INTERNATIONAL STANDARD

ISO/IEC 9798-3

Third edition
2019-01

IT Security techniques — Entity authentication —

Part 3: Mechanisms using digital signature techniques

Techniques de sécurité IT — Authentification d'entité —

Partie 3: Mécanismes utilisant des techniques de signature numériques

Reference number
ISO/IEC 9798-3:2019(E)

© ISO/IEC 2019



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2019

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ... **iv**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**

4 Symbols and abbreviated terms ... **2**

5 General ... **3**
5.1 Time variant parameters ... 3
5.2 Tokens ... 3
5.3 Use of text fields ... 4

6 Requirements ... **4**

7 Mechanisms without an on-line trusted third party ... **5**
7.1 Unilateral authentication ... 5
7.1.1 General ... 5
7.1.2 Mechanism UNI.TS — One-pass authentication ... 5
7.1.3 Mechanism UNI.CR — Two-pass authentication ... 6
7.2 Mutual authentication ... 6
7.2.1 General ... 6
7.2.2 Mechanism MUT.TS — Two-pass authentication ... 7
7.2.3 Mechanism MUT.CR — Three-pass authentication ... 8
7.2.4 Mechanism MUT.CR.par — Two-pass parallel authentication ... 9

8 Mechanisms involving an on-line trusted third party ... **10**
8.1 General ... 10
8.2 Unilateral authentication ... 11
8.2.1 General ... 11
8.2.2 Mechanism TP.UNI.1 — Four-pass authentication (initiated by *A*) ... 11
8.2.3 Mechanism TP.UNI.2 — Four-pass authentication (initiated by *B*) ... 12
8.3 Mutual authentication ... 13
8.3.1 General ... 13
8.3.2 Mechanism TP.MUT.1 — Five-pass authentication (initiated by *A*) ... 13
8.3.3 Mechanism TP.MUT.2 — Five-pass authentication (initiated by *B*) ... 15
8.3.4 Mechanism TP.MUT.3 — Seven-pass authentication (initiated by *B*) ... 17

Annex A (normative) **Object Identifiers** ... **20**

Annex B (informative) **Usage guidance** ... **21**

Annex C (informative) **Use of text fields** ... **24**

Bibliography ... **25**

© ISO/IEC 2019 – All rights reserved

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Joint Technical Committee JTC 1, *Information Technology*, Subcommittee SC 27, *IT Security techniques*.

This third edition cancels and replaces the second edition (ISO/IEC 9798–3:1998), which has been technically revised. It also incorporates the amendment ISO/IEC 9798–3:1998/Amd 1:2010, and corrigenda ISO/IEC 9798–3:1998/Cor 1:2009 and ISO/IEC 9798–3:1998/Cor 2:2012. The main changes compared to the previous edition are as follows:

— all mechanisms have been technically revised to resolve security issues and make the mechanism secure by default;

— all mechanisms have been renamed and editorially improved to represent them more clearly;

— three additional mechanisms have been included using an on-line trusted third party;

— guidance to explain the security properties of the mechanisms and guide users in selecting the appropriate mechanism for their use case has been added (Annex B).

A list of all parts in the ISO/IEC 9798 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

© ISO/IEC 2019 – All rights reserved

IT Security techniques — Entity authentication —

Part 3:
Mechanisms using digital signature techniques

1 Scope

This document specifies entity authentication mechanisms using digital signatures based on asymmetric techniques. A digital signature is used to verify the identity of an entity.

Ten mechanisms are specified in this document. The first five mechanisms do not involve an on-line trusted third party and the last five make use of on-line trusted third parties. In both of these two categories, two mechanisms achieve unilateral authentication and the remaining three achieve mutual authentication.

Annex A defines the object identifiers assigned to the entity authentication mechanisms specified in this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 9798-1, *Information technology — Security techniques — Entity authentication — Part 1: General*

ISO/IEC 14888 (all parts), *Information technology — Security techniques — Digital signatures with appendix*

ISO/IEC 9796 (all parts), *Information technology — Security techniques — Digital signature schemes giving message recovery.*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
atomic transaction
transaction which cannot be split into multiple smaller transactions

3.2
claimant
entity which is or represents a principal for the purposes of authentication

[SOURCE: ISO/IEC 9798–1:2010, 3.6, modified — The Note to entry has been removed.]

© ISO/IEC 2019 – All rights reserved

3.3
digital signature
signature
data appended to, or a cryptographic transformation of, a data unit that allows the recipient of the data unit to verify the source and integrity of the data unit

3.4
entity authentication
corroboration that an entity is the one claimed

[SOURCE: ISO/IEC 9798–1:2010, 3.14]

3.5
mutual authentication
entity authentication (3.4) which provides both entities with assurance of each other's identity

[SOURCE: ISO/IEC 9798–1:2010, 3.18]

3.6
token
message consisting of data fields that are the output of a cryptographic function

3.7
trusted third party
security authority or its agent, trusted by other entities with respect to security related activities

[SOURCE: ISO/IEC 9798–1:2010, 3.38, modified — The Note to entry has been removed.]

3.8
unilateral authentication
entity authentication which provides one entity with assurance of the other's identity but not vice versa

[SOURCE: ISO/IEC 9798–1:2010, 3.39]

3.9
verifier
entity that requires to verify the identity of another entity

4 Symbols and abbreviated terms

The symbols and abbreviated terms given in ISO/IEC 9798–1 and the following shall apply.

$Cert_X$	certificate for entity X
I_X	representation of the identity of entity X, which is either i_X or $Cert_X$
i_X	string identifying entity X
M	data string that is input to a digital signature algorithm
P_X	public verification key associated with X
Res_X	result of verifying entity X's public key or public key certificate
SID^i_m	constant uniquely identifying the mechanism m and the signed string (number i) within the mechanism
$sS_X(M)$	signature on data string M with the private signing key of entity X. The signature shall be such that M can be recovered

© ISO/IEC 2019 – All rights reserved