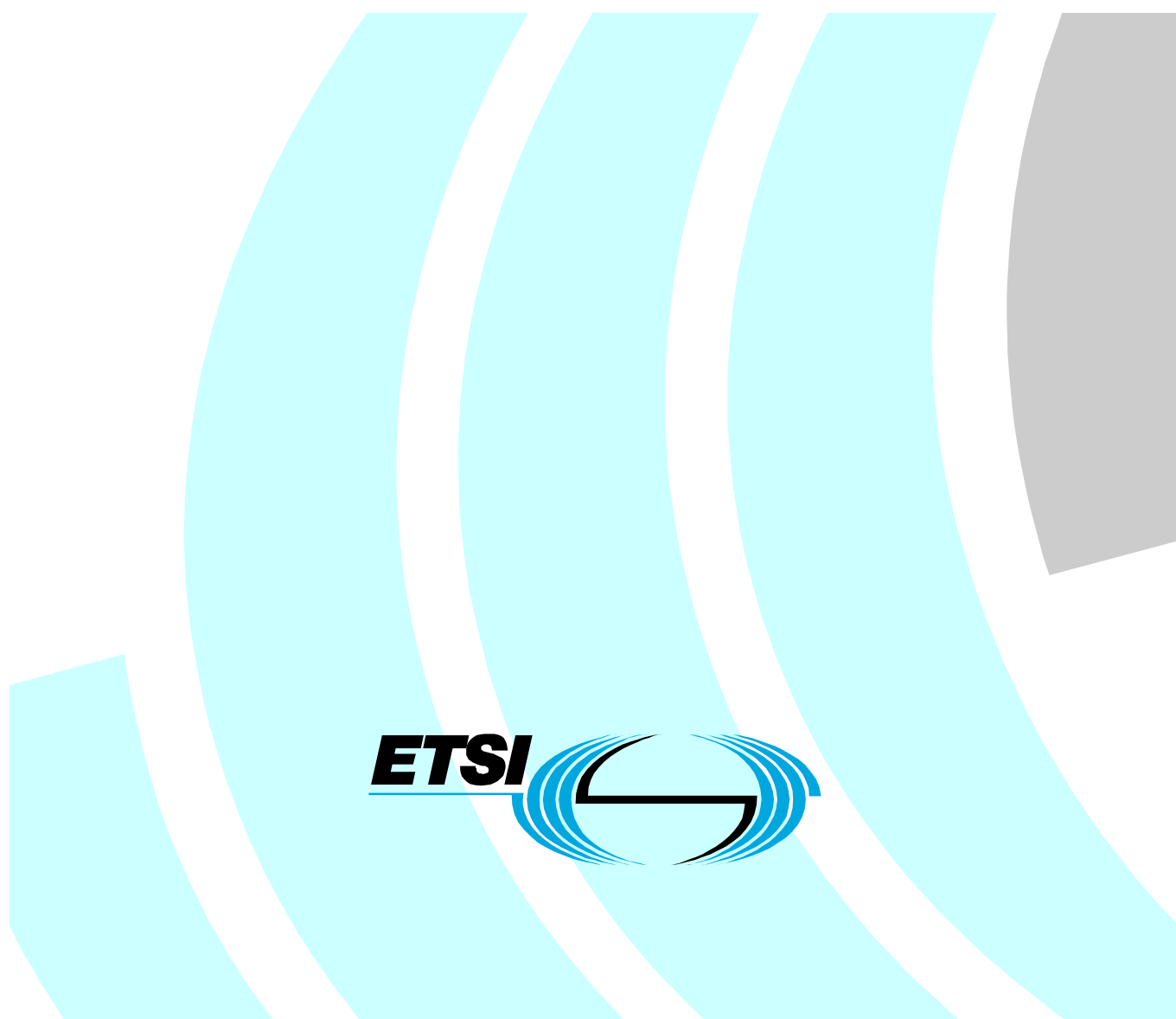


Time stamping profile



Reference

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Foreword

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

Background

Time Stamping is critical for electronic signatures in order to know whether the digital signature was affixed during the validity period of the certificate. To this respect, electronic signatures must be time stamped during the life time of the corresponding certificate.

A Time Stamp Protocol (TSP) has been defined by the IETF. The present document limits the number of options by placing some additional constraints.

1 Scope

The present document is based on the Time Stamp Protocol (TSP) from RFC 3161 [1].

It defines what a Time Stamping client must support and what a Time Stamping Server must support.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

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

- [1] IETF RFC 3161: "Internet X.509 Public Key Infrastructure Time-Stamp Protocol (TSP)".
- [2] FIPS Publication 180-2 (2002): "Secure Hash Standard (SHS)".
- [3] Void.
- [4] IETF RFC 1321 (1992): "The MD5 Message-Digest Algorithm".
- [5] IETF RFC 3447: "Public-Key Cryptography Standards (PKCS) #1: RSA Cryptography Specifications Version 2.1".
- [6] ISO/IEC 10118-3: "Information technology - Security techniques - Hash-functions - Part 3: Dedicated hash-functions".
- [7] ISO 9594-6: "Information technology - Open Systems Interconnection - The Directory: Selected attribute types".
- [8] ITU-T Recommendation X.520: "Information technology - Open Systems Interconnection - The Directory: Selected attribute types".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

Message Digest 5 (MD5): one way hash function that provides an 128 bits output

Race Integrity Primitives Evaluation Message Digest 160 (RIPEMD-160): one way hash function that provides a 160 bits output

Rivest Shamir Adleman (RSA): algorithm usable either for signature or encryption

Secure Hash Function 1(SHA-1): one way hash function that provides a 160 bits output

time-stamping unit: set of hardware and software which is managed as a unit and has a single time-stamping signing key active at a time

3.2 Abbreviations

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

DSA Digital Signature Algorithm

NOTE: A signature algorithm used in conjunction with SHA-1.

HTTP HyperText Transfer Protocol

MD5 Message Digest 5

PKCS Public Key Cryptographic Standards

NOTE: Standards published by RSA, Labs.

RIPEMD-160 Race Integrity Primitives Evaluation Message Digest 160

RSA Rivest Shamir Adleman

SHA-1 Secure Hash Function 1

TSA Time Stamping Authority

TSP Time Stamp Protocol

4 Requirements for a TSP client

4.1 Void

4.2 Profile for the format of the request

4.2.1 Parameters to be supported

The following requirement applies: no extension field shall be present.

4.2.2 Algorithms to be used

The following hash algorithms may be used to hash the information to be time-stamped: SHA-1, MD5, RIPEMD-160. It is recommended to use either SHA-1 or RIPEMD-160.

4.3 Profile for the format of the response

4.3.1 Parameters to be supported

The following requirements apply:

- the accuracy field must be supported and understood,
- the nonce parameter must be supported,
- no extension is required to be supported.

NOTE: A TSA may not support ordering hence clients should not depend on the ordering of time-stamps.

4.3.2 Algorithms to be supported

The following signature algorithm must be supported:

- SHA-1 with RSA.

4.3.3 Key lengths to be supported

For the RSA algorithm, key lengths of 1 024 bits must be supported. Key lengths of 2 048 bits should be supported.

For the DSA algorithm, the larger of the two primes, p and q, shall be at least 1 024 bits.

5 Requirements for a TSP server

5.1 Profile for the format of the request

5.1.1 Parameters to be supported

The following requirements apply:

- the nonce must be supported,
- certReq must be supported,
- no extension is required to be supported.

5.1.2 Algorithms to be supported

The following hash algorithms must be recognized: SHA-1, MD5, RIPEMD-160.

5.2 Profile for the format of the response

5.2.1 Parameters to be supported

The following requirements apply:

- a genTime parameter limited to represent time with one second is required,
- a minimum accuracy of one second is required,
- an ordering parameter missing or set to false is required,
- no extension is required to be generated,
- no extension shall be critical.

5.2.2 Structure for the name of the issuing TSP server

The name of the issuing TSP server shall contain an appropriate subset of the following attributes (defined in ISO 9594-6 [7] and ITU-T Recommendation X.520 [8]):

- countryName;
- stateOrProvinceName;
- organizationName;
- commonName.

The countryName, when applicable, identifies the name of the country where the TSA is established (which is not necessarily the name of the country where the time-stamping unit is located).

The stateOrProvinceName is an optional component that identifies a geographical subdivision in which the TSA is established.

The organizationName shall be present. It identifies the TSA responsible for managing the time-stamping unit. That name should be an officially registered name of the TSA.

The commonName shall be present. It specifies an identifier for the time-stamping unit. Within the TSA, the attribute commonName uniquely identifies the time-stamping unit used.

5.2.3 Algorithms to be supported

The following hash algorithms must be supported: SHA-1, MD5, RIPEMD-160.

The following signature algorithm must be supported:

- SHA1 with RSA.

The signature algorithm with SHA-1 and the RSA encryption algorithm is implemented using the padding and encoding conventions described in PKCS #1, RFC 3447 [5].

5.2.4 Key lengths be supported

For the RSA algorithm, key lengths of 1 024 bits must be supported. Key lengths of 2 048 bits may be supported.

6 Profiles for the transport protocols to be supported

One on-line protocol and one store and forward protocol must be supported for every Time Stamping Authority (TSA).

Among the four protocols that are defined in the RFC 3161 [1], the following protocol should be supported:

- the Time Stamp Protocol via HTTP (section 3.4 from the RFC 3161 [1]).

7 Object identifiers of the cryptographic algorithms

7.1 Hash algorithms

7.1.1 SHA-1

The SHA-1 digest algorithm is defined in FIPS Pub 180-2 [2]. The algorithm identifier for SHA-1 is:

```
sha-1 OBJECT IDENTIFIER ::= { iso(1) identified-organization(3) oiw(14) secsig(3) algorithm(2) 26 }
```

The AlgorithmIdentifier parameters field is optional. If present, the parameters field shall contain an ASN.1 NULL.

Implementations should accept SHA-1 AlgorithmIdentifiers with absent parameters as well as NULL parameters.

Implementations should generate SHA-1 AlgorithmIdentifiers with NULL parameters.

7.1.2 MD5

The MD5 digest algorithm is defined in RFC 1321 [4]. The algorithm identifier for MD5 is:

```
md5 OBJECT IDENTIFIER ::= { iso(1) member-body(2) us(840) rsadsi(113549) digestAlgorithm(2) 5 }
```

The AlgorithmIdentifier parameters field shall be present, and the parameters field shall contain NULL.

Implementations may accept the MD5 AlgorithmIdentifiers with absent parameters as well as NULL parameters.

7.1.3 RIPEMD-160

The RIPEMD-160 digest algorithm is defined in ISO/IEC 10118-3 [6].

Information about RIPEMD-160 can also be found in the following publications (see bibliography):

- "RIPEMD-160, a strengthened version of RIPEMD";
- "Handbook of Applied Cryptography";
- "The RIPEMD-160 cryptographic hash function";
- "The cryptographic hash function RIPEMD-160".

At the time of publication of the present document, this information was available at the following address:

<http://www.esat.kuleuven.ac.be/~bosselae/ripemd160.html#Outline>

The algorithm identifier for RIPEMD-160 is:

```
{iso(1) identified-organization(3) teletrust(36) algorithm(3) hashAlgorithm(2) ripemd160(1)}
```

7.2 Signature algorithm

The RSA signature algorithm is defined in RFC 3447 [5]. RFC 3447 [5] specifies the use of the RSA signature algorithm with the SHA-1 and MD5 message digest algorithms.

When the hash function to be used is SHA-1, then the OID should be:

```
sha1WithRSAEncryption OBJECT IDENTIFIER ::= { iso(1) member-body(2) US(840) rsadsi(113549)  
pkcs(1) pkcs-1(1) 5 }
```

Annex A (informative): Structure for the policy field

When the TSA conforms to TS 102 023, then the policy field from the TSTInfo structure should contain the identifier for the baseline time-stamp policy defined in the present document, which is:

```
itu-t(0) identified-organization(4) etsi(0) time-stamp-policy(xxxx)  
policy-identifiers(1) baseline-ts-policy (1)
```

If this identifier is not included, a TSA may define its own policy which enhances of this policy.

Annex B (informative): Bibliography

- Directive 1999/93/EC of the European Parliament and of the Council of 13 December 1999 on a Community framework for electronic signatures.
- IETF RFC 2459: "Internet X.509 Public Key Infrastructure Certificate and CRL Profile".
- IETF RFC 2630: "Cryptographic Message Syntax".
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- H. Dobbertin, A. Bosselaers, B. Preneel: "RIPEMD-160, a strengthened version of RIPEMD". Fast Software Encryption, LNCS 1039, D.Gollmann, Ed., Springer-Verlag, 1996, pp. 71-82.
- A. Menezes, P. van Oorschot, S. Vanstone: "Handbook of Applied Cryptography", CRC press.
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- ETSI TS 102 023: "Electronic Signatures and Infrastructures (ESI); Policy requirements for time-stamping authorities".

History

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