
ProcessIdentifier	M	1	This header shall be compiled according to the specifications of clause 7.1.1.3 using the process identifier of the Recipient as parameter.
MessageIdentifier	M	1	This header shall be compiled according to the specifications of the section 4.2.3 of BUSDOX LIME Technical Specification [9]. For each resend of the message for iterations due to errors such value shall be maintained always the same to the MessageIdentifier returned back from AP during the CREATE phase. For each iteration of sending message due to multi-recipient headers present in the Sender's MIME message, a new cycle CREATE/PUT shall be performed and so a new MessageIdentifier shall be used (that returned back from the CREATE response).
ChannelIdentifier	M	1	This header shall be compiled according to the specifications of the section 4.3 of BUSDOX LIME Technical Specification [9]. The method used by the REM/BUSDOX Gateway to obtain the value of this header is out of scope. It may be configured in the set up phase of REM/BUSDOX Gateway.

7.2.3 LIME Profile

The REM/BUSDOX Gateway **shall** acts like a LIME Client (LC) of a LIME-Enabled AP as specified in BUSDOX LIME Technical Specification [9] using a Message Channel (that is a WS-Transfer endpoint of the AP and is identified by an EndpointReference).

A flow like that described in the Figure 1 of BUSDOX LIME Technical Specification [9] **shall** be implemented. The REM/BUSDOX Gateway **shall** be the LIME Client (LC).

Two channels (Inbound and Outbound) **should** be implemented as defined in section 4.1 of BUSDOX LIME Technical Specification [9] and secured as defined in section 4.3.1 of BUSDOX LIME Technical Specification [9].

In the messages submitted by REM/BUSDOX Gateway to the AP the SAML attribute for common authentication assurance-level **shall** be included as for specification defined in the section 4.4.3 of BUSDOX LIME Technical Specification [9] and its value **shall** be "urn:eu:busdox:attribute:X" where X is a integer parameter in the interval 1..4. The exact value to use for the assurance-level is outside the scope of the present technical specification (e.g. at least the minimum level recovered as Metadata from SMP queries or special agreements among REM/BUSDOX Gateway providers and BUSDOX providers).

7.2.4 BUSDOX message composition

Once the addressing mapping are resolved (Participant/Document/Process Identifiers are available and the EndpointReference EPR is returned back from SMP), the REM/BUSDOX Gateway **shall** envelope the Sender's payload to a BUSDOX message and it **shall** be submitted to the Sender's REM-MD AP as indicated in clause 7.2.3.

The enveloping of the Sender's message is performed according to the specifications BUSDOX LIME Technical Specification [9] inside a SOAP 1.1 body container and using the WS-Transfer specification [12] to access to the submission channel (AP endpoint).

In this specific scenario, the REM/BUSDOX Gateway **shall** send the entire MIME envelope constituent the REM-MD message. This entire MIME envelope **shall** be the new payload of the BUSDOX delivery to send to the BUSDOX recipient. This choice allows to maintain attached together the Evidence (XML attachment to the REM-MD message) and the original Sender's MIME payload.

The non-normative examples of Figure 3 and Figure 4 shows how the REM/BUSDOX Gateway might send the entire REM-MD message to the AP as payload of the BUSDOX message for the final Recipient. Further details of the composition of a REM-MD message can be found in TS 102 640-2 [2] and TS 102 640-5 [5].

7.2.5 Generating REM-MD message

As defined in previous clauses the REM-MD messages **shall** be generated only at REM-MD level. To perform this operation the REM-MD **shall** have in input a standard MIME email message like that produced by usual email clients. This is the Sender's payload that **shall** be preserved by the entire transport path up to the Recipient. In some case defined in the previous clauses this MIME message **may** contain some new extra header defined in clause 7.2.1 with information like sender/recipient participantID, documentID and processID. It is out of the scope of the present document to specify how these headers are added to the MIME message submitted by the Sender.

Any REM-MD that receives a MIME message from any REM-MD client application (in the present TS a REM-MD client application **may** be either a Sender's REM-UA or the REM/BUSDOX Gateway) containing the new four REM extra headers defined in clause 7.2.1 **shall** preserve such headers copying them also in the external REM-MD Envelope.

The non-normative examples of Figure 3 and Figure 4 shows how the REM-MD client applications (in the present TS a REM-MD client application **may** be either a Sender's REM-UA or the REM/BUSDOX Gateway) always send to the REM-MD a input payload in MIME format.

7.2.6 Evidence

In this scenario it is possible to build, at REM-MD level, some of the evidence that the normal REM flow **may** produce. According to the elements provided at BUSDOX level and the REM TS, the following evidence **shall** be provided:

Table 5: Evidence types list for REM-BUSDOX scenario

Event and REM-MD Evidence (TS 102 640-1 [1], clause 6.1)	REM-MD Evidence (TS 102 640-2 [2], clause 5.1)
6.2.1 Event A.1 - S-REM-MD Acceptance	5.1.1 SubmissionAcceptanceRejection
6.2.1 Event A.2 - S-REM-MD Rejection	
6.2.2 Event B.1 - R-REM-MD Acceptance	5.1.2 RelayToREMMDAcceptanceRejection
6.2.2 Event B.2 - R-REM-MD Rejection	
6.2.2 Event B.3 - Expiration of time to deliver to R-REM-MD	5.1.3 RelayToREMMDFailure
6.2.3 Event C.1 - REM Object Delivery	5.1.4 DeliveryNonDeliveryToRecipient
6.2.3 Event C.2 - Non delivery within a given retention period	
6.2.3 Event D.1 - REM-MD Message Delivery	
6.2.3 Event D.2 - Expiration of time to deliver notification	

Since the first evidence, SubmissionAcceptanceRejection, is generated in REM environment it **shall** be maintained as it is in a REM pure environment.

The second evidence, RelayToREMMDAcceptanceRejection, **shall** be generated by the Sender's REM/BUSDOX Gateway whenever a message is successfully conveyed from the Sender's AP to the Recipient's AP. The physical event that provokes the generation of the evidence is given by the result of the relay operation from the Sender's AP to the receiver's AP. If the PUT operation of the outbound LIME interaction returns a positive response, this is a proof-of-delivery and so the REM/BUSDOX Gateway **shall** generate a positive RelayToREMMDAcceptanceRejection evidence for the Sender's REM-MD and a positive DeliveryNonDeliveryToRecipient evidence for the Sender.

In case of a permanent failure on PUT operation the REM/BUSDOX Gateway **shall** generate a negative RelayToREMMDAcceptanceRejection evidence for the Sender's REM-MD.

In case of repeated temporary failures on PUT operation (according to a configured number of times) the REM/BUSDOX Gateway **shall** generate a RelayToREMMDFailure evidence for the Sender.

In both the two cases of failure above the REM/BUSDOX Gateway **shall** generate a negative DeliveryNonDeliveryToRecipient evidence for the Sender.

7.3 BUSDOX to REM-MD+BUSDOX

In this scenario a normal BUSDOX user (the Sender) needs to send a generic BUSDOX message to a REM-MD user (the REM Recipient). The Recipient **shall** be identified by the Sender using a conventional e-mail address inserted in a BUSDOX context becoming a real participant identifier, as specified in clause 7.1.1.1. It is out of the scope of the present document to specify how the Sender gains access to this identifier.

Composing the envelope for the intended Recipient, the REM/BUSDOX Gateway **shall** compile the reply-to MIME header with one of own gateway addresses and the X-REM-Busdox-senderId with the real BUSDOX Sender's participant identifier in order to allow the REM Recipient to eventually answer to the received message to the correct BUSDOX address. Figure 5 shows a non-normative example of this flow.

The back flow of answer/reply to the received message **shall** be one of those described in clause 7.2 having the actual REM Recipient with a role of Sender and vice versa the actual BUSDOX sender with a role of Recipient.

Another possibility is to specify a participant identifier of the REM/BUSDOX Gateway as first hop and further addresses the Recipient through an email address specified in the message to send that, in this case, **shall** be a MIME message and **shall** be conveyed between Sender's AP and REM/BUSDOX Gateway's AP as a normal BUSDOX document. The MIME message **shall** have the "To:" header set to the REM email address of the Recipient. To allow the REM Recipient to eventually answer to the received message the Sender **should** also compile the From:/Reply-to: MIME headers using a method of those described in clause 7.2 but reversing the roles Sender/Recipient.

The pure BUSDOX envelope (containing the MIME message as Sender's payload) **shall** have the Recipient's participantID set to a BUSDOX address of the REM/BUSDOX Gateway (that acts as a registered LIME Client of BUSDOX network) and the Sender's participantID set to the BUSDOX Sender's address. These last two participantID **should** also be set, respectively as X-REM-Busdox-recipientId and X-REM-Busdox-senderId MIME headers, in the MIME payload specified by the Sender.

In case of particular agreements with the Sender the REM/BUSDOX Gateway providers **may** add these two participant identifiers to the MIME payload using the values present in the incoming pure BUSDOX external envelope. In such case **shall** not be mandatory for the Sender to specify the aforementioned MIME headers.

The REM/BUSDOX Gateway **shall** submit to the intended Recipient specified in the "To:" header any MIME message coming from BUSDOX Network to a REM/BUSDOX Gateway address. Figure 6 shows a non-normative example of this flow.

In this scenario the Recipient's REM/BUSDOX Gateway **shall** be registered to the SMP service using a set of participant identifier (for scalability purposes). These participant identifiers are associated to (composed of) a list of 1..N conventional e-mail addresses handled in Recipient's REM-MD own environment for the REM/BUSDOX Gateway functions. In particular, the domain addresses used by the Sender to identify the REM/BUSDOX Gateway need to be handled (and also registered in SMP as "managed" participantID) by the Recipient's REM-MD.

These are non-normative examples explaining a possible mapping and flows from BUSDOX network and REM network:

The BUSDOX sender needs to send a generic (not necessarily MIME) BUSDOX message to a REM Recipient. For this purpose it specifies a real Recipient's participantID like the following example:

`etsi-actorid-ts102640pis::rfc5322:emailaddr-one-rem-md-recipient@one-rem-md.domain.com`

The REM/BUSDOX Gateway receives the messages sent from the BUSDOX user and envelopes it in a standard MIME Message using, as Recipient, the following example address extracted from the Recipient's participantID:

emailaddr-one-rem-md-recipient@one-rem-md.domain.com

The REM/BUSDOX Gateway, will add also the following headers where, in the example, the first is the participantID of the Recipient and the second is the participantID of the Sender (this is needed to allow the Recipient eventual replies to the message)

X-REM-Busdox-recipientId: etsi-actorid-ts102640pis::rfc5322:emailaddr-one-rem-md-recipient@one-rem-md.domain.com

X-REM-Busdox-senderId: busdox-actorid-upis::0010:5798000000001

In Figure 5 there is example of this flow.

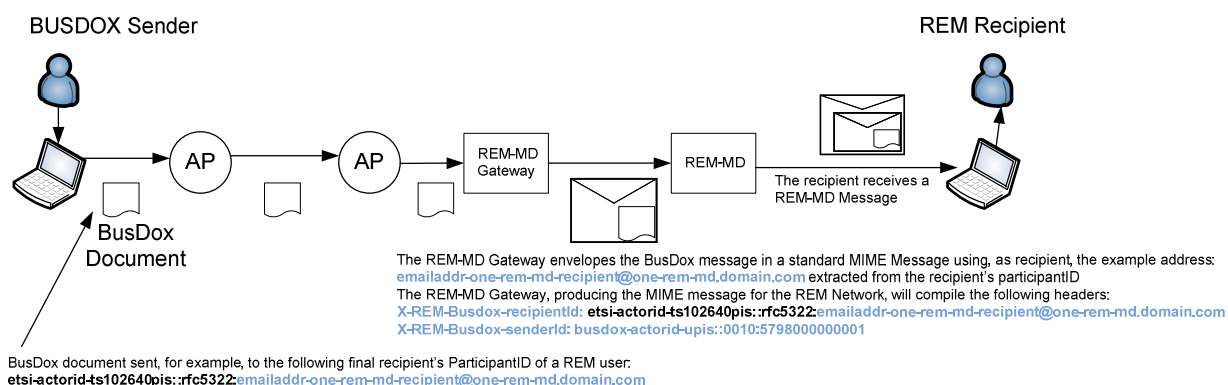


Figure 5

Alternatively the REM Recipient might not be registered to SMP with a specific participantID. The REM/BUSDOX Gateway **may** act on behalf of such type of Recipients. The BUSDOX sender **may** specify, as virtual Recipient, a particular REM/BUSDOX Gateway participantID (one of a set of 1..N participantID associated to as many gateway mailboxes, for scalability purposes) of the gateway. E.g.:

```
'etsi-actorid-ts102640pis::rfc5322: rem-mdgateway1@rem-md-gateway-domain'
```

The BUSDOX sender specifies the standard email address of the Recipient in the "To:" header of MIME envelope. For example:

```
emailaddr-one-rem-md-recipient@one-rem-md.domain.com
```

The Sender specifies also the MIME headers "From:/Reply-to:" of the message to send with one of the following own values. For example:

```
From: 579800000001@rem-md-gateway-domain
```

```
Reply-to: 579800000001@rem-md-gateway-domain
```

The Sender **should** also specify the MIME headers for Sender's participantID. In case of particular agreements this header **may** be added by the REM/BUSDOX Gateway, using the participantID value present in the pure BUSDOX SOAP Envelop, as follows:

```
X-REM-Busdox-senderId: busdox-actorid-upis::0010:5798000000001
```

In Figure 6 there is example of this flow.

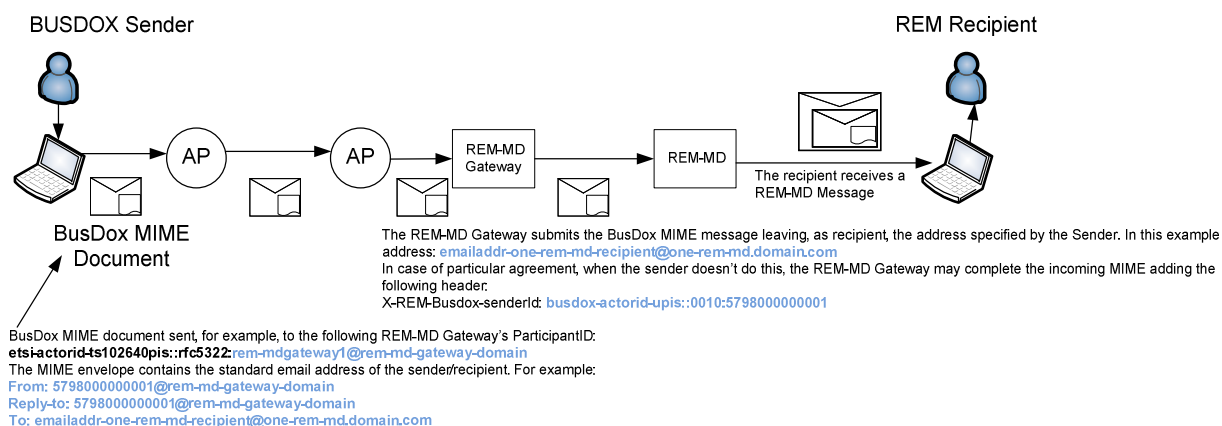


Figure 6

It is important to outline that in this flow, is not necessary the REM Recipient to be registered to SMP.

Some detailed example of this opposite (answer/reply) flow is defined in Figure 4.

The first part of interaction flow (Sender - Sender's BUSDOX AP) **shall** be executed as usual in BUSDOX environment. After this step, the Sender's BUSDOX message **shall** be delivered to the Recipient's REM-MD (by means of client/server polling performed by REM/BUSDOX Gateway to the Recipient's BUSDOX AP) according to the LIME profile defined in the BUSDOX LIME Technical Specification [9].

The Recipient's REM-MD **shall** "forward" the incoming BUSDOX message to the intended REM Recipient, as usual in REM environment.

The lookup on SML/SMP BUSDOX services, the LIME access, the generation of the REM-MD message and the Evidence relevant to the steps of the flow **shall** be defined in the next clauses.

7.3.1 SML and SMP Profiling

In this scenario, the lookup of Service Metadata information **shall** be very similar to the opposite flow described in clause 7.2.2 of the present document. So even in this case the submission of a message through the Sender's BUSDOX AP requires the compilation of some parameters such as the identity and other Recipient's properties. And also as for the opposite scenario, every "participant" of the BUSDOX system (and therefore also every particular recipient like a REM-MD service, that in this case is a BUSDOX receiver entity) is recorded to one and only one SMP.

Under these considerations the necessary sequence of steps that the Sender's BUSDOX application needs to implement **shall** be the following:

- The Sender's BUSDOX application composes the access URL, to the SML in order to discover the access URL of the SMP provider for the specific Recipient, according to the Service Metadata Locator (SML) specification [8].
- The Sender's BUSDOX application requires to SMP the Service Metadata relevant to the Recipient of the REM-MD message using the URL composed according to the previous point.
- The Sender's BUSDOX application, using the Service Metadata received from the SMP answer, compiles the correct BUSDOX message to submit to the AP.

A detailed track of the steps summarized above is defined in the next clauses.

7.3.1.1 URL to access to SMP composition

The composition of the URL to access to SMP is very similar to that defined in clause 7.2.2.1 but reversing the roles. Even in this case is not always necessary to for the REM Recipient to be registered to SMP but, in some case, the REM/BUSDOX Gateway **may** act on behalf of REM Recipients.

The format of the URL for the lookup to SMP has the following syntax:

`http://<hash over recipient's participantID>.<schemeID>.<SML domain>/<recipient's participantID>/services/<documentType>`

Where:

- The HASH of the Recipient's participantID is composed of the string "B-" followed by the MD5 hash of the participantID (the recipientID in this case). The purported Recipient's participant identifier **shall** be composed by the BUSDOX sender application as usual. It is out of the scope of the present document to specify how the BUSDOX sender may gain access to this information.
- The schemeID **shall** be the scheme under which the Recipient's participantID has been generated . It is out of the scope of the present document to specify how the BUSDOX sender may gain access to this information.
- The SML internet domain is a fixed starting domain that **shall** be available for BUSDOX sender application. It is out of the scope of the present document to specify how the BUSDOX sender application may gain access to this information.
- An appropriate document type **shall** be used according to the type of document to send and with the definitions of clause 7.1.1.2. It is out of the scope of the present document to deal with the means by which the Sender may gain access to the document types that the Recipient may deal with.

The present document does not provide further profiling of BUSDOX Service Metadata Locator (SML) specification [8].

7.3.1.4 BUSDOX Headers and REM Headers/Metadata

In this scenario the same headers of the opposite scenario defined in clause 7.2.2.3 **shall** be used.

7.3.2 LIME Profile

The BUSDOX sender application **shall** acts as usually in BUSDOX network. It is out of the scope of the present document to specify how this application interacts with a BUSDOX Access Point and if this interaction is according to the LIME profile.

7.3.3 Generating REM-MD message

Even in this case the REM-MD messages **shall** be generated only at REM-MD level and the same considerations of the opposite scenario defined in clause 7.2.5 **shall** be valid. It is out of the scope of the present document to specify how the BUSDOX sender generates, when required, a standard MIME message to attach as Sender's payload to the usual BUSDOX message.

7.3.4 Evidence

In this scenario it is possible leverage the Evidence Layer of REM network to add some other tracking information to the BUSDOX sender. All the mandatory Evidence types present in Table 7, generated from the Recipient's REM-MD, **may** be forwarded back to the BUSDOX sender. Furthermore some other optional Evidence **may** be requested and so forwarded as the others. The actor of these operations is the REM/BUSDOX Gateway that **shall** implement some behaviour regarding the Evidence handling according to some service policy agreed with the parts.

Table 7: Evidence types list for BUSDOX-REM scenario

Event and REM-MD Evidence (TS 102 640-1 [1], clause 6.1)	REM-MD Evidence (TS 102 640-2 [2], clause 5.1)
6.2.1 Event A.1 - S-REM-MD Acceptance	5.1.1 SubmissionAcceptanceRejection
6.2.1 Event A.2 - S-REM-MD Rejection	
6.2.2 Event B.1 - R-REM-MD Acceptance	5.1.2 RelayToREMMDAcceptanceRejection
6.2.2 Event B.2 - R-REM-MD Rejection	
6.2.2 Event B.3 - Expiration of time to deliver to R-REM-MD	5.1.3 RelayToREMMDFailure
6.2.3 Event C.1 - REM Object Delivery	5.1.4 DeliveryNonDeliveryToRecipient
6.2.3 Event C.2 - Non delivery within a given retention period	
6.2.3 Event D.1 - REM-MD Message Delivery	
6.2.3 Event D.2 - Expiration of time to deliver notification	
6.2.3 Event F.1 (mailbox) - Retrieval	5.1.6 RetrievalNonRetrievalByRecipient
6.2.3 Event F.2 (mailbox) - Expiration of time for Retrieval	

All the mandatory/Recommended/Optional evidence types present in the Table 7 above **may** be forwarded back to the BUSDOX sender, each in a new BUSDOX message, by the REM/BUSDOX Gateway using a similar flow of that defined for answers/replies. This means that the REM/BUSDOX Gateway, according to the local policy agreements, **shall** autonomously compose new BUSDOX messages for the Sender containing the evidence messages coming from the REM-MD. A similar back answer/reply flow is defined in clause 7.3 and some non-normative example may be found in Figure 5 and Figure 6. It is out of the scope of the present document to specify how the REM/BUSDOX Gateway maintains the necessary mappings among the addresses present in Evidence messages and BUSDOX addresses who to forward the Evidence.

In particular, the SubmissionAcceptanceRejection evidence **shall** be sent also to the Recipient (attached to the REM-MD Message) but in this case it is, for the Recipient, somehow weaker than the same evidence in REM pure network. In fact a **SubmissionAcceptanceRejection** evidence is normally produced (and signed) by the Sender's REM-MD whereas, in this scenario, it is generated from the Recipient's REM-MD.

History

Document history		
V1.1.1	September 2011	Publication