



**Electronic Signatures and Infrastructures (ESI);
CAAdES digital signatures;
Part 3: Incorporation of Evidence Record Syntax (ERS)
mechanisms in CAAdES**

Reference

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Foreword

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

The present document is part 3 of a multi-part deliverable covering CAdES digital signatures. Full details of the entire series can be found in part 1 [4].

Modal verbs terminology

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

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Introduction

Evidence record syntax (ERS) allows to cover different data objects with a single time-stamp, and subsequently augment the lifetime of the evidence record (ER) by adding validation data to the previous time-stamp and adding new time-stamps. The aim of the present document is to provide clear indications how to bind an ERS to a CAdES signature which is covered by the ERS.

NOTE: ETSI EN 319 162-1 [i.5] and ETSI EN 319 162-2 [i.6] specify the use of ERS in ASiC.

1 Scope

The present document provides mechanism to incorporate evidence records in ASN.1 format within a CAdES signature as outlined in ETSI EN 319 122-1 [4], annex B. It specifies the attributes to be used and profiles the ERS standard (IETF RFC 4998 [2]) to provide clear rules how to incorporate ERS within a CAdES signature or a legacy CAdES signature.

2 References

2.1 Normative references

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

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

- [1] IETF RFC 3161 (2001): "Internet X.509 Public Key Infrastructure Time-Stamp Protocol (TSP)".
- [2] IETF RFC 4998 (2007): "Evidence Record Syntax (ERS)".
- [3] IETF RFC 5816 (2010): "ESSCertIDv2 Update for RFC 3161".
- [4] ETSI EN 319 122-1: "Electronic Signatures and Infrastructures (ESI); CAdES digital signatures; Part 1: Building blocks and CAdES baseline signatures".

2.2 Informative references

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

- [i.1] ETSI TR 119 001: "Electronic Signatures and Infrastructures (ESI); The framework for standardization of signatures; Definitions and abbreviations".
- [i.2] ETSI TS 101 733: "Electronic Signatures and Infrastructures (ESI); CMS Advanced Electronic Signatures (CAdES)".
- [i.3] ETSI EN 319 122-2: "Electronic Signatures and Infrastructures (ESI); CAdES digital signatures; Part 2: Extended CAdES signatures".
- [i.4] ETSI TS 119 312: "Electronic Signatures and Infrastructures (ESI); Cryptographic Suites".
- [i.5] ETSI EN 319 162-1: "Electronic Signatures and Infrastructures (ESI); Associated Signature Containers (ASiC); Part 1: Building blocks and ASiC baseline containers".
- [i.6] ETSI EN 319 162-2: "Electronic Signatures and Infrastructures (ESI); Associated Signature Containers (ASiC); Part 2: Additional ASiC containers".

[i.7] ETSI TS 119 172-1: "Electronic Signatures and Infrastructures (ESI); Signature policies; Part 1: Building blocks and table of contents for human readable signature policy documents".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in ETSI TR 119 001 [i.1], ETSI EN 319 122-1 [4] and the following apply:

archive-timestamp: timestamp which is used for long-term preservation purposes

EXAMPLE: An archive-timestamp can for example be a `TimeStampToken` according to IETF RFC 3161 [1] and updated by IETF RFC 5816 [3] or an `ArchiveTimeStamp` according to IETF RFC 4998 [2].

evidence-record: Evidence Record according to IETF RFC 4998 [2].

evidence-records attribute: unsigned attribute which contains one or more evidence-records as defined in the present document

evidence record renewal: either time-stamp renewal or hash-tree renewal within an evidence record

initial ArchiveTimeStamp: the first `ArchiveTimeStamp` instance of the first `ArchiveTimeStampChain` instance within the `ArchiveTimeStampSequence` instance

NOTE: `ArchiveTimeStamp`, `ArchiveTimeStampChain` and `ArchiveTimeStampSequence` are as defined in IETF RFC 4998 [2].

validation data: data that is used to validate a digital signature

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in ETSI TR 119 001 [i.1] and the following apply:

ER	Evidence Record
ERS	Evidence Record Syntax
TSU	Time Stamping Unit

4 General requirements

4.1 Introduction

This clause specifies mechanisms how to include validation data into the signature.

4.2 Inclusion of validation data within a `TimeStampToken` instance

When including validation data within a `TimeStampToken` instance according to IETF RFC 3161 [1] and updated by IETF RFC 5816 [3] one of the following methods shall be used:

- 1) adding the information in the `SignedData` of the timestamp token; or

- 2) adding the `certificate-values` attribute according to ETSI EN 319 122-1 [4], clause A.1.1.2 and the `revocation-values` attribute according to ETSI EN 319 122-1 [4], clause A.1.2.2 as unsigned attributes within the `TimeStampToken` instance.

Method 1) should be used.

4.3 Inclusion of validation data within CAdES signatures

The present document specifies two strategies for the inclusion of validation data within a CAdES signature, depending on whether attributes for long term availability, as defined in different versions of ETSI TS 101 733 [i.2], have already been added to the `SignedData`:

- If none of `ATSV2` attributes (see clause A.2.4 of ETSI EN 319 122-1 [4]), or an earlier form of archive time-stamp as defined in ETSI TS 101 733 [i.2] or `long-term-validation` (see clause A.2.5 of ETSI EN 319 122-1 [4]) attributes is already present in any `SignerInfo` of the root `SignedData`, then the new validation material shall be included within the root `SignedData.certificates`, or `SignedData.crls` as applicable.
- If an `ATSV2`, or other earlier form of archive time-stamp or a `long-term-validation` attribute, is present in any `SignerInfo` of the root `SignedData` then the root `SignedData.certificates` and `SignedData.crls` contents shall not be modified. The new validation material shall be provided within the `TimeStampToken` instance of the latest archive time-stamp (which can be an `ATSV2` or an `ATSV3` as defined in clause 5.5.3 of ETSI EN 319 122-1 [4]) or within the latest `long-term-validation` attribute already contained in the `SignerInfo` as described in ETSI EN 319 122-1 [4], clause A.2.5.

OCSP responses shall be included as defined in clause 5.4.2 of ETSI EN 319 122-1 [4].

If the OCSP response is included within `SignedData.crls`, it shall be included as defined in clause 5.4.2.2 of ETSI EN 319 122-1 [4].

When generating a new attribute to include validation data, either initially when creating the signature or later when augmenting the signature, it shall be encoded in DER (see clause 4.7.1 of ETSI EN 319 122-1 [4]), whilst preserving the encoding of any signed field included in the attribute. The augmentation shall preserve the binary encoding of already present unsigned attributes and any component contributing to the archive time-stamp's message imprint computation input.

5 Attribute semantics and syntax

5.1 The evidence-records attributes

In the present document two attributes are described that allow to include an evidence record (ER) over the whole `SignedData` instance:

- The `internal-evidence-records` attribute (clause 5.2) protects the whole `SignedData` instance and is used in cases of attached signatures.
- The `external-evidence-records` attribute (clause 5.3) also protects the whole `SignedData` instance not containing an `eContent` element within `encapContentInfo` (a detached signature), and the external signed data.

The term "evidence-records attribute" is used to denote either one of these attributes.

Semantics

The evidence-records attribute shall be an unsigned attribute.

At most one of the **SignerInfo** instances within the **SignedData** instance shall contain evidence-records attributes. If the **SignerInfo** instance contains more than one evidence-records attribute, only the ER(s) in the latest added evidence-records attribute shall be updated.

NOTE 1: Updating one of the ER in the other evidence-records attributes will invalidate the ER(s) in the later added evidence-records attribute(s).

Once an evidence-records attribute is included within a **SignedData** instance, the only changes that might be applied to the **SignedData** instance are the renewal of the ER within the evidence-records attribute, the adding of a new ER within a new **AttributeValue** of the latest evidence record attribute or the adding of another evidence-records attribute. No other changes shall be applied to the **SignedData** instance.

Syntax

The **ContentInfo** instance shall be DER encoded before computing the hash.

The evidence-records attribute may contain one or more instances of **AttributeValue** type.

The evidence-records attribute should contain one instance of **AttributeValue** type.

If the evidence-records attribute contains more than one instance of **AttributeValue** type, the input of the message imprint computation of all initial **ArchiveTimeStamp** within each of the **AttributeValue** instances shall include at least exactly the same fields within the signature and the signed document. The parts of the reduced hash-tree not corresponding to the signature or the signed document may be different.

NOTE 2: Having more than one instance of **AttributeValue** type allows to have parallel evidence-records (from different TSAs or with different hash algorithms) protecting the same signature.

NOTE 3: This means that if a signature contains already an evidence-records attribute with more than one instance of **AttributeValue** type, and a new evidence-records attribute is added (with one or more instances of **AttributeValue** type) this new attribute covers amongst other information the whole previous evidence-records attribute, including all instances of **AttributeValue** type.

The evidence-records attribute value shall be an instance of **EvidenceRecord** ASN.1 type as defined in IETF RFC 4998 [2].

The **timeStamp** field of any **ArchiveTimeStamp** instance within the **EvidenceRecord** instance shall be of type **TimeStampToken** as defined in IETF RFC 3161 [1] and updated by IETF RFC 5816 [3].

Before adding a new **ArchiveTimeStamp** instance to the ER, i.e. during a Timestamp Renewal or a Hash-Tree Renewal, the validation data missing to validate the time-stamp within the latest **ArchiveTimeStamp** instance shall be included within the **TimeStampToken** of the latest **ArchiveTimeStamp** instance as described in clause 4.

Before covering a **SignedData** instance with an ER included in an evidence-records attribute, the **SignedData** shall be extended to include any validation data, not already present, which is required for validating all the included **SignerInfo** instances. Validation data may include certificates, CRLs, OCSP responses, as required to validate any signed object within the signature including the existing signature, counter-signatures, time-stamps, OCSP responses, certificates, attribute certificates and signed assertions. In the case that the validation data contains a Delta CRL, then the whole set of CRLs shall be included to provide a complete revocation list.

NOTE 4: Validation data already present for example in the time-stamp token need not be included again.

Before adding a new evidence-records attribute, all the missing validation data to validate all the evidence-records in the previous evidence-records attributes shall be added within the corresponding **timeStamp** field instance of the latest **ArchiveTimeStamp** instance in each evidence-record as described in clause 4.

5.2 The internal-evidence-records attribute

Semantics

The `internal-evidence-records` attribute incorporates an ER covering the `ContentInfo` instance of type `signed-data`, as specified in ETSI EN 319 122-1 [4], containing an `eContent` element within `encapContentInfo`.

Syntax

The `internal-evidence-records` attribute shall be identified by the `id-aa-er-internal` OID as defined in ERS (IETF RFC 4998 [2], appendix A).

For the initial `ArchiveTimeStampSequence`,

- 1) if the initial `ArchiveTimeStamp` contains the `reducedHashtree` field, then the first component of the instance of `PartialHashtree` type shall contain in its object group at least the hash value of the `ContentInfo` instance of type `signed-data`;
- 2) if the initial `ArchiveTimeStamp` does not contain the `reducedHashtree` field, then the message imprint of the corresponding `TimeStampToken` shall be the hash value of the `ContentInfo` instance of type `signed-data`.

Illustration

Figure 1 illustrates the `internal-evidence-records` attribute.

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Full standard:
<https://standards.iteh.ai/catalog/standards/sist/7dd8f927-6c0f-44b8-9a75-5fb8701baa06/etsi-ts-119-122-3-v1.1.1-2017-01>