



Electronic Signatures and Infrastructures (ESI); Registered Electronic Mail (REM) Services; Part 2: Semantic Contents

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 48 server) which are, or may be, or may become, essential to the present document.

49 Foreword

50 This draft European Standard (EN) has been produced by ETSI Technical Committee Electronic Signatures and
 51 Infrastructures (ESI) and is now submitted for public review before approval by TC ESI and submission for the
 52 combined Public Enquiry and Vote phase of the ETSI standards EN Approval Procedure.

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

| Proposed national transposition dates | |
|---|---------------------------------|
| Date of latest announcement of this EN (doa): | 3 months after ETSI publication |
| Date of latest publication of new National Standard or endorsement of this EN (dop/e): | 6 months after doa |
| Date of withdrawal of any conflicting National Standard (dow): | 6 months after doa |

54

55 Modal verbs terminology

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

59 "**must**" and "**must not**" are **NOT** allowed in ETSI deliverables except when used in direct citation.

60 Introduction

61 **EDITORIAL NOTE: introduction to be completed**

62

63 1 Scope

64 The present document describes the semantic content of messages and evidence used in registered electronic mail
65 (REM) service. Registered electronic mail is a specific type of electronic registered delivery, which builds on the
66 formats, protocols and mechanisms used in ordinary e-mail messaging.

67 The present document is part 2 of a multi-part deliverable covering Registered Electronic Mail (REM) Services, as
68 identified below:

69 Part 1: "Framework and architecture";

70 **Part 2: "Semantic contents";**

71 Part 3: "Formats";

72 Part 4: "Interoperability profiles";

73 The general concepts and requirements of electronic registered delivery are described ETSI EN 319 522 covering
74 Electronic Registered Delivery Services, which is also a multi-part deliverable. Since registered electronic mail is a
75 specific type of electronic registered delivery, the general provisions given in ETSI EN 319 522 apply to registered
76 electronic mail as well. Hence, parts 1, 2 and 3 of EN 319 532 are aligned with EN 319 522, and they reference the
77 necessary provisions of the corresponding part.

78 As a consequence, the present document relies on ETSI EN 319 522-2 [2] for all semantic contents and requirements
79 which are generally applicable to all electronic registered delivery services, and defines the interpretation and specific
80 requirements which apply only to registered electronic mail.

81 2 References

82 2.1 Normative references

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

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87 <https://docbox.etsi.org/Reference/>.

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

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

91 [1] ETSI EN 319 522-1: "Electronic Signatures and Infrastructures (ESI); Electronic Registered
92 Delivery Services; Part 1: Framework and Architecture".

93 [2] ETSI EN 319 522-2: "Electronic Signatures and Infrastructures (ESI); Electronic Registered
94 Delivery Services; Part 2: Semantic content".

95

96 2.2 Informative references

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

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

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

- 104 [i.1] ETSI TR 119 001: "Electronic Signatures and Infrastructures (ESI); The framework for
105 standardization of signatures; Definitions and abbreviations"
- 106 [i.2] ETSI EN 319 532-1: "Electronic Signatures and Infrastructures (ESI); Registered Electronic Mail
107 (REM) Services; Part 1: Framework and Architecture"
- 108 [i.3] ETSI EN 319 532-3: "Electronic Signatures and Infrastructures (ESI); Registered Electronic Mail
109 (REM) Services; Part 3: Formats"
- 110 [i.4] Regulation (EU) No 910/2014 of the European Parliament and of the Council on electronic
111 identification and trust services for electronic transactions in the internal market and repealing
112 Directive 1999/93/EC.
- 113 [i.5] ETSI TS 119 612: "Electronic Signatures and Infrastructures (ESI); Trusted Lists"
- 114 [i.6] ETSI EN 319 522-3: "Electronic Signatures and Infrastructures (ESI); Electronic Registered
115 Delivery Services; Part 2: Formats".
- 116 [i.7] IETF RFC 5321: "Simple Mail Transfer Protocol"
- 117 [i.8] IETF RFC 1939: "Post Office Protocol - Version 3"
- 118 [i.9] IETF RFC 3501: "INTERNET MESSAGE ACCESS PROTOCOL - VERSION 4rev1"
- 119 [i.10] IETF RFC 5246: "The Transport Layer Security (TLS) Protocol Version 1.2"
- 120 [i.11] IETF RFC 4422: "Simple Authentication and Security Layer (SASL)"

121

122 3 Definitions and abbreviations

123 3.1 Definitions

124 For the purposes of the present document, the terms and definitions given in ETSI EN 319 532-1 [i.2] apply.

125 3.2 Abbreviations

126 For the purposes of the present document, the abbreviations given in ETSI EN 319 532-1 [i.2] apply.

127 4 Overview

128 4.1 ERDS and REM data structures

129 The semantic content flowing across the interfaces of ERD services in general, as specified in clause 4 of ETSI EN
130 319 522-2 [2], applies to REM as well. The present document specifies how to interpret the ERDS concepts in the
131 specific case of REM.

132 The ERDS objects flowing across the interfaces can contain the types of information detailed below. Their
133 interpretation in the REM specific case are the following:

- 134 • **user content:** the original data produced by the sender which has to be delivered to the recipient. This may
135 consist of one or more files. When the user content is submitted within an email message, the body of the
136 message and the body of all attachments – if any – are considered to be the user content.
- 137 • **submission metadata:** data submitted to the electronic registered delivery service together with the user
138 content. This may include any accompanying information that the sender specifies in relation to the submitted
139 content. When the user content is submitted in the form of an email message, the headers of the message and
140 the headers of attachments – if any – are considered to be part of the submission metadata. This includes

141 headers specified by the sender and headers added by any servers the email passes through before reaching the
 142 boundary of the REMS systems. Other data specified in the SMTP transaction (e.g. sender and recipient
 143 addresses) are also part of the submission metadata.

- 144 • **ERDS relay metadata:** data related to the user content which is generated by the REMS for the purpose of
 145 relaying to another REMS. This may contain a transformation of the submission metadata and also additional
 146 data. In REM the ERDS relay metadata is the header of the relayed message (or any parts thereof).
- 147 • **ERDS evidence:** data generated within an ERDS, which aims to prove that a certain event has occurred at a
 148 certain time. This is the same in REM as for any other type of ERDS.
- 149 • **ERDS handover metadata:** data related to the user content which is generated by the REMS and handed over
 150 to the ERD user agent/application of the recipient. When the user content is handed over in the form of an
 151 email message, headers of the message (or any parts thereof) are considered to be part of the ERDS handover
 152 metadata.

153 The ERD systems build up data structures using the above information for the purpose of storage or communication
 154 between ERDSs or with end users. The various data structures are the following:

- 155 • **ERD message:** data structure generated by the electronic registered delivery service provider, which contains
 156 any of the user content, ERDS relay metadata and/or ERDS evidence.
- 157 • **ERD dispatch:** ERD message which contains the user content, some ERDS relay metadata and ERDS
 158 evidence.
- 159 • **ERD payload:** ERD message which contains the user content and some ERDS relay metadata.
- 160 • **ERDS serviceinfo:** ERD message which contains some ERDS relay metadata.
- 161 • **ERDS receipt:** ERD message which contains ERDS evidence and some ERDS relay metadata.

162 An additional data structure can appear on the interfaces of the ERDS, which is not built by the ERD systems, but
 163 comes from the outside:

- 164 • **original message:** data structure including the user content and the submission metadata. For the purpose of
 165 submission, the ERD user agent / application of the sender builds up a data structure, e.g. an email message.
 166 Any servers forwarding the message can modify this before it reaches the systems of the ERDS (e.g. add extra
 167 headers, correct format errors, etc.). The original message is the resulting data structure, which passes through
 168 the ERDS MSI: Message Submission Interface provided by the sender's ERDS.

169 In addition, the following objects specific for REM are introduced:

- 170 • **REMS introduction:** data generated by the REMS containing information for the users about the data
 171 structure it is included in. This may be formatted text or plaintext. This is intended to be displayed to the user
 172 upon receipt of a REM message, and it can provide guidelines on how to interpret or use the various parts of
 173 the content of the REM message.
- 174 • **REMS extension:** data generated by the REMS in machine-readable form containing additional information
 175 for other REMSs or the ERD-UA of users. The content and format of REMS extension can be defined by
 176 application-specific or sector-specific rules; it is outside the scope of the present deliverable.
- 177 • **REM envelope:** signed data structure generated by the registered electronic mail service which contains any
 178 of the REMS introduction, user content, ERDS relay metadata, ERDS evidence and/or REMS extension. The
 179 REM envelope should be generated in the format specified in EN 319 532-3 [i.3]. The REM envelope shall
 180 bear the digital signature of the generating REMSP.

181 All ERD messages can be formatted as REM envelopes. Consequently, the following REM message types are defined:

- 182 • **REM message:** ERD message in the form of a REM envelope.
- 183 • **REM dispatch:** ERD dispatch in the form of a REM envelope.
- 184 • **REMS notification:** ERDS serviceinfo in the form of a REM envelope, which includes a reference to the user
 185 content to be delivered. A REMS notification shall not contain the user content. A REMS notification shall not
 186 contain ERDS evidence.

- **REMS receipt:** ERDS receipt in the form of a REM envelope. A REMS receipt shall not contain the user content.

NOTE: A REMS notification cannot contain ERDS evidence, but a REMS receipt can contain ERDS relay metadata including a reference to the user content. If a REMS aims to convey some ERDS evidence and also a reference to the user content to the recipient in the same message then it can use the REMS receipt structure.

NOTE: The use of ERD payload in the form of a REM envelope, although permitted, is not specified by the present deliverable. Therefore, the term ‘REM payload’ is not defined.

The following table 1 specifies the required cardinality of basic components (REMS introduction, user content, ERDS relay metadata, ERDS evidence, REMS extension) within each of the subtypes of REM message that are used in REM (REM dispatch, REMS receipt, REMS notification).

Table 1: cardinality of components in REM messages

| Type of message | | REMS introduction | user content | ERDS relay metadata | ERDS evidence | REMS extension |
|-----------------|-------------------|-------------------|--------------|---------------------|---------------|----------------|
| REM message | REM dispatch | 0..1 | 1 | 1 | 1..n | 0..n |
| | REMS receipt | 0..1 | | 1 | 1..n | 0..n |
| | REMS notification | 0..1 | | 1 | | 0..n |

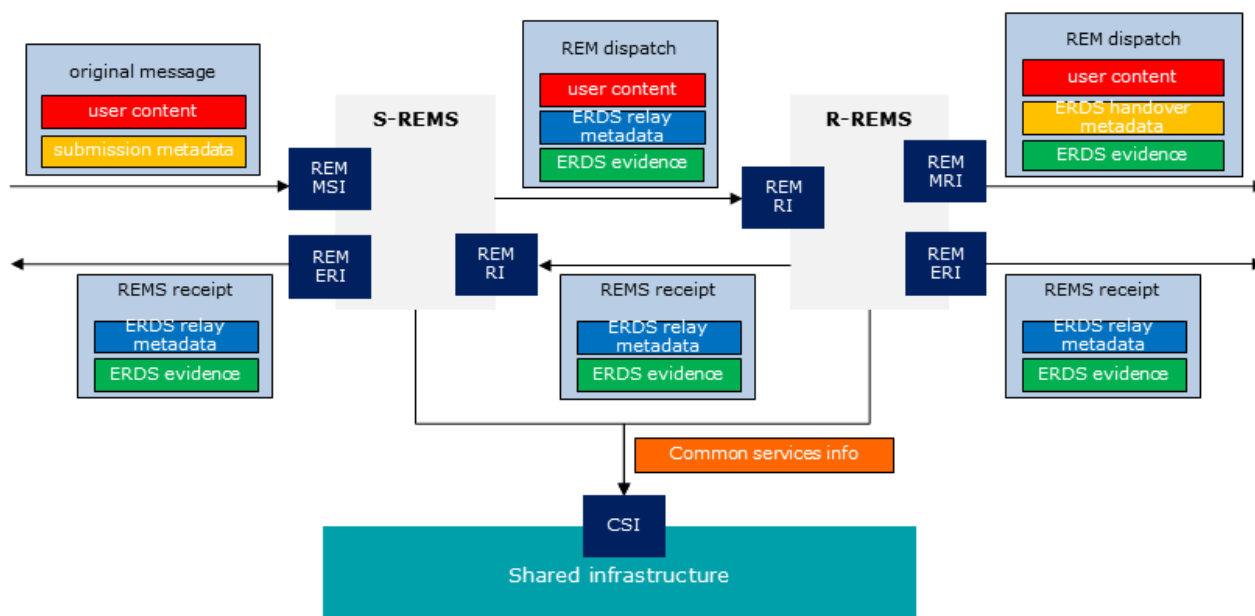
4.2 Typical flows of REM messages

4.2.1 Introduction

The sub-clauses below show how the data structures specified in clause 4.1 typically flow between the sender, the recipient and the REMSs. The 4-corner model (see clause 4.3 of EN 319 532-1 [i.2]) is used for this illustration, but this does not preclude the participation of more service providers in the delivery process, as in the extended model (see clause 4.4 of EN 319 532-1 [i.2]). When more than two REMSs are involved, the same objects flow to or from any intermediate REMS as between S-REMS and R-REMS depicted in the figures.

4.2.2 Use of data structures in Store and Forward style

Figure 1 shows the types of objects typically appearing on the interfaces when all REMSs are operating in Store and Forward style (see clause 4.3.2.1 of EN 319 532-1 [i.2] for the sequence of messages in this case).



211 **Figure 1: Typical flow of REM messages in Store and Forward style**

212 In S&F style objects relayed between REMSs – through the REM RI: Relay Interface – shall always be in the form of
 213 REM dispatch or REMS receipt. Objects forwarded to the recipient through the REM MRI: Message Retrieval Interface
 214 should be in the form of REM dispatch. Objects forwarded to the sender or recipient through the REM ERI: Evidence
 215 Retrieval Interface may be in the form of REMS receipt.

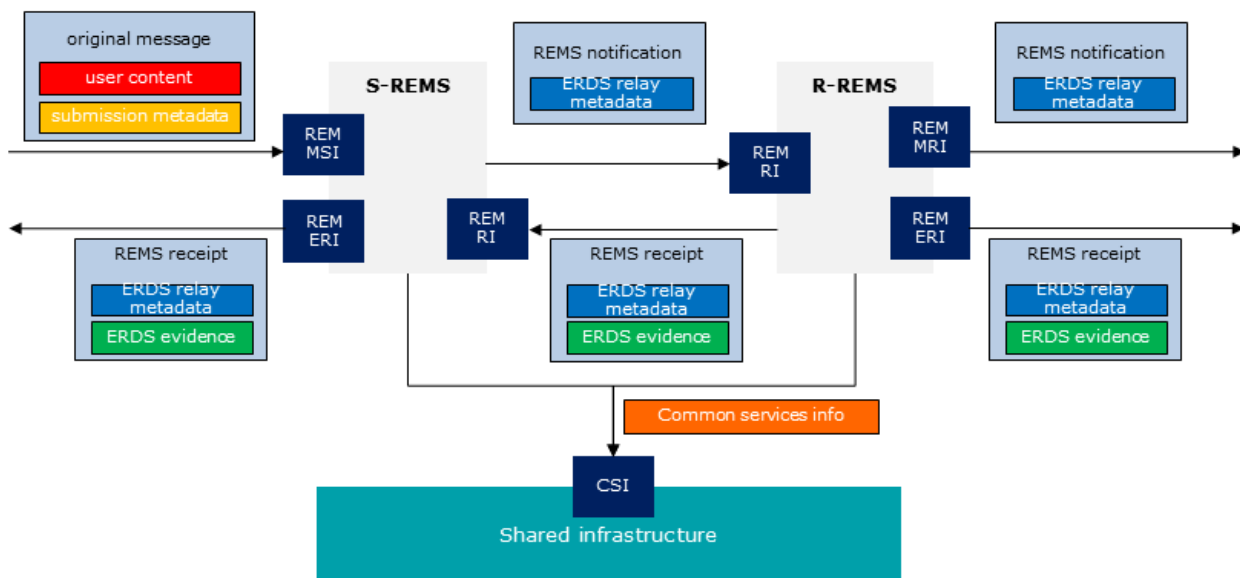
216 **NOTE:** The use of these REM messages between a REMS and its end users is recommended, but not mandatory
 217 (e.g. R-REMS is allowed to convey the user content and related ERDS evidence to the recipient in
 218 separate data structures).

219 When the user content is handed over to the recipient enveloped in a REM dispatch, then the ERDS handover metadata
 220 is identical to the ERDS relay metadata, otherwise it may be different.

221 Different REM messages relating to the same user content may contain a different subset of the ERDS relay metadata
 222 relating to that user content.

223 **4.2.3 Use of data structures in Store and Notify style**

224 Figure 2 shows the types of objects typically appearing on the interfaces when the sender's REMS is operating in Store
 225 and Notify style (see clause 4.3.2.3 of EN 319 532-1 [i.2] for the sequence of messages in this case). Only those objects
 226 are shown in the figure that are used before the recipient responds to the notification.



227

228 **Figure 2: Typical flow of REM messages in Store and Notify style**

229 In S&N style, the object relayed – through the REM RI: Relay Interface – by the S&N REMS (S-REMS in the figure)
 230 and any subsequent REMSs to the next REMS shall always be in the form of REMS notification. The object forwarded
 231 to the recipient by R-REMS in order to notify about the incoming message may be in the form of REMS notification, or
 232 it may be in any other form as agreed between R-REMS and the recipient.

233 If the recipient accepts the incoming message based on the notification then the REM dispatch may be forwarded to the
 234 recipient in the same way as in S&F style. The data structures used in this communication are as shown in figure 1. The
 235 same rules apply: the object forwarded between REMSs shall be a REM dispatch, the object handed over by R-REMS
 236 to the recipient should be a REM dispatch.

237 Alternatively, once the recipient signalled acceptance, the user content may be handed over by S-REMS directly to the
 238 recipient. (This option is not shown in the figures.) In this case, the object handed over to the recipient should be a REM
 239 dispatch.

240 Objects forwarded to the sender or recipient through the REM ERI: Evidence Retrieval Interface may be in the form of
 241 REMS receipt.

242 When the sender's REMS operates in S&F style and the recipient's REMS operates in S&N style, the same rules apply
243 as above, mutatis mutandis.

244 When the user content is handed over to the recipient enveloped in a REM dispatch, then the ERDS handover metadata
245 is identical to the ERDS relay metadata, otherwise it may be different.

246 Different REM messages relating to the same user content may contain a different subset of the ERDS relay metadata
247 relating to that user content.

248 5 Identification of actors in REM

249 A REMS needs to generate, exchange and validate attributes to support the identification and authentication of end
250 entities like sender, recipient or a delegate. All provisions for identification in ERDS specified in clause 5 of ETSI EN
251 319 522-2 [2] shall apply to REM as well.

252 It is possible to provide REM service to users whose real-world identity is not established by the service provider. Even
253 in that case, authentication of these users can be necessary, for instance in order to provide access to the mailbox or to
254 provide access to evidence relating to a submitted user content.

255 In cases where the real-world identity of end users is established by the service provider, this identification can be
256 performed in two manners:

- 257 1) Performing a full check of identity attributes and association with the real-world entity for each operation the
258 user performs in the system; or
- 259 2) Performing a full check of identity attributes and association with the real-world entity once at the time of
260 enrolment, and issuing or registering a method for authenticating the user, which is then used in each operation
261 the user performs in the system.

262 REMS may provide information on the assurance level and method of both initial identity verification and
263 authentication.

264 Initial identity verification of end users performed at their enrolment is out of scope of the present document.

265 The protocols used by regular email and often used by REM services as well – namely SMTP [i.7], IMAP [i.9] and
266 POP3 [i.8]– all support user authentication based on the Simple Authentication and Security Layer (SASL), defined in
267 IETF RFC 4422 [i.11], and also support secure communication over TLS [i.10]. When authentication is performed
268 based on SASL or TLS then the REMS should include in the authentication components sufficient information about
269 the mechanism such that the reported level of assurance is justified.

270 6 REM metadata content

271 6.1 Introduction

272 ERDS relay metadata defined in clause 6 of ETSI EN 319 522-2 [2] shall apply to REM as well.

273 In addition, components defined in the next clause apply.

274 6.2 Metadata components

275 6.2.1 Acceptance/rejection interface location

| | |
|---------------------|--|
| Description | Acceptance/rejection interface location |
| Format | URL |
| Meaning | In a REMS notification generated by a REMS operating in S&N style this component contains the location where the recipient can respond to the notification, and accept or reject the delivery of the user content referred to by the REMS notification. |
| Requirements | This component shall always be present in a REMS notification. This component should not be present in any other REM message. The content of this component shall be provided by the S&N REMS generating the REMS Notification. R-REMS and intermediate REMSs shall propagate this component as received from the previous REMS in the delivery chain. |

276

277 7 Digital signatures in REM

278 The requirements for digital signatures in ERDS specified in clause 7 of ETSI EN 319 522-2 [2] shall apply to REM as
279 well. In addition, the following requirements apply.

280 The REM message shall bear the digital signature of the generating REMSP.

281 The digital signature on the REM message shall cover all the basic components, as defined in clause 4.1, that are
282 included in the REM message (i.e. not only the mandatory components, but also the optional ones that are present, and
283 all occurrences of a component that is included in multiple instances).

284 For more detailed requirements on the format of digital signatures applied in REM, see EN 319 532-3 [i.3] clause 8.

285 8 REM evidence set and components

286 ERDS evidence set and components defined in clause 8 of ETSI EN 319 522-2 [2] shall apply to REM as well.
287

288 9 Common service interface content

289 9.1 Introduction

290 The common service interface (CSI) is the abstract interface through which the shared infrastructure assisting the
291 delivery in a multi-provider scenario is accessible. As described in clause 7 of EN 319 532-1 [i.2], the shared
292 infrastructure may include several distinct actors, and different functions of the CSI may be provided by different
293 entities. The CSI can be used, among others, for the four purposes described in clause 4.3.1 of ETSI EN 319 522-1 [1]:

- 294 1) Message routing;
- 295 2) Trust establishment;
- 296 3) Capability management;
- 297 4) Governance support.

298 These purposes are described in the following clauses, with trust establishment and governance in the same clause.

299 It is possible to provide basic REM services with a lightweight shared infrastructure, consisting of:

- 300 • Routing information provided in public DNS, and
- 301 • Trust information provided in Trusted Lists, as defined in ETSI TS 119 612 [i.5].

302 If more sophisticated policy constraints or capability negotiations are needed then extensions to the above elements or
303 further elements can be necessary in the shared infrastructure.

304 9.2 REM message routing

305 The requirements and explanations given in clause 9.2 of ETSI EN 319 522-2 [2] shall apply to REM, with the
306 following amendments.

307 In REM, the identifier of a recipient is an email address. The REMS may use the Domain Name System (DNS) to find
308 the server providing the REM RI: Relay Interface of the REMS responsible for the domain identified in the domain part
309 of the recipient's address. The REMS may attempt to forward the REM message directly to the identified server, or may
310 use a different routing strategy.

311 Multi-hop routing of an ERD message via a path of one or more intermediate REMSs is out of scope of this
312 specification.

313 NOTE: One possibility to configure such multi-hop routing is to ensure that DNS lookups, as described above,
314 for the recipient's domain by any server in the path always yield the next-hop server along the path.

315 9.3 REM trust establishment and governance

316 The requirements and explanations given in clause 9.3 of ETSI EN 319 522-2 [2] shall apply to REM, with the
317 following amendments.

318 The REMS should use TSL to establish trust with other REMSs.

319 The REMS should ensure publication of information about itself in a TSL to facilitate trust establishment by other
320 REMSs.

- 321 • The Service type identifier, as per clause 5.5.1 of ETSI TS 119 612 [i.5], should be
322 <http://uri.etsi.org/TrstSvc/Svctype/EDS/REM/Q> or <http://uri.etsi.org/TrstSvc/Svctype/EDS/REM>.
- 323 • The Service digital identity, as per clause 5.5.3 of ETSI TS 119 612 [i.5], should contain the digital certificate
324 that is used by the REMS to sign ERDS evidence and REM messages.
- 325 • The Service supply points, as per clause 5.5.7 of ETSI TS 119 612 [i.5], should contain the URIs where the
326 REM MSI and REM RI interfaces of the REMS are accessible. If these interfaces are provided using SMTP
327 then this URI should be an smtp: URI.

328 Further details on the information about REMS in a TSL can be found in clause 10 of EN 319 532-3 [i.3].

329 9.4 Capability management

330 9.4.1 Introduction

331 Capability management provides the functionality to resolve the unique identifier of a recipient into:

- 332 1) Identification of the R-REMS of which the recipient is a subscriber,
- 333 2) Metadata for the capabilities of this REMS,
- 334 3) Metadata for the capabilities of the recipient in this REMS.

335 9.4.2 Resolving recipient identification to ERDS identification

336 In REM, the identifier of a recipient is an email address. The domain part of this email address shall identify the REMS
337 responsible for that domain (of which the recipient is a subscriber).

338 If the REMS supports receiving relayed messages from other REMS using SMTP, the REMSP should ensure that the
339 hostname of the server providing the REM RI is available in MX records of the DNS to all other REMS, which need to
340 relay messages to this REMS. The hostname provided should be the same as the one included in a URI contained in the
341 Service supply point of the TSL entry (see clause 9.3), if the REMS uses TSL to publish trust information about itself.

342 9.4.3 Recipient metadata

343 The requirements and explanations given in clause 9.4.3 of ETSI EN 319 522-2 [2] shall apply.

344 9.4.4 REMS capability metadata

345 The requirements and explanations given in clause 9.4.4 of ETSI EN 319 522-2 [2] shall apply to REM, with the
346 following amendments.

347 The REMS capabilities shall contain the styles of operation supported by the REMS:

- 348 • Support of S&F style: yes/no
- 349 • Support of S&N style: yes/no

350 The REMS capability metadata should be in the format specified in clause 6.3.2 of ETSI EN 319 532-3 [i.6].

351 If the REMS uses TSL to publish trust information about itself, the REMS capability metadata may be accessible in any
352 of the following ways:

- 353 • Downloadable from the URI pointed by the TSP service definition URI, as per clause 5.5.8 of ETSI TS
354 119 612 [i.5];
- 355 • Downloadable from a URI pointed by the additionalServiceInformation field of Service information
356 extensions, as per clause 5.5.9.4 of ETSI TS 119 612 [i.5];
- 357 • Embedded within the additionalServiceInformation field of Service information extensions, as per clause
358 5.5.9.4 of ETSI TS 119 612 [i.5];
- 359 • Any other location accessible to all other REMS which need to relay messages to this REMS.

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361 History

| Document history | | |
|------------------|--------------|--------------------------------|
| V0.0.4 | October 2017 | Stable draft for public review |

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