

ETSI TS 102 640-6-1 V1.1.1 (2011-09)



**Electronic Signatures and Infrastructures (ESI);  
Registered Electronic Mail (REM);  
Part 6: Interoperability Profiles;  
Sub-part 1: REM-MD UPU PReM Interoperability Profile**

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Reference

DTS/ESI-000069-2

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Keywords

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

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

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## Introduction

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

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# 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 [3] and systems that are compliant with UPU S52-1 UPU Postal Registered electronic Mail functional specification (PReM henceforth) [4].

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 positive features present in both the realities as pursued in the Technical Specifications.

The present document is structured as follows:

- Clause 4: General requirements.
- Clause 5: Mapping of terms and definitions among REM and PReM.
- Clause 6: Mapping of boundary roles.
- Clause 7: Functional GAP analysis between REM and PReM.
- Clause 8: High level definition of the inter-communication flows between REM and PReM.
- Clause 9: Mapping of exchanged formats (structure of messages, attachments, signature etc).
- Clause 10: Mapping of evidence names and semantics.
- Clause 11: Mapping of protocol elements.
- Clause 12: Definition of mutual recognition system based on ETSI-TSL and UPU-Designated Operator Trusted List.

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# 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 referenced 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 102 640-5: "Electronic Signatures and Infrastructures (ESI); Registered Electronic Mail (REM); Part 5: REM-MD Interoperability Profiles".
- [4] UPU S52-1: "Functional specification for postal registered electronic mail".

NOTE: The present document has been produced on the version 1 of the aforementioned UPU specification.

- [5] ETSI TS 102 231: "Electronic Signatures and Infrastructures (ESI); Provision of harmonized Trust-service status information".

## 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 102 640-3: "Electronic Signatures and Infrastructures (ESI); Registered Electronic Mail (REM); Part 3: Information Security Policy Requirements for REM Management Domains".
- [i.2] ETSI TS 102 640-4: "Electronic Signatures and Infrastructures (ESI); Registered Electronic Mail (REM); Part 4: REM-MD Conformance Profiles".
- [i.3] ETSI TS 102 640-6-2: "Electronic Signatures and Infrastructures (ESI); Registered Electronic Mail (REM); Part 6: Interoperability profiles; Sub-part 2: REM-MD BUSDOX Interoperability Profile".
- [i.4] 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.5] IETF RFC 5321: "Simple Mail Transfer Protocol".
- [i.6] IETF RFC 5322: "Internet Message Format".
- [i.7] IETF RFC 5751: "Secure/Multipurpose Internet Mail Extensions (S/MIME) Version 3.2 Message Specification".
- [i.8] ISO 3166-1: "Codes for the representation of names of countries and their subdivisions -- Part 1: Country codes".
- [i.9] ISO/IEC 27001:2005: "Information technology -- Security techniques -- Information security management systems -- Requirements".

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## 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] to TS 102 640-5 [3], TS 102 231 [5], UPU S52-1 [4] and the following apply:

**REM/PReM Gateway:** set of technical and physical components, policies and processes that provide the Gateway service among REM network and UPU/PReM network

NOTE: A REM/PReM 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:

DO Designated Operator

NOTE: Definition in UPU S52-1 [4].

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## 4 General requirements

This clause describes the tools and the formalities used for defining the profile in the present document.

### 4.1 Compliance requirements

Requirements are grouped in three different categories, each one having its corresponding identifier. Table 1 defines these categories and their identifiers.

**Table 1: Requirements categories**

Identifier	Requirement to implement
<b>M</b>	System <b>shall</b> implement the element.
<b>R</b>	System <b>should</b> implement the element.
<b>O</b>	System <b>may</b> implement the element.

All the requirements of Table 8, Table 9, Table 11, Table 12 and Table 15 will be defined as follows.

**Table 2: Requirements template**

N°	Service / Protocol element	TS reference	Requirement	Implementation guidance	Notes

Column **N°** will identify a unique number for the requirements. This number will start from 1 in each clause. The eventual references to it would also include the clause number to avoid any ambiguity.

Column **Service / Protocol element** will identify the service element or protocol element the requirement applies to.

Column **TS Reference** will reference the relevant clause of the standard where the element is defined. The reference is to TS 102 640-1 [1], TS 102 640-2 [2], TS 102 640-3 [i.1], TS 102 640-4 [i.2], TS 102 640-5 [3] or PReM UPU [4] specification except where explicitly indicated otherwise.

Column **Requirement** will contain an identifier, as defined in Table 1.

Column **Implementation guidance** will contain letters referencing explanation of the requirement.

Column **Notes** will contain additional notes as informative text to the requirement.

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## 5 Mapping of terms and definitions

In Table 3 a mapping among the main terms and definitions used in REM Technical specifications [1], [2], [i.1], [i.2], [3] and equivalent terms used in PReM UPU [4] specification 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 3: Mapping of definitions

ETSI REM definitions	UPU PReM definitions
certification authority	
information security policy	
Information Security Management System	
long term storage	
message archive	Message Store + Evidence Store
original message	PReM Object
REM-MD repository	Directory Server+Evidence Store+Message Store
Registered E-Mail	Postal Registered eMail
REM dispatch	PReM Message
REM Management Domain	Designated Operator
REM-MD envelope	Signed part of PReM Message
REM-MD evidence	Evidence
REM-MD Evidence Provider	Designated Operator
REM-MD Evidence Verifier	Designated Operator
REM-MD Message	PReM Message
REM-MD Message Gateway	Designated Operator
REM-MD Message Transfer Agent	
REM-MD Repository Retrieval Interface	
REM-MD Sender Message Submission Interface	
REM-MD Third Party Evidence Retrieval Interface	
REM Message Store	Message Store
REM Object	PReM Object or PReM Message or PReM Dispatch
REM Objects Relay Interface	
REM User Agent (REM-UA)	Web-browser/email client software
REM Policy	PReM policy
REM Policy Domain	UPU PReM group
REM Policy Domain Authority	UPU
REM Recipient	Addressee / Mailee
REM Sender	Mailer
REM Third Party	Authorized party
Signature Creation Server	
Time-Stamping Authority	
Time-Stamp Token	
	Notification
	Designated Operator Trust List

## 6 Mapping of boundary roles

For the purposes of the present document only the boundary elements of both systems **shall** be considered. In particular, as outlined in Figure 1, the main roles involved in the interactions are: REM-MDs, Designated Operators, Trusted Lists. A new element is needed to cover the gap between the two systems: it is called REM/PReM Gateway.

The REM/PReM Gateway **shall** act with double role: it **shall** be considered as a generic REM-MD when the intercommunication is between REM network  $\leftrightarrow$  REM/PReM Gateway; in a similar way, the REM/PReM Gateway **shall** be considered as one of the Designated Operators of the UPU/PReM network when the intercommunication is between REM/PReM Gateway  $\leftrightarrow$  PReM network.

## 7 Functional GAP analysis between REM and PReM

The main differences between the functional aspects of ETSI REM and UPU PReM will be identified in this clause by comparing, when possible, the similar aspects of the two systems under analysis.

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.7]) enriched with a set of typical Headers of the SMTP (RFC 5321 [i.5]) messaging protocol.

Clause 6.1 of TS 102 640-1 [1] and clause 5.1 of TS 102 640-2 [2] define the "Events" and the corresponding "Evidence" produced for each of these events.



Sections 5.2 and 7.2 of UPU PReM Technical Specification [4] define a functional description of the PReM service flow.

Each event/evidence is associated to a function and a mapping between functions is identified in the following tables. The attention is concentrated to the boundary functions that are involved in the gateway among REM and PReM systems. Anyway, some other remarkable function is inserted in the table to provide a more general view when significant for the interoperability.

The analysis is organized in a table with two columns where the first one **always** contains a list of the events and relevant evidence of the flows of a **REM system**. The second column **always** contains a similar list with corresponding functions of a PReM system. The order of the contents (cells of left/right) does not depend on the direction of the flow. There is a correspondence between the two systems comparing, line by line, the left cell with right cell. When possible the events/evidence/functions are grouped for analogy of meaning. Events or functions that are not present in one of the two systems are identified in the comments. Internal events/functions that are not relevant for interoperability are neglected in this analysis.

**Table 4: GAP Analysis - Transmission/Relay/Delivery - REM-MD → DO**

Opr.	ETSI REM Events (TS 102 640-1 [1], clause 6.2) and Evidence (TS 102 640-2 [2], clause 5.1)	UPU PReM functions, events, and descriptions (UPU PReM Technical Specification [4], sections 5.2 and 8.3)
Transmission / Relay / Delivery (Orig. REM-MD→Dest. DO)	<p><i>Function:</i></p> <p><b>Relay</b></p> <p>This is the general operation (performed from a REM-MD to a destination Designated Operator) to convey a REM-MD Message containing the Sender's message.</p> <p>To cover the gap among the two systems, the operation requires a gateway.</p>	<p><i>Function/Method:</i></p> <p><b>SendMessageToDestination</b></p> <p>This is the real function invoked from the REM/PReM Gateway that, <b>when executed at DO side</b>, allows PReM Message to be sent to DO of Destination.</p>
	<p><i>Function:</i></p> <p><b>Relay</b></p> <p>This is the general operation (performed from the Recipient's Designated Operator to Sender's REM-MD) to convey a REM-MD Message containing an evidence relevant to a Sender's message.</p> <p>To cover the gap among the two systems, the operation requires a gateway.</p>	<p><i>Function/Method:</i></p> <p><b>SubscribeNotification</b></p> <p>This is the real function that allows the REM/PReM Gateway system to <b>subscribe</b> certain PReM events, and to be <b>notified</b> through a call to the ReceiveNotification function, when these events occur.</p>
	<p><i>Events:</i></p> <p>6.2.2 Event B.1 - R-REM-MD Acceptance 6.2.2 Event B.2 - R-REM-MD Rejection</p> <p>This event occurs at Sender's REM-MD side in consequence of the <b>result</b> of the relay operation.</p>	<p><i>Events:</i></p> <p>Events 5.1, in the Workflow Process of Figure 3, interpreted as result of the SendMessageToDestination execution (relay operation) for Receive/NotReceive the message conveyed from a Sender's REM-MD to a Recipient's DO.</p>
	<p><i>Evidence:</i></p> <p>5.1.2 Evidence RelayToREMMDAcceptanceRejection</p> <p>The responsible for issuance of this recommended evidence should be the Recipient's DO but it is not present in the workflow of section 5.2.3 of PReM UPU [4] TS. The REM/PReM Gateway <b>shall</b> generate such evidence for the Sender, on behalf of the Recipient's DO, using as input the result of the SendMessageToDestination operation.</p>	<p><i>Evidence:</i></p> <p>EFW-DSP-ACC/REJDOD Evidence of Forward – Acceptance/Rejection – DOD #4 Table 4 section 8.3 of PReM UPU [4] TS.</p> <p>This evidence seems equivalent to the required RelayToREMMDAcceptanceRejection but it is not issued by a DO and it is only logged.</p>

Opr.	ETSI REM Events (TS 102 640-1 [1], clause 6.2) and Evidence (TS 102 640-2 [2], clause 5.1)	UPU PReM functions, events, and descriptions (UPU PReM Technical Specification [4], sections 5.2 and 8.3)
	<p><i>Event:</i></p> <p>6.2.2 Event B.3 - Expiration of time to deliver to R-REM-MD</p> <p>This event occurs at Sender's REM-MD side when the attempts of relay within a fixed interval of time fail completely.</p>	<p><i>Event:</i></p> <p>This event makes sense at Sender's REM-MD side, so it is not considered here.</p>
	<p><i>Evidence:</i></p> <p>5.1.3 Evidence RelayToREMMDFailure</p> <p>The responsible for issuance of this evidence is the Sender's REM-MD and the recipient of the evidence is the Sender.</p>	<p><i>Evidence:</i></p> <p>In the flow direction under analysis an evidence like that indicated in the left cell makes sense only at Sender's REM-MD side and so it is not considered here.</p>
	<p><i>Events:</i></p> <p>6.2.3 Event C.1 - Message Delivery</p>	<p><i>Events:</i></p> <p>Event 5.8 of the Workflow Process of section 5.2.3 of PReM UPU [4] TS (summarized in Figure 3 of the present document) for Acceptance/Non-Acceptance of the message conveyed from the Sender's REM-MD to the Recipient's DO.</p>
	<p><i>Evidence:</i></p> <p>5.1.4 Evidence DeliveryNonDeliveryToRecipient</p>	<p><i>Evidence:</i></p> <p>E-DSP-ACC/REJ-DOD Evidence of PReM Dispatch Acceptance/Rejection - DOD #27 Table 4 section 8.3. of PReM UPU [4] TS.</p> <p>The responsible for issuance of this evidence is the Recipient's DO. The 'DeliveryNonDeliveryToRecipient' evidence <b>shall</b> be notified to the Sender's REM-MD, via the call-back function subscribed at REM/PReM Gateway level, by means of the ReceiveNotification. The function ReceiveNotification is invoked by the Recipient's DO and executed at REM/PReM Gateway level.</p>
	<p><i>Event:</i></p> <p>6.2.3 Event C.2 - Expiration of time to deliver message</p> <p>This event occurs at Sender's REM-MD side when no positive delivery evidence for a sent message is received in a fixed time.</p>	<p><i>Event:</i></p> <p>In this profile, this event makes sense only at Sender's REM-MD side, so it is not considered here.</p>
	<p><i>Evidence:</i></p> <p>5.1.4 Evidence DeliveryNonDeliveryToRecipient</p> <p>The responsible for issuance of this evidence is the Sender's REM-MD and the recipient of the evidence is the Sender.</p>	<p><i>Evidence:</i></p> <p>In this profile an evidence like that indicated in the left cell makes sense only at Sender's REM-MD side and so it is not considered here.</p>

Table 5: GAP Analysis - Transmission/Relay/Delivery - DO → REM-MD

Opr	ETSI REM Events (TS 102 640-1 [1], clause 6.2) and Evidence (TS 102 640-2 [2], clause 5.1)	UPU PReM functions, events and descriptions (UPU PReM Technical Specification [4], sections 5.2 and 8.3)
Transmission / Relay / Delivery (Orig. DO → Dest. REM-MD)	<p><i>Function:</i></p> <p><b>Relay</b></p> <p>This is the general operation (performed from a Designated Operator to a destination REM-MD) to convey a REM-MD Message containing the Sender's message.</p> <p>To cover the gap among the two systems, the operation requires a gateway.</p>	<p><i>Function/Method:</i></p> <p><b>SendMessageToDestination</b></p> <p>This is the real function invoked from the Sender's DO that, when executed at REM/PReM Gateway side, allows PReM Message to be sent to the REM-MD of Destination.</p>
	<p><i>Function:</i></p> <p><b>Relay</b></p> <p>This is the general operation (performed from a REM-MD to a Designated Operator) to convey a REM-MD Message containing an evidence relevant to a Sender's message.</p> <p>To cover the gap among the two systems, the operation requires a gateway.</p>	<p><i>Function/Method:</i></p> <p><b>ReceiveNotification:</b></p> <p>This is the real function subscribed from Sender's DO that, when invoked from Recipient's REM/PReM Gateway, allows REM-MD system to notify certain REM-MD events when these occur. The execution of the ReceiveNotification function happens at Sender's Designated Operator side.</p>
	<p><i>Events:</i></p> <p>6.2.2 Event B.1 - R-REM-MD Acceptance 6.2.2 Event B.2 - R-REM-MD Rejection</p> <p>This event occurs at Recipient's REM-MD side in consequence of the <b>execution</b> of the relay operation.</p>	<p><i>Events:</i></p> <p>Events 5.1 in the Workflow Process of section 5.2.3 of PReM UPU [4] TS (summarized in Figure 3 of the present document) interpreted as consequence of the execution of relay operation (at REM/PReM Gateway side) for Receive/NotReceive the message conveyed from the Sender's DO to the Recipient's REM-MD. The event is the result of the SendMessageToDestination operation executed at REM/PReM Gateway level.</p>
	<p><i>Evidence:</i></p> <p>5.1.2 Evidence RelayToREMMDAcceptanceRejection</p> <p>In REM network, the responsible for issuance of this recommended evidence is the Recipient's REM-MD and the primary intended recipient is the Sender's REM-MD (in this particular flow it is a Sender's DO). Since the workflow of section 5.2.3 of PReM UPU [4] TS does not have this evidence at Sender's DO side (this means that it is not expected nor recognized), it may be simply logged at REM/PReM Gateway side, and not sent back to the Sender's DO.</p>	<p><i>Evidence:</i></p> <p>EFW-DSP-ACC/REJDOD Evidence of Forward – Acceptance/Rejection – DOD #4 Table 4 section 8.3 of PReM UPU [4] TS.</p> <p>This evidence is substantial equivalent to the required RelayToREMMDAcceptanceRejection but, in the workflow of section 5.2.3 of PReM UPU [4] TS, it is only logged and not issued. This means that an evidence of this type, coming from a REM network through the REM/PReM Gateway, would not be recognized by the Sender's DO. So, even if it is generated in the REM network, it <b>shall</b> be only logged in the REM/PReM Gateway.</p>
	<p><i>Event:</i></p> <p>6.2.2 Event B.3 - Expiration of time to deliver to R-REM-MD</p> <p>This event makes sense when the Sender's operator is a REM-MD.</p>	<p><i>Event</i></p> <p>This event makes sense when the Sender's operator is a REM-MD.</p>
	<p><i>Evidence:</i></p> <p>5.1.3 Evidence RelayToREMMDFailure</p> <p>This event makes sense when the Sender's operator is a REM-MD.</p>	<p><i>Evidence:</i></p> <p>This evidence makes sense when the Sender's operator is a REM-MD.</p>

Opr	ETSI REM Events (TS 102 640-1 [1], clause 6.2) and Evidence (TS 102 640-2 [2], clause 5.1)	UPU PReM functions, events and descriptions (UPU PReM Technical Specification [4], sections 5.2 and 8.3)
	<p><i>Events:</i></p> <p>6.2.3 Event C.1 - Message Delivery</p>	<p><i>Events:</i></p> <p>Event 6.1 of the Workflow Process of section 5.2.3 of PReM UPU [4] TS (summarized in Figure 3 of the present document) for Acceptance/Non-Acceptance of the message conveyed from the Sender's DO to the Recipient's REM-MD.</p>
	<p><i>Evidence:</i></p> <p>5.1.4 Evidence DeliveryNonDeliveryToRecipient</p> <p>The responsible for issuance of this evidence is the Recipient's REM-MD. The 'DeliveryNonDeliveryToRecipient' evidence <b>shall be notified</b> to the Sender's DO, via the call-back function subscribed at Sender's DO level, by means of the ReceiveNotification. The function ReceiveNotification is invoked by the REM/PReM Gateway (when the event C.1 occurs at Recipient's REM-MD) and executed at Sender's DO level.</p>	<p><i>Evidence:</i></p> <p>E-DSP-ACC/REJ-DOD Evidence of PReM Dispatch Acceptance/Rejection - DOD #27 Table 4 section 8.3 of PReM UPU [4] TS.</p> <p>The evidence 'DeliveryNonDeliveryToRecipient' <b>shall</b> be received by the Sender's DO executing the ReceiveNotification function invoked by the REM/PReM Gateway, as indicated in the left cell.</p>
	<p><i>Event:</i></p> <p>6.2.3 Event C.2 - Expiration of time to deliver message</p> <p>This event makes sense when the Sender's operator is a REM-MD.</p>	<p><i>Event</i></p> <p>In this profile, this event makes sense only at Sender's REM-MD side.</p>
	<p><i>Evidence:</i></p> <p>5.1.4 Evidence DeliveryNonDeliveryToRecipient</p> <p>This evidence makes sense when the Sender's operator is a REM-MD.</p>	<p><i>Evidence:</i></p> <p>In this profile, this evidence makes sense only at Sender's REM-MD side.</p>

Table 6: GAP Analysis - Retrieval - REM-MD → DO

Opr	ETSI REM Events (TS 102 640-1 [1], clause 6.2) and Evidence (TS 102 640-2 [2], clause 5.1)	UPU PReM functions, events and descriptions (UPU PReM Technical Specification [4], sections 5.2 and 8.3)
Retrieval (Orig. REM-MD → Dest. DO)	<p><i>Function:</i></p> <p><b>Retrieval</b></p> <p>The retrieval operation (performed at Designated Operator level) generates some evidence relevant to a Sender's message.</p> <p>To cover the gap among the two systems, the operation requires a gateway.</p>	<p><i>Function/Method:</i></p> <p><b>SubscribeNotification</b></p> <p>This is the real function that allows the REM/PReM Gateway system to <b>subscribe</b> certain PReM events, and to be <b>notified</b> through a call to the ReceiveNotification function, when these events occur.</p>
	<p><i>Function:</i></p> <p><b>Retrieval</b></p> <p>The retrieval operation (performed from a Designated Operator level) generates some evidence relevant to a Sender's message.</p> <p>To cover the gap among the two systems, the operation requires a gateway.</p>	<p><i>Function/Method:</i></p> <p><b>RejectMessage</b></p> <p>The Recipient <b>may</b> explicitly <b>Rejects</b> the message with <b>RejectMessage</b> function.</p> <p>This is the real function that allows PReM system to <b>notify</b> REM Senders, through a gateway, the Recipient's rejection of the message.</p>

Opr	ETSI REM Events (TS 102 640-1 [1], clause 6.2) and Evidence (TS 102 640-2 [2], clause 5.1)	UPU PReM functions, events and descriptions (UPU PReM Technical Specification [4], sections 5.2 and 8.3)
	<p><i>Events:</i></p> <p>6.2.3 Event F.1 (mailbox) – Retrieval</p>	<p><i>Events:</i></p> <p>Event 9.3 in the Workflow Process of section 5.2.3 of PReM UPU [4] TS for Retrieval of the message conveyed from the Sender's REM-MD to the Recipient's DO.</p> <p>The Recipient explicitly <b>Rejects</b> the message with the invocation of the <b>RejectMessage</b> function. The RejectMessage function is translated in the proper evidence (Mailee #31 Table 4 section 8.3 of PReM UPU [4] TS) notified by the Recipient's DO invoking the ReceiveNotification function.</p> <p>This event is mapped with the 'AcceptanceRejectionByRecipient' REM-MD Evidence.</p> <p>The Recipient <b>Accepts</b> the message and <b>Retrieves</b> it with <b>RetrieveResult</b> function: these two functions are available in REM system and they are related to the event F.1.</p>
	<p><i>Evidence:</i></p> <p>5.1.6 Evidence RetrievalNonRetrievalByRecipient</p>	<p><i>Evidence:</i></p> <p>E-MSG-ADRDLV/NDL-DOD Evidence of Delivery/Non-delivery - Addressee/Mailee #29 Table 4 section 8.3 of PReM UPU [4] TS.</p> <p>E-MSG-ADR-REJDOD Evidence of Reject – Addressee/Mailee #31 Table 4 section 8.3 of PReM UPU [4] TS.</p> <p>The responsible for issuance of "Retrieval" optional evidence is the Recipient's DO. The evidence <b>shall be notified</b> to the Sender's REM-MD, via the call-back function subscribed at REM/PReM Gateway level, by means of the ReceiveNotification function invoked by the Recipient's DO (Event 10.4 in the Workflow Process of section 5.2.3 of PReM UPU [4] TS).</p> <p>The responsible for issuance of "Reject" optional evidence is the Recipient's DO. It <b>shall be notified</b> to the Sender's REM-MD, via the call-back function subscribed at REM/PReM Gateway level, by means of the ReceiveNotification function invoked by the Recipient's DO (Event 10.4 in the Workflow Process of section 5.2.3 of PReM UPU [4] TS).</p>
	<p><i>Events:</i></p> <p>6.2.3 Event F.2 (mailbox) - Expiration of time for Retrieval</p>	<p><i>Events:</i></p> <p>Event 9.3 in the Workflow Process of section 5.2.3 of PReM UPU [4] TS for Retrieval of the message conveyed from the Sender's REM-MD to the Recipient's DO.</p> <p>The Recipient <b>Ignores</b> the message and it expires: This behaviour is available in REM system and it is related to the event F.2.</p>

Opr	ETSI REM Events (TS 102 640-1 [1], clause 6.2) and Evidence (TS 102 640-2 [2], clause 5.1)	UPU PReM functions, events and descriptions (UPU PReM Technical Specification [4], sections 5.2 and 8.3)
	<p><i>Evidence:</i></p> <p>5.1.6 Evidence RetrievalNonRetrievalByRecipient</p>	<p><i>Evidence:</i></p> <p>30 E-MSG-ADR-EXPDOD Evidence of PReM Message Expiration - Addressee/Mailee.</p> <p>The responsible for issuance of "Expiration" optional evidence is the Recipient's DO. It <b>shall</b> be <b>notified</b> to the Sender's REM-MD, via the call-back function subscribed at REM/PReM Gateway level, by means of the ReceiveNotification function invoked by the Recipient's DO.</p>

Table 7: GAP Analysis - Retrieval - DO →REM-MD

Opr	ETSI REM Events (TS 102 640-1 [1], clause 6.2) and Evidence (TS 102 640-2 [2], clause 5.1)	UPU PReM functions, events and descriptions (UPU PReM Technical Specification [4], sections 5.2 and 8.3)
Retrieval (Orig. DO → Dest. REM-MD)	<p><i>Function:</i></p> <p><b>Retrieval</b></p> <p>The retrieval operation (performed at REM-MD level) generates some evidence relevant to a Sender's message.</p> <p>To cover the gap among the two systems, the operation requires a gateway.</p>	<p><i>Function/Method:</i></p> <p><b>ReceiveNotification:</b></p> <p>This is the real function subscribed from Sender's DO that, when invoked from Recipient's REM/PReM Gateway, allows REM-MD system to notify certain REM-MD events when these occur. The execution of the ReceiveNotification function happens at Sender's Designated Operator side.</p>
	<p><i>Events:</i></p> <p>6.2.3 Event F.1 (mailbox) – Retrieval</p> <p>This event occurs at Recipient's REM-MD side in consequence of the <b>execution</b> of the retrieval operation.</p>	<p><i>Events:</i></p> <p>Event 11.1 in the Workflow Process of section 5.2.3 of PReM UPU [4] TS (summarized in Figure 3 of the present document) to receive the notification of the message retrieved at Recipient's REM-MD side.</p>
	<p><i>Evidence:</i></p> <p>5.1.6 Evidence RetrievalNonRetrievalByRecipient</p> <p>In REM network, the responsible for issuance of this optional evidence is the Recipient's REM-MD and the primary intended recipient is the Sender (in this particular flow it is a PReM sender). The RetrievalNonRetrievalByRecipient evidence, when issued, <b>shall</b> be <b>notified</b> to the Sender's DO (that after will notify this evidence to the intended PReM sender), via the call-back function subscribed at Sender's DO level, by means of the ReceiveNotification. The function ReceiveNotification is invoked by the REM/PReM Gateway (when the event F.1 occurs at Recipient's REM-MD side) and executed at Sender's DO level.</p>	<p><i>Evidence:</i></p> <p>E-MSG-ADRDLV/NDL-DOD Evidence of Delivery/Non-delivery - Addressee/Mailee <b>#29</b> Table 4 section 8.3 of PReM UPU [4] TS.</p> <p>E-MSG-ADR-REJDOD Evidence of Reject – Addressee/Mailee <b>#31</b> Table 4 section 8.3 of PReM UPU [4] TS.</p> <p>The responsible for issuance of "Retrieval" optional evidence is the Recipient's REM-MD. The RetrievalNonRetrievalByRecipient <b>shall</b> be mapped, at REM/PReM Gateway level, to one of the above PReM evidence types according to REM Evidence Event Code.</p>

Opr	ETSI REM Events (TS 102 640-1 [1], clause 6.2) and Evidence (TS 102 640-2 [2], clause 5.1)	UPU PReM functions, events and descriptions (UPU PReM Technical Specification [4], sections 5.2 and 8.3)
	<p><i>Events:</i></p> <p>6.2.3 Event F.2 (mailbox) - Expiration of time for Retrieval</p>	<p><i>Events:</i></p> <p>Event 9.3 in the Workflow Process of section 5.2.3 of PReM UPU [4] TS for Retrieval of the message conveyed from the Sender's REM-MD to the Recipient's DO.</p> <p>The Recipient <b>ignores</b> the message and it expires: This behaviour is available in REM system and it is related to the event F.2.</p>
	<p><i>Evidence:</i></p> <p>5.1.6 Evidence RetrievalNonRetrievalByRecipient</p> <p>In REM network, the responsible for issuance of this optional evidence is the Recipient's REM-MD and the primary intended recipient is the Sender (in this particular flow it is a PReM sender). The RetrievalNonRetrievalByRecipient evidence, when issued, <b>shall</b> be <b>notified</b> to the Sender's DO (that after will notify this evidence to the intended PReM sender), via the call-back function subscribed at Sender's DO level, by means of the ReceiveNotification. The function ReceiveNotification is invoked by the REM/PReM Gateway (when the event F.2 occurs at Recipient's REM-MD side) and executed at Sender's DO level.</p>	<p><i>Evidence:</i></p> <p>30 E-MSG-ADR-EXPDOD Evidence of PReM Message Expiration - Addressee/Mailee.</p> <p>The responsible for issuance of "Expiration" optional evidence is the Recipient's REM-MD. It <b>shall</b> be notified to the Sender's DO, via the call-back function subscribed by Sender's DO, by means of the ReceiveNotification function invoked by the REM/PReM Gateway.</p> <p>The responsible for issuance of "Expiration" optional evidence is the Recipient's REM-MD. The RetrievalNonRetrievalByRecipient <b>shall</b> be mapped, at REM/PReM Gateway level, to PReM evidence indicated above.</p>

## 8 High level definition of the inter-communication flows between REM and PReM

### 8.1 Agreements

The interchange among a PReM system and a REM system is governed by an agreement among at least one REM Management Domain and one UPU Designated Operator. This agreement is part of a more high-level agreement among a UPU PReM Policy Domain and a REM Policy Domain (the REM terms are used in this context but the designated authorities are present behind these terms). The first Policy Domain, PReM-PD, represents the environment (common set of rules) of the universe PReM. The second Policy Domain, REM-PD, defines the space within which it has life the particular instance of REM to put in communication with the PReM. From the technical point of view, the agreement among the UPU PReM Policy Domain and a REM Policy Domain requires the application of the present technical specification that provides the support for the interoperability. Whereas, regarding the operational level, the agreement among REM-MDs and DOs is concretised with a registration inside a special trusted index. These indexes **shall** be secured and trusted with an implementation like that defined in clause 12.

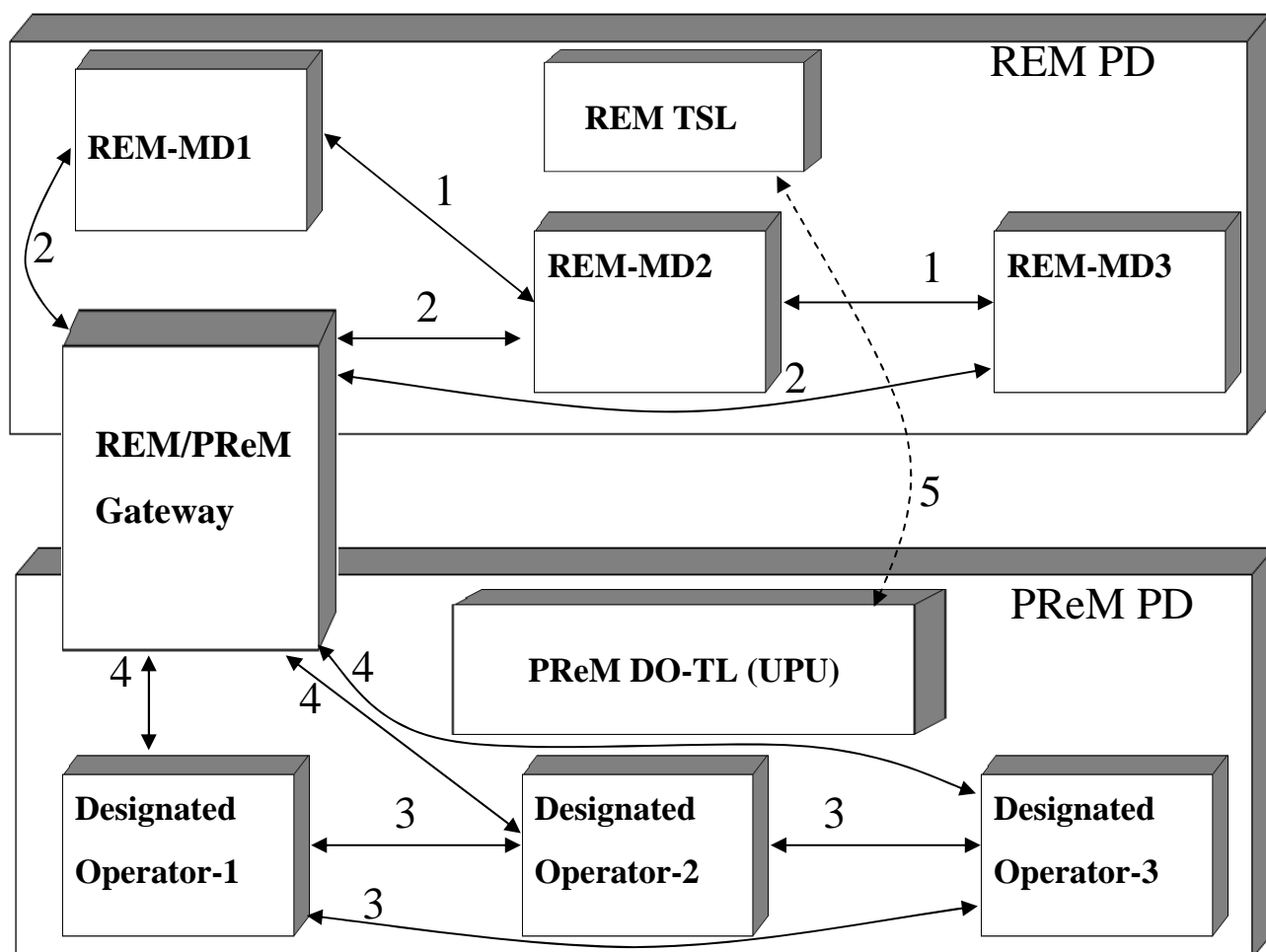


Figure 1

In Figure 1 a description of the main points of contact and interaction is represented.

The normal flows among REM-MDs are represented with the label "1". In a similar way the normal flow among PReM Designated Operators is indicated with the label "3".

The interaction from REM to PReM, identified by the labels "2" and "4", happens through a REM/PReM Gateway implemented according to the profile defined in the present technical specification. From the point of view of any single REM-MD, the interaction through the Gateway ("2") is identical to that towards another generic REM-MD of the same system ("1"). The information, instead of arriving to a local REM-MD, flows towards a remote Designated Operator of the PReM system ("2" + "4") through the Gateway. The REM/PReM Gateway **may** be implemented to have a behaviour like a normal REM-MD or it **may** collapse in a particular role of an existing REM-MD. In Figure 1 an explicit separation is outlined for clarity reasons.

Conversely, the interaction from PReM to REM happens through a REM/PReM Gateway and it is identified by the labels "4" + "2". Other than the role in REM network defined above, in the UPU/PReM network the REM/PReM Gateway **shall** also be considered as one of the Designated Operators or to be collapsed in a particular role of an existing DO.

The addressing bridging between these two systems is effected through a mutual acknowledgment by means of specific indexes implemented for this purpose. The validation and trusting of these indexes **shall** be implemented through the REM-TSL and PReM Designated Operators Trust List, identified by the label "5". Indexes implementation details are out of the scope of the present document.



## 8.2 Operational scenario

A typical operational scenario when a message flows from a REM system to a PReM system and vice versa is defined in this clause.

The directions of the collateral informative flows on which the two main flows are based are:

- When a REM User is the initiator of a message for a PReM User:
  - REM→PReM (REM send a dispatch to PReM),
  - REM←PReM (REM receive the list of evidence from PReM).
- When a PReM User is the initiator of a message for a REM User:
  - PReM→REM (PReM send a dispatch to REM),
  - PReM←REM (PReM receive the list of evidence from REM).

The profile to use between the REM Sender and the REM/PReM Gateway (through the REM-MD and the REM-UA) **shall** be the "REM-MD Interoperability Profiles" defined in TS 102 640-5 [3] 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.

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## 9 Mapping of exchanged formats

The main aspects to consider during the interchanges between two messaging systems are those relevant to the structure of the messages:

- attachments
- signatures
- evidence

An explicit normative reference to the REM ETSI TS [2] is reported in sections 2, 8.2, 8.4 and 8.5 of PReM UPU [4] specification regarding the formats of the messages (and the formats of the types of evidence). So in a normal case, when a PReM system interacts in a homogeneous way with another PReM system, it already uses the REM specification for the formats of the PReM Messages and the formats of the evidence.

Under this light, in the case of interaction among REM and PReM systems, the format of the messages/evidence exchanged is exactly the same defined in REM ETSI TS [2] specification and other additional requirement **shall not** be needed. Figure 2 defines some detail of the format. Section 3.9 of UPU PReM Technical Specification [4] also defines the formatting of attachments using a MIME structure and the signature of the external envelope using S/MIME specification (as also defined in the normative reference to REM ETSI TS [2] specification).

Whereas the formats of the evidence are outwardly the same format of the messages, the list of types of evidence is considered apart in clause 10.

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## 10 Mapping of evidence names and semantics

For the UPU/PReM network, the types of evidence and their usage are defined in sections 8.2 and 5.2 of the PReM UPU [4] technical specification. In REM network all the evidence types are defined in TS 102 640-2 [2] clause 5.1.

According with the aforementioned definitions and with the GAP Analysis of clause 7, the list of the types of evidence **may** be classified in:

- Evidence internal to REM-MD (or internal to the Designated Operator using the PReM UPU [4] terminology): these are the cases when both Sender and Recipients belong to the same REM-MD (or the same Designated Operator). Even in this case, the evidence is produced, available for the users and logged locally to the Designated Operator.
- Evidence between the REM-MD and the Sender/Recipient (or between a Designated Operator and a mailee/addressee using the PReM UPU [4] terminology): this is the direct evidence that flows from a REM-MD (or Designated Operator) and the users registered to it.
- Evidence among REM-MDs (or among the Designated Operators according to the PReM UPU [4] terminology): this is the evidence that flows between different REM-MD (or different Designated Operators).

Only the third list of types of evidence is interesting for the purposes of interoperability, object of the present document. In fact, when two different systems REM/PReM need to interoperate, only the third type of evidence **shall** flow between the two types of systems and so between REM-MD and DO (and vice versa according to the flow direction).

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## 11 Mapping of protocol elements

In section 5.2.5 of the PReM UPU [4] specification it is recommended that the interchange of messages (Dispatches) among two Designated Operators (REM-MD in REM terminology) is operated through Web Services.

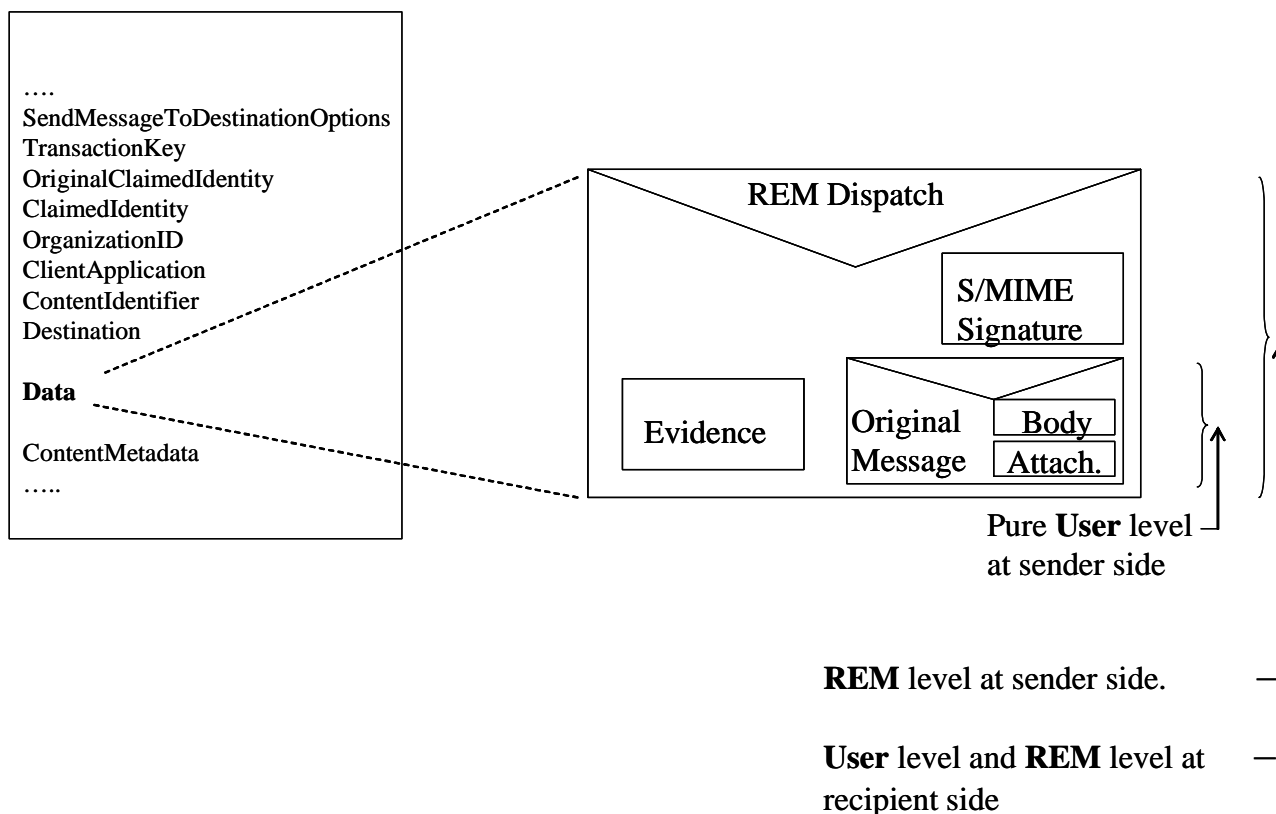
The packages of information conveyed among Designated Operators are fully defined in the PReM UPU [4] specification as a XML schema and an associated WSDL.

A specific "**Data**" element is defined in the XML schema. It is a b64 binary element that **shall** host the REM Dispatch to be transmitted from a Designated Operator to another one. The same process **shall** be applied also in case of a REM-MD Message constituted by an evidence. The REM/PReM Gateway **shall** include the REM Dispatch or the REM-MD Message within a PReM WebService structure as specified in sections 7.1.7.2, 8.1 and 8.3 of the PReM UPU [4] specification.

### 11.1 Enveloping REM Dispatch in PReM Web Service business payload

Figure 2 illustrates how is implemented this mapping/embodying of REM Dispatch or REM-MD Messages to PReM Dispatch structure as WebService business payload.

## PRem WebService Structure



**Figure 2**

The envelope on the right part of Figure 2 represents the entire REM Dispatch according to the TS 102 640-1 [1], TS 102 640-2 [2] and TS 102 640-5 [3] (equivalent to the PReM Message, in UPU Terminology).

The Sender's payload is the internal enveloped content indicated as "Original Message" in Figure 2.

The Recipient **shall** receive the entire content (indicated as "REM Dispatch" in Figure 2) containing the "untouched" Sender's payload. Some variant to this schema **may** be possible according to the following rules:

- The REM Dispatch/REM-MD Message **may** contain other attachments (for own purposes of UPU/PReM service), but the basic structure with the mandatory elements defined in the TS 102 640-1 [1], TS 102 640-2 [2] and TS 102 640-5 [3] **shall** be maintained unchanged.
- The REM-MD Message representing an evidence (generally without a Sender's payload) **shall** be enveloped in the PReM WebService Structure exactly as for the REM Dispatch (that contains the Original Message/Sender's payload).

The mapping described in Figure 2 is implicitly performed when a UPU Designated Operator needs to interoperate with another UPU Designated Operator according to the specification PReM UPU [4].

In consequence, a REM/PReM Gateway:

- 1) **shall** build up an appropriate PReM Web Service structure around the normal REM Dispatch, when the direction is REM → PReM. This PReM Web Service structure **shall** be submitted to the UPU/PReM network in order to be delivered to the intended PReM recipient;
- 2) **shall** extract the REM-MD Message, containing some evidence, from the "Data" element, when the direction of the Sender's message is REM → PReM (and so the direction of the evidence messages is PReM → REM). These evidence messages **shall** be submitted to the REM network in order to be delivered to the intended REM recipient;

- 3) **shall** extract the REM Dispatch contained in the "Data" element, when the direction is PReM → REM. This REM-MD Message containing the Sender's payload **shall** be submitted to the REM network in order to be delivered to the intended REM Recipient;
- 4) **shall** build up an appropriate PReM Web Service structure around the normal REM-MD Message that contains an evidence, when the direction of the Sender's message is PReM → REM (and so the direction of the evidence messages is REM → PReM). These PReM Web Service structure **shall** be submitted to the UPU/PReM network in order to be delivered to the intended PReM recipient.

Next clauses specify the processing to be implemented by the gateway.

## 11.2 PReM Designated Operators - relay Web Service Interface

The main purpose of the present document is directed to specify the requirements for a REM/PReM Gateway guarantor of the interoperability among REM-MD and PReM Designated Operators. The attention of this clause is concentrated to analyse the Web Service operations (verbs in UPU PReM terminology) defined in PReM UPU [4] specification for the interaction among homogenous PReM Designated Operators. The analysis of these verbs allows to define the interface needed in the interoperability among REM-MD and PReM Designated Operators.

The workflow among two general PReM Designated Operators is represented in Figure 3. This workflow is coherent with the workflow defined in section 5.2.3 of PReM UPU [4] specification. It is purged of sub-flows not relevant for interoperability purposes (that are represented by a cloud) and only the boundary functionalities are mentioned.

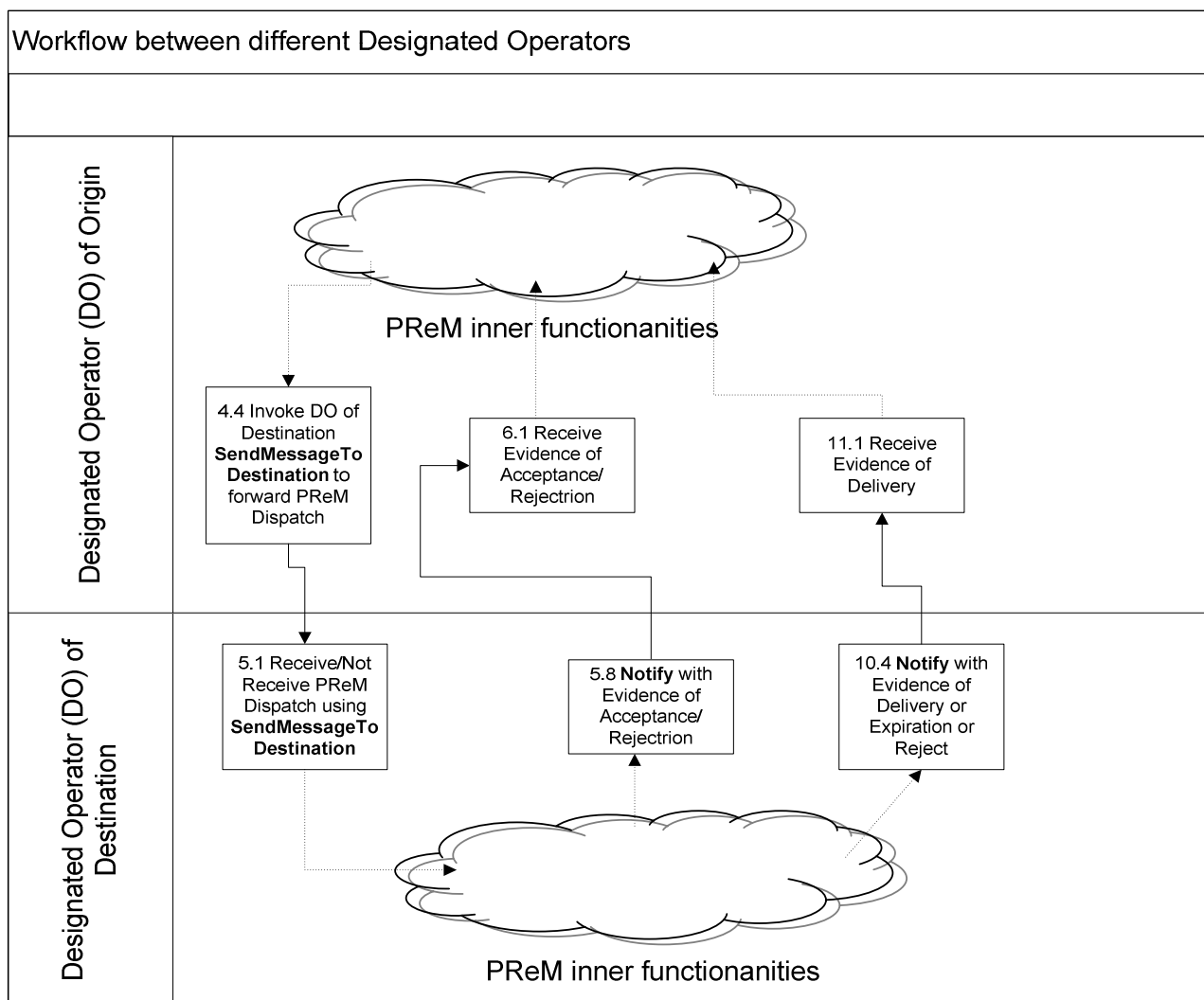


Figure 3: Synthesis of section 5.2.3 of PReM UPU [4] TS

The list of PReM verbs relevant for interoperability, that are mainly used in the functions represented in Figure 3, are:

- SendMessageToDestination;
- SubscribeNotification;
- UnsubscribeNotification;
- ReceiveNotification;
- RejectMessage.

As defined in clause 6 the REM/PReM Gateway **shall** act with double role: "a generic REM-MD" plus "a Designated Operators" according to the direction of the interaction. Under this light the typical usage of the previous functions is the following:

- Case of REM-MD that needs to relay a REM-MD Message to a PReM DO: REM→PReM:
  - The REM/PReM Gateway **shall** register itself to receive notifications/evidence using the method "**SubscribeNotification**" (this operation is done rarely, typically during the setup of the system).
  - A REM-MD **shall** relay a REM Dispatch or REM-MD Message and this, through the REM/PReM Gateway, **shall** be sent to the correct PReM DO of destination by means of the **SendMessageToDestination** method.
  - The PReM DO of destination, **shall** deliver the incoming PReM Message to the Recipient (Addressee/Mailee in PReM terminology) using the **SendMessageToDestination** method.
  - The REM/PReM Gateway **shall** receive the evidence coming from the remote PReM DO of destination using the **ReceiveNotification** method. The evidence **shall** be extracted and sent back to the originator REM-MD.
- Case of PReM DO that needs to relay a PReM Message to a REM-MD: PReM→REM:
  - The PReM DO of origin **shall** register itself to receive notifications/evidence using the method "**SubscribeNotification**" (this operation is done rarely, typically during the setup of the system).
  - The PReM DO of origin **shall** send a PReM Message to the REM/PReM Gateway by means of **SendMessageToDestination** method and this, through the REM/PReM Gateway **shall** be sent to the correct Recipient's REM-MD.
  - The Recipient's REM-MD, **shall** deliver the REM-MD Message obtained by the incoming PReM Message (the REM/PReM Gateway shall extract the REM-MD Message as payload of the PReM Message) to the Recipient.
  - The REM/PReM Gateway **shall** receive the evidence messages coming from the Recipient's REM-MD and **shall** notify them to the PReM DO of origin that, using the **ReceiveNotification** method **shall** receive all the evidence messages.

A full description of the mapping for these functions is given in the next clauses.

## 11.2.1 SendMessageToDestination

The SendMessageToDestination method is used to send a PReM Message from a Designated Operator to another Designated Operator. In the context of the present document, the role of one of the Designated Operators (Recipient's DO or Sender's DO according to the direction of the flow) **shall** be covered by the REM/PReM Gateway.

The XML schema of such operation **may** be found in sections 7.1.7.1 and 7.1.7.2 of PReM UPU [4] specification.

### 11.2.1.1 Mapping of fields during a REM → PReM flow

The following table profiles the SendMessageToDestination operation in the use case of a REM-MD sending REM Dispatch to a PReM DO.

Table 8: SendMessageToDestination XML elements

Nº	Service / Protocol element	PRem UPU [4] reference	Requirement	Implementation guidance	Notes
1	EndLifeCycle	Clause 7.1.7.1	M	a	
2	ExtendLifeCycle	Clause 7.1.7.1	M	b	
3	IssuePostMarkedReceipt	Clause 7.1.7.1	M	c	
4	TransactionKey	Clause 7.1.7.1	M	d	
5	OriginalClaimedIdentity	Clause 7.1.7.1	M	e	
6	ClaimedIdentity	Clause 7.1.7.1	M	f	
7	OrganizationID	Clause 7.1.7.1	R	g	
8	ClientApplication	Clause 7.1.7.1	M	h	
9	ContentIdentifier	Clause 7.1.7.1	O	i	
10	Destination	Clause 7.1.7.1	M	l	
11	Timeout	Clause 7.1.7.1	M	m	
12	Data	Clause 7.1.7.1	M	n	
13	ContentMetadata	Clause 7.1.7.1	O	o	

## Implementation guidance:

- a) The SendMessageToDestination **shall** contain 'EndLifeCycle' element indicating if the current operation is at the "end" of the business transaction lifecycle. Since in REM the concept of business transaction lifecycle is not present, its value **shall** be set to true, where the meaning is that any interaction is always at the start/end of the transaction lifecycle.
- b) The SendMessageToDestination **shall** contain 'ExtendLifeCycle' element indicating if the current operation extends the business transaction lifecycle. Its value **shall** be set to false.
- c) The SendMessageToDestination **shall** contain 'IssuePostMarkedReceipt' element indicating if a specific "PostMark" receipt (to attest that the REM Dispatch has been successfully received by the remote PRem Designated Operator) is required. Its value **should** be false unless the Sender's REM-MD is able to interpret such receipt.
- d) The SendMessageToDestination **shall** contain 'TransactionKey' element that is a complex type including a unique transaction identifier. In order to have a unique identifier important for correlation of the exchanged REM Dispatch and relevant evidence the value of its significant components **shall** be set as follows:
  - i) CountryCode: <two-bytes of the sender country according to the ISO 3166-1 [i.8] country code list>
  - ii) Version: <"1.0">
  - iii) Key: <the Message-ID value of the REM-MD Message envelope>
- e) The SendMessageToDestination **shall** contain 'OriginalClaimedIdentity' element that is a complex type specifying the original unique identification of the Sender. The value of its significant components **shall** be set as follows:
  - i) NameQualifier: <the Internet Domain address of the Sender's e-mail address (the part on the right of the '@' in the e-mail address according to the standard RFC 5322 [i.6])>
  - ii) Format: <http://tools.ietf.org/html/rfc5322#section-3.4.1>
  - iii) UserID: <the user part of Internet e-mail address of the Sender's e-mail address (the part on the left of the '@' in the e-mail address according to the standard RFC 5322 [i.6])>
- f) The SendMessageToDestination **shall** contain 'ClaimedIdentity' element that is a complex type specifying the actual identification of the Sender. The value of its significant components **shall** be set to the same value of the OriginalClaimedIdentity components (implementation guidance e).
- g) The SendMessageToDestination **should** contain 'OrganizationID' element specifying the identifier of the organization that provides the REM/PRem Gateway service. If present, its value **should** be set to the same value of the TSP name present in Table 17 of Trusted Service Providers List for this organization.

- h) The `SendMessageToDestination` **shall** contain 'ClientApplication' element that is a complex type specifying the client application requesting the `SendMessageToDestination`. The value of its significant component **shall** be set as follows:
  - i) `NameAndVersion`: "REM/PReM Gateway v1.0"
- i) The `SendMessageToDestination` **may** contain 'ContentIdentifier' element specifying an identifier of the content. If present, its value **shall** be set to "REM-MD Message".
- j) The `SendMessageToDestination` **shall** contain 'Destination' element specifying the e-mail destination addresses. Its value **shall** be set to a list of e-mail addresses (according to the syntax specified in RFC 5322 [i.6]) relevant to a single remote PReM Designated Operator. If the REM Dispatch is directed to many e-mail addresses belonging to different remote PReM Designated Operators, the same REM Dispatch **shall** be sent many times, one per each remote Designated Operator. In each of these `SendMessageToDestination` invocations the element "destination" **shall** be set to the exact list of addresses relevant for each remote PReM Designated Operator. It is out of scope of the present document to specify the routing aspects (e.g. how the messages are routed from any REM-MD to the remote DO through the REM/PReM Gateway).
- k) The `SendMessageToDestination` **shall** contain 'Timeout' element specifying the period of time (in hours) that the Recipient's DO should wait before considering a PReM Message as "not received" by the Recipient (if set to 0 means that the timeout value is determined by the Recipient's DO). Its value **should** be set to the same time period defined in laws/statutory requirements or local policies of REM network. In case no time period is specified at REM level the value 0 **may** be used in Timeout element, indicating to use the Recipient's DO default value (that in any case may override any specified value, as indicated in section 7.2.7.2 of PReM UPU [4] specification).
- l) The `SendMessageToDestination` **shall** contain 'Data' element that is a complex type specifying a binary element (in b64 form) which embodies the entire REM Dispatch (or the REM-MD Message) to convey using the `SendMessageToDestination` method. The value of its significant component **shall** be set as follows:
  - i) `MimeType`: "message/rfc822"
  - ii) `base64Binary`: <the base64 encoding of the entire REM-MD Message in MIME format>
- m) The `SendMessageToDestination` **may** contain 'ContentMetadata' element that is a complex type specifying a sequence of custom details regarding the REM-MD Message. If present its value **shall** be set as follows:
  - i) `MetadataName`: <name of the metadata>
  - ii) `MetadataValue`: <value of the metadata>

The REM/PReM Gateway **may** elaborate the answer of the `SendMessageToDestination` operation in order to produce some new local Evidence to return back to the REM Sender, whenever this is not explicitly expected from the PReM system.

### 11.2.1.2 Mapping of fields during a PReM → REM flow

The REM/PReM Gateway **shall** parse any PReM Dispatch coming from the PReM network and **shall** extract REM Dispatch from the XML "Data" element. The REM Dispatch coming from the PReM network **shall** be auto consistent in the sense that, according to the aspects considered in clause 9 of the present document, it **shall** have all the REM fields correctly and coherently compiled to be interpreted by the destination REM system.

The REM/PReM Gateway **shall** decode any REM Dispatch (extracted as indicated above) from the base64 format and **shall** submit it to the REM network. The submission operation requires to compile the "forward-path" and "reverse-path" for the correct addressing to the proper REM-MDs and to avoid loops and/or multiple submissions of the same message. The two terms "forward" and "reverse" path are used in the present document like their usage in RFC 5321 [i.5].

Below follows a non-normative example of how the "forward-path" and "reverse-path" are compiled:

This operation may be performed as follows:

- i) collect all the "To:" and "Cc:" MIME Headers from the REM Dispatch extracted from the 'Data' element;
- ii) select all the destination addresses that are belonging to the REM system. This may be done by a lookup to some specific trusted index (see clause 12 for trust building);
- iii) insert all the addresses selected in the previous point as "forward-path" for the correct routing of the REM-MD Message;
- iv) collect the "Reply-To:" MIME Headers from the REM Dispatch extracted from the 'Data' element and set it as "reverse-path" for the correct return path to use in case of exceptions.

It is out of scope of the present document to specify further these routing aspects.

## 11.2.2 SubscribeNotification

In the context of the present document, the SubscribeNotification method **shall** be used to cover the following situations:

- Used by the REM/PReM Gateway for subscribing itself to the event notification service of the PReM system. In this situation the SubscribeNotification is that usually implemented by any remote PReM DO.
- Used by any remote PReM Designated Operators to subscribe themselves to be notified on the relevant events (called evidence in REM terminology) occurring at REM/PReM Gateway side. In this situation the SubscribeNotification **shall** be implemented by the REM/PReM Gateway.

There is a direct correspondence among the PReM notifications and the REM-MD Evidence types. It is required an invocation of this function for each event type (and so evidence type) that needs to be notified to the REM/PReM Gateway.

The REM/PReM Gateway **shall** subscribe itself, using the SubscribeNotification function, to each Designated Operator of the PReM system that needs to use the gatewaying function with REM. Conversely, all these Designated Operators of the PReM system that need to use the gatewaying function with REM **shall** subscribe themselves, using the SubscribeNotification function to the REM/PReM Gateway.

This invocation is a "registration" of information (containing also a call-back URL), so it is performed rarely, and typically at configuration time. Other means to register the required information **may** be possible under particular agreements among the REM/PReM Gateway providers and PReM DO providers. Specification of alternative means is out of scope of the present document.

The XML schema of such operation **may** be found in sections 7.1.9.1 and 7.1.9.2 of PReM UPU [4] specification.

### 11.2.2.1 Mapping of fields during a REM → PReM flow

Any DO **shall** implement the function SubscribeNotification. The REM/PReM Gateway **shall** subscribe itself to be notified on events (evidence in REM terminology) occurring in any remote DO. Any event occurring at DO side means a specific invocations to the ReceiveNotification (defined in clause 11.2.4.1) URL subscribed by the REM/PReM Gateway with SubscribeNotification method.

Table 9 contains the mapping of the elements of SubscribeNotification, function invoked from the REM/PReM Gateway and implemented in any remote DO.

**Table 9: SubscribeNotifications elements - REM → PReM**

Nº	Service / Protocol element	PReM UPU [4] reference	Requirement	Implementation guidance	Notes
1	EventType	Clause 7.1.9.1	M	a	
2	ClientApplication	Clause 7.1.9.1	M	b	
3	CallbackUrl	Clause 7.1.9.1	M	c	



Implementation guidance:

- a) The SubscribeNotification **shall** contain 'EventType' element specifying the event to subscribe for which a notification is required. This function **shall** be invoked, from the REM/PReM Gateway, for each of the following events:
  - i) "MessageDelivered"
  - ii) "MessageUndelivered"
  - iii) "MessageReadByAddressee"
- b) The SubscribeNotification **shall** contain 'ClientApplication' element that is a complex type specifying the client application requesting the SubscribeNotification. The value of its significant component **shall** be set as follows:
  - i) NameAndVersion: "REM/PReM Gateway v1.0"
- c) The SubscribeNotification **shall** contain 'CallbackUrl' element specifying the call-back URL function that it is required to be invoked by any subscribed DO whenever the event denoted by EventType occurs. This URL **shall** implement a function according to the interface defined for the "ReceiveNotification" method, as described in clause 11.2.4.1 of the present document. The value of this element **shall** be set as follows:
  - i) CallbackUrl: <URL of the WebService of the REM/PReM Gateway pointing to the ReceiveNotification function>

Whenever some events occur at DO level, it **shall** invoke the specific ReceiveNotification call-back function as defined in clause 11.2.4.1 of the present document.

### 11.2.2.2 Mapping of fields during a PReM → REM flow

The REM/PReM Gateway **shall** implement the function SubscribeNotification. The remote PReM Designated Operators **shall** subscribe themselves to be notified on events (evidence in REM terminology) occurring in the REM/PReM Gateway. The REM-MD Messages containing evidence information directed to PReM Designated Operators **shall** be converted, by the REM/PReM Gateway, in specific invocations to the ReceiveNotification (defined in clause 11.2.4.2) URLs subscribed by any DO with SubscribeNotification method.

Table 10 contains the mapping of the elements of SubscribeNotification, function implemented in the REM/PReM Gateway.

**Table 10: SubscribeNotifications elements – PReM → REM**

Nº	Service / Protocol element	PReM UPU [4] reference	Requirement	Implementation guidance	Notes
1	EventType	Clause 7.1.9.1	M	a	
2	ClientApplication	Clause 7.1.9.1	M	b	
3	CallbackUrl	Clause 7.1.9.1	M	c	

Implementation guidance:

- a) The SubscribeNotification **shall** contain 'EventType' element specifying the event to subscribe for which a notification is required. This function **shall** be invoked, by any remote DO, for each of the following events:
  - i) "MessageDelivered"
  - ii) "MessageUndelivered"
  - iii) "MessageReadByAddressee"

- b) The SubscribeNotification **shall** contain 'ClientApplication' element that is a complex type specifying the client application requesting the SubscribeNotification. The value of its significant component **may** be set as follows:
- i) NameAndVersion: "Remote DO v1.0"  
Other values **may** be used by the DOs for this element. It is out of scope of the present document to provide further specification on this element since it is considered informative and not critical for the interoperability.
- c) The SubscribeNotification **shall** contain 'CallbackUrl' element specifying the call-back URL function that it is required to be invoked by the REM/PReM Gateway whenever the event denoted by EventType occurs. This URL **shall** implement a function according to the interface defined for the "ReceiveNotification" method, as described in clause 11.2.4.2 of the present document. The value of this element **shall** be set as follows:
- i) CallbackUrl: <URL of the WebService of the remote DO associated to the ReceiveNotification function>

The REM/PReM Gateway **shall** maintain a configuration table with the following mapping.

**Table 11: SubscribeNotifications - Event mapping - PReM → REM**

PReM EventType	REM Event (TS 102 640-1 [1], clause 6.2)
MessageDelivered	6.2.3 Event C.1 - Message Delivery
MessageUndelivered	6.2.3 Event C.2 - Expiration of time to deliver message
MessageReadByAddressee	6.2.3 Event F.1 (mailbox) - Retrieval

Whenever a REM-MD Evidence, related to the specified REM Event, arrives to the REM/PReM Gateway, it **shall** invoke the specific ReceiveNotification call-back function for all the subscribed PReM Designated Operators as defined in clause 11.2.4.2 of the present document.

### 11.2.3 UnsubscribeNotification

The UnsubscribeNotification method is useful to cancel a previous registration process performed by a SubscribeNotification. It is out of scope of the present document to list all the possible reasons requiring to unsubscribe a previous agreement. The full usage description of this method **may** be found in section 7.2.10 of PReM UPU [4] specification

The REM/PReM Gateway requiring unsubscribing an agreement with some remote DO **shall** queue all the REM-MD Evidence messages directed to such remote DO. The REM-MD Evidence messages queued, when any subscription agreement with a remote DO is defined, **shall** subsequently be delivered as soon as a new subscription agreement will be effected. Further details on the subscription agreements are out of scope of the present document.

### 11.2.4 ReceiveNotification

The ReceiveNotification method is used to receive evidence information whenever some event, subscribed with the method SubscribeNotification, occurs.

The XML schema of such operation **may** be found in section 7.1.11.1 of PReM UPU [4] specification.

#### 11.2.4.1 Mapping of fields during a REM → PReM flow

In this context the flow REM → PReM means that a REM-MD Message (or a REM Dispatch) has been sent to a remote PReM Designated Operator and the relevant evidence needs to be received from the REM/PReM Gateway by means of ReceiveNotification. The REM/PReM Gateway **shall** implement the ReceiveNotification function and it **shall** be available at the URL subscribed as indicated in clause 11.2.2.1 of the present document. The following table contains the mapping of the relevant elements.

**Table 12: ReceiveNotifications elements - REM → PReM**

Nº	Service / Protocol element	PReM UPU [4] reference	Requirement	Implementation guidance	Notes
1	TransactionKey	Clause 7.1.11.1	M	a	
2	EventType	Clause 7.1.11.1	M	b	
3	EventDateTime	Clause 7.1.11.1	M	c	
4	EventData	Clause 7.1.11.1	M	d	

Implementation guidance:

- a) The ReceiveNotification **shall** contain 'TransactionKey' element specifying the TransactionKey returned back in the previous SubscribeNotification invocation. Even if the syntax of this element states that it is mandatory, its value **shall** be ignored, at REM/PReM Gateway side, during the implementation of ReceiveNotification.
- b) The ReceiveNotification **shall** contain 'EventType' element specifying the event that has occurred on the remote PReM Designated Operator, the invoker of ReceiveNotification. The REM/PReM Gateway **shall** extract the evidence from the ReceiveNotification and **shall** submit it in the REM network as described in implementation guidance d) below. The evidence **shall** be fully formatted and enveloped in the EventData element by the remote PReM Designated Operator according to the following mapping table:

**Table 13: ReceiveNotifications - Event mapping - REM → PReM**

PReM EventType	REM-MD Evidence (TS 102 640-1 [1], clause 5.1)
MessageDelivered	5.1.4 DeliveryNonDeliveryToRecipient
MessageUndelivered	5.1.4 DeliveryNonDeliveryToRecipient
MessageReadByAddressee	5.1.6 RetrievalNonRetrievalByRecipient

- c) The ReceiveNotification **shall** contain 'EventDateTime' element specifying the date/time reference of the event which has just occurred. Even if the syntax of this element states that it is mandatory, its value **shall** be ignored, at REM/PReM Gateway side, during the implementation of ReceiveNotification.
- d) The ReceiveNotification **shall** contain 'EventData' element that is a complex type specifying a binary element (in b64 form) which embodies the entire REM-MD Message containing the REM-MD evidence to convey using the ReceiveNotification method. The value of its significant component **shall** be set as follows:
  - i) MimeType: "message/rfc822"
  - ii) base64Binary: <the base64 encoding of the entire REM-MD Message containing the evidence>

The REM/PReM Gateway, executing the invocation of ReceiveNotification, **shall** decode the REM-MD Message containing the evidence, extracted from the element indicated above, from the base64 format and **shall** submit it in the REM network. The submission operation requires to compile the "forward-path" and "reverse-path" for the correct addressing to the proper REM-MDs and to avoid loops and/or multiple submissions of the same object. The two terms "forward" and "reverse" path are used in the present document like their usage in RFC 5321 [i.5].

Below follows a non-normative example of how the "forward-path" and "reverse-path" are compiled:

This operation may be performed as follows:

- i) collect all the "To:" MIME Headers from the REM-MD Message extracted from the 'EventData' element and set the "forward-path" with this value;
- ii) collect the "From:" MIME Headers from the REM-MD Message extracted from the 'EventData' element and set it as "reverse-path" (for the correct return path in case of exceptions).

It is out of scope of the present document to specify further these routing aspects.

### 11.2.4.2 Mapping of fields during a PReM → REM flow

In this context the flow PReM → REM means that a PReM Message has been sent from a PReM Designated Operator of origin to a REM-MD through the REM/PReM Gateway. The Gateway, receiving back the REM-MD Evidence from the Recipient's REM-MD, **shall** notify this to the PReM Designated Operator of origin by means the invocation of ReceiveNotification. The ReceiveNotification function will be available at the URL subscribed in advance by the PReM Designated Operator as indicated in clause 11.2.2.2 of the present document.

The REM/PReM Gateway **shall** invoke the proper URL notifying the correct PReM EventType according to the following table:

**Table 14: ReceiveNotifications - Event mapping - PReM → REM**

REM-MD Evidence (TS 102 640-1 [1], clause 5.1)	PReM EventType
5.1.4 DeliveryNonDeliveryToRecipient - delivery case	MessageDelivered
5.1.4 DeliveryNonDeliveryToRecipient - expiration time to delivery case	MessageUndelivered
5.1.6 RetrievalNonRetrievalByRecipient - retrieval case	MessageReadByAddressee

Table 15 contains the mapping of all the relevant elements of the ReceiveNotification invocation.

**Table 15: ReceiveNotifications elements - PReM → REM**

Nº	Service / Protocol element	PReM UPU [4] reference	Requirement	Implementation guidance	Notes
1	TransactionKey	Clause 7.1.11.1	M	a	
2	EventType	Clause 7.1.11.1	M	b	
3	EventDateTime	Clause 7.1.11.1	M	c	
4	EventData	Clause 7.1.11.1	M	d	

Implementation guidance:

- a) The ReceiveNotification **shall** contain 'TransactionKey' element specifying the TransactionKey returned back in the previous SubscribeNotification invocation.
- b) The ReceiveNotification **shall** contain 'EventType' element specifying the event to transmit to the Sender's PReM Designated Operator (the initiator of the messaging transaction) according with Table 14. The REM/PReM Gateway **shall** invoke the ReceiveNotification submitting the REM-MD Message containing an evidence to the Sender's DO as described in implementation guidance d) below.
- c) The ReceiveNotification **shall** contain 'EventDateTime' element specifying the date/time reference of the event which has just occurred. This time **should** be collected from the evidence.
- d) The ReceiveNotification **shall** contain 'EventData' element that is a complex type specifying a binary element (in b64 form) which embodies the entire REM-MD Message containing the REM-MD evidence to be send back to the Sender's DO. The value of its significant component **shall** be set as follows:
  - i) MimeType: "message/rfc822"
  - ii) base64Binary: <the base64 encoding of the entire REM-MD Message containing the evidence>

The REM/PReM Gateway, executing the invocation of ReceiveNotification, **shall** encode the REM-MD Message containing the evidence in base64 format and **shall** submit it to the Sender's DO.

### 11.2.5 RejectMessage

The RejectMessage method is useful to explicitly indicate the will of the Recipient to reject the message. It is out of scope of the present document to list all the possible reasons requiring this method. The full usage description of this method **may** be found in section 7.2.8 of PReM UPU [4] specification.

Since the event associated with rejection is present in both technical specifications REM and UPU/PReM, it **may** be used in both directions.

### 11.2.5.1 Mapping of evidence during a REM → PReM flow

In this context the flow REM → PReM means that a REM-MD Message (or a REM Dispatch) has been sent to a remote PReM Designated Operator and the final Recipient rejects the incoming message with an explicit declaration. This act is translated in an invocation to the RejectMessage method.

The REM/PReM Gateway **shall** implement the RejectMessage mapping this event to the 'AcceptanceRejectionByRecipient' REM-MD Evidence (with EventCode='Rejection'). The new REM-MD Evidence message composed by the REM/PReM Gateway **shall** be sent back to the REM Sender of the original message. It is out of scope of the present document how the REM/PReM Gateway maintains the correlation among all the sent/received information needed to compose the 'AcceptanceRejectionByRecipient' REM-MD Evidence.

### 11.2.5.2 Mapping of evidence during a PReM → REM flow

In this context the flow PReM → REM means that a PReM Message has been sent to a REM Recipient and, in case of the optional reject mechanism is provided to the final user, this user rejects the incoming message with an explicit declaration. This declaration is translated, at Recipient's REM-MD level, in a generation of a 'AcceptanceRejectionByRecipient' REM-MD Evidence (with EventCode='Rejection').

The REM/PReM Gateway **shall** invoke the RejectMessage implemented and executed, as usual in PReM environment, by the Sender's DO. It is out of scope of the present document how the REM/PReM Gateway maintains the correlation among all the sent/received information needed to invoke the RejectMessage method.

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## 12 Definition of mutual recognition system based on ETSI-TSL and UPU-Designated Operator Trusted List

This clause contains the specifications that **should** be implemented for cross-trusting between ETSI/REM and UPU/PReM networks.

A PReM Policy Domain, according to PReM UPU [4] specification, is a collection of PReM enabled Designated Operators operating which belong to a group that is managed according to rules and regulations agreed by the group. Each PReM Designated Operator grants trust to the PReM End Users abiding by the same Policy Domain rules and granting that each PReM Message properly submitted is managed, tracked and delivered under the common Policy Domain rules. Digital signatures applied by PReM Designated Operators to PReM Messages and PReM Evidence certify the respect of the Policy Domain rules. UPU is responsible for Policy Domain rules establishment and supervises Designated Operators operating under Policy Domain rules.

A PReM Trust List is required to support PReM End User or interested party to:

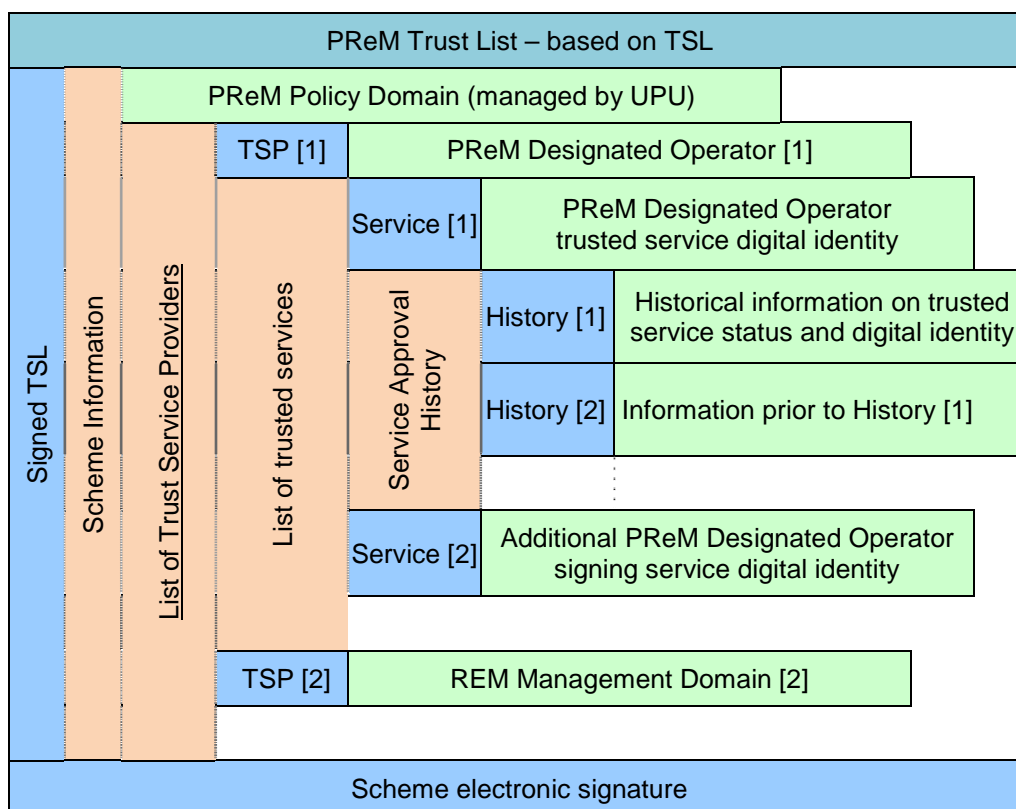
- verify that the signing certificate used for PReM Dispatch is valid and belongs to an authorized Designated Operator
- verify if the PReM Designated Operator belongs to the expected PReM Policy Domain
- verify if the PReM Designated Operator current status was in accord with PReM Policy Domain rules when a signature envelope was created

TSL defined in TS 102 231 [5] addresses those requirements and is the recommended instrument for a seamless mutual recognition between a REM and PReM systems evidence. When a TSL is used to implement or complement a PReM Trust List, TS 102 640-1 [1] **shall** apply.

In term of domain trust the following mapping among PReM, REM and TSL defined roles is applied:

- entity responsible for Policy Domain rules (i.e. UPU) - REM Policy Domain (REM-PD) - TSL Schema Operator
- PReM Designated Operator - REM Management Domain (REM-MD) - TSLTrust Service Provider (TSP)
- PReM Designated Operator signing service - REM-MD Evidence Provider - TSL Service

A TSL contains trust information, in a hierarchical format. Figure 4 shows the information contained in a TSL and how it is mapped to REM/PReM entities.



NOTE: The notations "[1]" and "[2]" in Figure 4 indicate the indexes of elements of the list.

**Figure 4: Mapping UPU Trust List to TSL (based on TS 102 231 [5])**

When UPU, as responsible for PReM Policy Domain, issues a TSL, it acts as TSL schema operator and creates, signs and publishes the TSL.

A TSL for PReM **shall** be of type Generic and all the Designated Operators **shall** be listed as TSP. Each of these **should** contain information related to REM-MD Evidence provider, current and historical information among which digital identity that can be used to verify the service signatures and status.

It is assumed that each party that needs to verify a REM-MD Evidence **should** trust at least a Schema Operator.

As non normative example, a REM User typically trusts TSLs issued by own REM-PD.

A TSL issued for PReM **should** contain all the Designated Operators and the related certificated associated to the digital keys that they use to:

- i) digital sign the PReM Messages
- ii) verify integrity and trust of the PReM Messages (including the PReM Objects and Evidence)

If a PReM Designated Operator certificate is no longer used (e.g. when approaching its expiration date) a new certificate is generated and associated to the service while the previous certificate is added to the service history. For each active signing digital key a Trusted Service element and its history **shall** be updated. No new Trusted Service entry **should** be added when a new signing key is generated and associated to a new certificate to renew an expiring one.

## 12.1 Scheme information section

The scheme information section of a TSL issued by a PReM Policy Domain **should** be populated in conformance to Table 16.

**Table 16: UPU PReM TSL Scheme Information**

TSL field name	Value
TSL type (M)	Set to " <a href="http://uri.etsi.org/TrstSvc/TSLType/generic">http://uri.etsi.org/TrstSvc/TSLType/generic</a> "
Scheme operator name (M)	See TS 102 231 [5]
Scheme operator address (M)	
Scheme operator postal address (M)	
Scheme operator electronic address (M)	
Scheme name (M)	
Scheme information URI (M)	
Status determination approach (M)	
Scheme type/community/rules (O)	Set to "supervision"
Scheme territory (O)	Not present
TSL policy/legal notice (M)	See TS 102 231 [5]
Historical information period (M)	
Pointers to other TSLs (O)	
Additional information field (O)	
Attribute of: Pointers to other TSLs	
List issue date and time (M)	
Next update (M)	
Distribution points (O)	
Scheme extensions (O)	Not present
List of Trust Service Providers (O) → sequence of elements in Table 17	List of Trust Service Providers as specified in clause 12.2

## 12.2 List of Trust Service Providers section

The List of Trust Service Providers section should be compiled according to Table 17.

**Table 17: List of Trust Service Providers**

TSL field	Value
TSP name (M)	Set with the Designated Operator Name
TSP trade name (M)	See TS 102 231 [5]
TSP address (M)	
TSP postal address (M)	
TSP electronic address (M)	
TSP information URI (M)	An URI where general information relevant to the users like public certificates, addresses, etc. is published by the Designated Operator
TSP information extensions (O)	Not present
List of services (M)	Sequence of Trusted Service information elements as specified in clause 12.3

## 12.3 Trusted Service information section

The List of Trust Service information section should be compiled according to Table 18.

**Table 18: Trusted Service information**

TSL field	Value
Service type identifier (M)	The value shall be one of the following. Case of UPU/PReM TSP: <a href="http://www.upu.int/PReMService">http://www.upu.int/PReMService</a>  Case of ETSI/REM TSP: <a href="http://uri.etsi.org/TrstSvc/Svctype/REM">http://uri.etsi.org/TrstSvc/Svctype/REM</a>
Service name (M)	See TS 102 231 [5]
Service digital identity (M)	The Designated Operator Certificate X.509 certificate and optionally an X509 SKI element
Service current status (M)	Set to one of "In accord / Suspended / Revoked"
Current status starting date and time (M)	See TS 102 231 [5]
Scheme service definition URI (O)	
Service supply points (O)	
TSP service definition URI (O)	Optionally an URI for publishing general information relevant to the users like public certificates, addresses, etc.
Service information extensions (O)	Not present
Service approval history (O)	Sequence of service approval history elements as specified in clause 12.4

## 12.4 Trusted Service approval history section

The List of Trust Service approval history section should be compiled according to Table 19.

**Table 19: Service approval History**

TSL field	Value
Service type identifier	See Table 18
Service name	See Table 18
Service digital identity	See Table 18
Service previous status	See TS 102 231 [5]
Previous status starting date and time	
Service information extensions	Not present



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## History

<b>Document history</b>		
V1.1.1	September 2011	Publication