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Information technology — Personal identification — ISO-compliant driving licence

Part 3: Access control, authentication and integrity validation

Technologies de l'information — Identification des personnes — Permis de conduire conforme à l'ISO

Partie 3: Contrôle d'accès, authentification et validation d'intégrité

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Foreword

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The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

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ISO/IEC 18013-3 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 17, *Cards and personal identification*.

ISO/IEC 18013 consists of the following parts, under the general title *Information technology — Personal identification — ISO-compliant driving licence*:

— *Part 1: Physical characteristics and basic data set.* Part 1 defines the basic terms for ISO/IEC 18013, including physical characteristics, basic data element set, visual layout, and physical security features.

— *Part 2: Machine-readable technologies.* Part 2 defines the technologies that may be used for ISO/IEC 18013, including the logical data structure and data mapping for each technology.

— *Part 3: Access control, authentication and integrity validation.* Part 3 defines the electronic security features that may be incorporated under ISO/IEC 18013, including mechanisms for controlling access to data, verifying the origin of an ISO-compliant driving licence, and confirming data integrity.

Introduction

This part of ISO/IEC 18013 prescribes requirements for the implementation of mechanisms to control access to data recorded in the machine-readable technology on an ISO-compliant driving licence (IDL), verifying the origin of an IDL, and confirming data integrity.

One of the functions of an IDL is to facilitate international interchange. Whilst storing data in machine-readable form on the IDL supports this function by speeding up data input and eliminating transcription errors, certain machine-readable technologies are vulnerable to being read without the knowledge of the card holder and to other means of unauthorized access by unintended persons, that is other than driving licence or law enforcement authorities. Controlling access to IDL data stored in machine-readable form protects the data on the card from being read remotely by electronic means without the knowledge of the card holder.

Identifying falsified driving licences, or an alteration to the human-readable data on authentic driving licences present a major problem for driving licence and law enforcement authorities, both domestically and in the context of international interchange. Verifying the authenticity of an IDL and confirming the integrity of the data recorded on an IDL provide driving licence and law enforcement authorities with a means to identify an authentic IDL from a falsified or altered one in the interests of traffic law enforcement and other traffic safety processes.

Information technology — Personal identification — ISO-compliant driving licence —

Part 3: Access control, authentication and integrity validation

1 Scope

ISO/IEC 18013 establishes guidelines for the design format and data content of an ISO-compliant driving licence (IDL) with regard to human-readable features (ISO/IEC 18013-1), machine-readable technologies (ISO/IEC 18013-2), and access control, authentication and integrity validation (ISO/IEC 18013-3). It creates a common basis for international use and mutual recognition of the IDL without impeding individual countries/states to apply their privacy rules and national/community/regional motor vehicle authorities in taking care of their specific needs.

This part of ISO/IEC 18013

a) is based on the machine-readable data content specified in ISO/IEC 18013-2;

b) specifies mechanisms and rules available to issuing authorities (IAs) for

1) access control (i.e. limiting access to the machine-readable data recorded on the IDL),

2) document authentication (i.e. confirming that the document was issued by the claimed IA),

3) data integrity validation (i.e. confirming that the data has not been changed since issuing).

This part of ISO/IEC 18013 does not address issues related to the subsequent use of data obtained from the IDL, e.g. privacy issues.

2 Conformance

A driving licence is in conformance with this part of ISO/IEC 18013 if it meets all mandatory requirements specified directly or by reference herein. Compliance with ISO/IEC 18013-2 is required for compliance with this part of ISO/IEC 18013.

Compliance with ISO/IEC 18013-1 is not required for compliance with this part of ISO/IEC 18013. Conversely, the incorporation of a machine-readable technology which is not compliant with this part of ISO/IEC 18013 does not render the IDL non-compliant with ISO/IEC 18013-1.

3 Normative references

The following referenced documents are indispensable for the application 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 1831:1980, *Printing specifications for optical character recognition*

ISO/IEC 7816-4:2005, *Identification cards — Integrated circuit cards — Part 4: Organization, security and commands for interchange*

ISO/IEC 7816-8:2004, *Identification cards — Integrated circuit cards — Part 8: Commands for security operations*

ISO/IEC 8825-1:2002, *Information technology — ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)*

ISO/IEC 8859-1:1998, *Information technology — 8-bit single-byte coded graphic character sets — Part 1: Latin alphabet No. 1*

ISO/IEC 9797-1:1999, *Information technology — Security techniques — Message Authentication Codes (MACs) — Part 1: Mechanisms using a block cipher*

ISO/IEC 10118-3:2004, *Information technology — Security techniques — Hash-functions — Part 3: Dedicated hash-functions*

ISO/IEC 11770-2:1996, *Information technology — Security techniques — Key management — Part 2: Mechanisms using symmetric techniques*

ISO/IEC 11770-2:1996/Cor.1:2005, *Information technology — Security techniques — Key management — Part 2: Mechanisms using symmetric techniques — Corrigendum 1*

ISO/IEC 11770-3, *Information technology — Security techniques — Key management — Part 3: Mechanisms using asymmetric techniques*

ISO/IEC 18013-1, *Information technology — Personal identification — ISO-compliant driving licence — Part 1: Physical characteristics and basic data set*

ISO/IEC 18013-2, *Information technology — Personal identification — ISO-compliant driving licence — Part 2: Machine-readable technologies*

ISO/IEC 18033-3:2005, *Information technology — Security techniques — Encryption algorithms — Part 3: Block ciphers*

ISO/IEC 18033-3:2005/Cor.1:2006, *Information technology — Security techniques — Encryption algorithms — Part 3: Block ciphers — Corrigendum 1*

ISO/IEC 18033-3:2005/Cor.2:2007, *Information technology — Security techniques — Encryption algorithms — Part 3: Block ciphers — Corrigendum 2*

ANSI X9.62:2005, *Public Key Cryptography For The Financial Services Industry: The Elliptic Curve Digital Signature Algorithm (ECDSA)*

FIPS 186-2 (including Change Notice), *Digital Signature Standard (DSS)*, Federal Information Processing Standards Publication, National Institute of Standards and Technology, 27 January 2000

NIST SP 800-38B, *Recommendation for Block Cipher Modes of Operation: The CMAC Mode for Authentication*, May 2005

RFC 2631, E. Rescorla, *Diffie-Hellman Key Agreement Method*, June 1999, http://www.ietf.org/rfc.html

RFC 3279, W. Polk et al., *Algorithms and Identifiers for the Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile*, April 2002, http://www.ietf.org/rfc.html

RFC 3280, R. Housley et al., *Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile*, April 2002, http://www.ietf.org/rfc.html

RFC 3369, R. Hously, *Cryptographic Message Syntax*, August 2002, http://www.ietf.org/rfc.html

RFC 4055, J. Schaad, B. Kaliski, R. Housley, *Additional Algorithms and Identifiers for RSA Cryptography for use in the Internet X.509 Public Key Infrastructure Certificate and Certificate Revocation List (CRL) Profile*, June 2005, http://www.ietf.org/rfc.html

4 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 18013-1, ISO/IEC 18013-2 and the following apply.

4.1
active authentication
mechanism that uses information stored in a secure area of a secure integrated circuit (SIC) to confirm that the SIC and the other machine-readable data were issued together

NOTE See 8.2.

4.2
basic access protection
BAP
mechanism to confirm that an inspection system (IS) has physical access to a proximity integrated circuit card (PICC) before the IS is allowed access to the data stored on the PICC and to ensure that communication between the IS and the PICC (once access is authorized) is protected

NOTE See 8.5 and Annex B.

4.3
chip authentication
ephemeral-static key agreement protocol that provides authentication of the secure integrated circuit and strong secure messaging

NOTE See 8.6 and C.3.

4.4
clone
unauthorized exact copy of a document that has the same security characteristics as the original document and that cannot be distinguished from the legitimate one

4.5
eavesdropping
unauthorized interception and interpretation of information-bearing emanations

NOTE Adapted from ISO/IEC 2382-8:1998, 08.05.25.

4.6
extended access protection
EAP
protocol for limiting access to select optional data groups to reading authorities

NOTE See 8.6.

4.7
input string
string of characters printed on an ISO-compliant driving licence [as human-readable text, optionally (or by specification) accompanied by or consisting of a machine-readable rendering thereof] used as input (either manually or automatically through the use of suitable equipment) for the non-match alert and basic access protection mechanisms

4.8
issuing authority
IA
licensing authority, or issuing country if separate licensing authorities have not been authorized, which applies a digital signature to an ISO-compliant driving licence and is responsible for the associated key management

NOTE Adapted from ISO/IEC 18013-1.

4.9
non-match alert
mechanism to detect any differences between the machine-readable information and (some of) the human-readable information on an ISO-compliant driving licence

NOTE See 8.4.

4.10
passive authentication
mechanism to confirm that machine-readable data on an ISO-compliant driving licence (IDL) has not been changed since the IDL was issued

NOTE See 8.1.

4.11
pseudo issuing authority
PIA
authority that does not issue ISO-compliant driving licences [but that is similar to an issuing authority (IA) in all other respects] and which does not issue document keys, but which does have a root key pair with which it can sign documents of other IAs or PIAs that it trusts

4.12
public key infrastructure
PKI
technologies and products using public key (asymmetric) cryptography

NOTE Both passive authentication and extended access protection use this technology.

4.13
reading authority
RA
authorized entity reading the machine-readable data on an ISO-compliant driving licence (IDL)

NOTE Driving licence authorities other than the authority that issued the IDL and law enforcement authorities are examples of reading authorities.

4.14
reference string
string of characters used as a reference against which to compare the input string when using the non-match alert mechanism, and used for session key calculation purposes by the secure integrated circuit during execution of the basic access protection mechanism

4.15
scanning area identifier
SAI
one or more graphical elements that demarcate an input string

4.16
secure integrated circuit
SIC
integrated circuit that includes both a security feature (or security features), and memory and/or a central processing unit

NOTE 1 An integrated circuit card with contacts and a proximity integrated circuit card (PICC) are examples of a SIC.

NOTE 2 A SIC can be embedded in different solutions, for example in ID-1 sized cards (as used for the ISO-compliant driving licence) and in a booklet (as found in passports).

4.17
secure memory
integrated circuit (IC) memory of which the content (once populated by an issuing authority during the personalization process) is accessible only by the IC operating system for internal use, and cannot be made available by the operating system to any reading device

4.18
skimming
reading data from a proximity integrated circuit card (PICC) without the card holder's awareness

4.19
trust chain
sequential set of trust points that a verifying authority references to verify a specific issuing authority's public root key

4.20
trust model
description of the functional and logical aspects of a traditional public key infrastructure, specifically excluding technical implementation details

4.21
trust network
component of a trust model that describes the trust relationships and chains between issuing authorities

4.22
trust point
issuing authority or pseudo issuing authority that publishes a trust list (and the related public root keys) that verifying entities can reference

4.23
twinning
copying the data and/or integrated circuit of a physically and/or biometrically similar driver to the attacker's integrated circuit or ISO-compliant driving licence

4.24
unpacked BCD
binary coding of a sequence of integers using 4 bits for each integer (where the bit weights are 8421) and encoding one integer in the least significant bits of each byte

NOTE Only unsigned BCD is used in this part of ISO/IEC 18013.

4.25
verifying authority
VA
verifying entity that is part of a trust network, i.e. that also is an issuing authority or a pseudo issuing authority

NOTE 1 Not all verifying entities are VAs: A car rental company can be a verifying entity, but is not a VA as it is not part of the trust network.

NOTE 2 VAs can be divided into immediate VAs and non-immediate VAs.

4.25.1
immediate VA
VA that acquired the public root key of the issuing authority via out-of-band means

4.25.2
non-immediate VA
VA that acquired the public root key of the issuing authority from another VA

4.26
verifying entity
entity that tries to determine if a digital signature is valid (i.e. if the data to which a certificate has been applied has not been changed, and if the signature was generated by the issuing authority the verifying entity expects)

5 Abbreviated terms

APDU	application protocol data unit
BAC	basic access control
BAP	basic access protection
BCD	binary coded decimal
BER-TLV	basic encoding rules – tag-length-value (see ISO/IEC 8825-1:2002)
CA	certification authority
CBC	cipher block chaining
DER	distinguished encoding rules (see ISO/IEC 8825-1:2002)
DF	dedicated file
DG	data group
DO	data object
DST	control reference template for digital signature (see ISO/IEC 7816-4:2005)
EAP	extended access protection
EF	elementary file
IA	issuing authority
IC	integrated circuit
ICC	integrated circuit card
IDL	ISO-compliant driving licence
IS	inspection system
IV	initialization vector
KAT	control reference template for key agreement (see ISO/IEC 7816-4:2005)
LDS	logical data structure
MAC	message authentication code
MSE	manage security environment (see ISO/IEC 7816-4:2005)
OCR	optical character recognition
OID	object identifier
PIA	pseudo issuing authority
PIC	proximity integrated circuit

PICC	proximity integrated circuit card
PKI	public key infrastructure
PSO	perform security operation (see ISO/IEC 7816-4:2005)
RA	reading authority
SAI	scanning area identifier
SIC	secure integrated circuit
SM	secure messaging
SOD	document security object
SSC	send sequence counter
TRCA	trust root certificate authority
UTC	coordinated universal time
VA	verifying authority
2D	two-dimensional

6 Functional requirements

6.1 Access control

Access control can be broken down into the following functional requirements:

a) Prevent skimming of machine-readable data on a PICC by ensuring that physical access to the IDL is acquired prior to reading.

b) Prevent unnoticed alteration of communication between a reader and a SIC.

c) Prevent eavesdropping between a reader and a SIC.

d) Selectively restrict access to specific optional machine-readable data groups for specific reading authorities.

6.2 Document authentication

Document authentication can functionally be established by allowing for verification of the origin of an IDL.

6.3 Data integrity validation

Data integrity validation can be broken down into the following functional requirements:

a) Verify that the IDL (including the machine-readable data) is not a clone of another IDL. A cloning attempt can schematically be illustrated as shown in Figure 1.

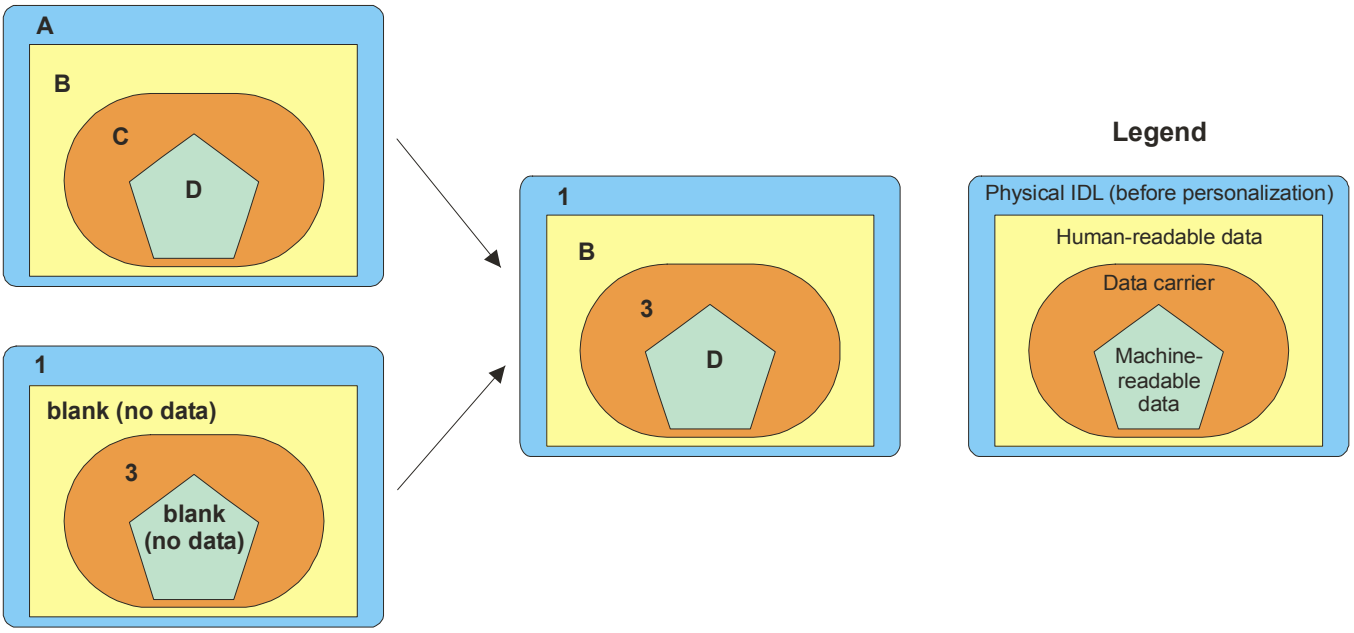

Figure 1 — Data integrity validation: IDL cloning

b) Protect against the exchange of machine-readable data carriers between otherwise authentic IDLs[1]. This type of attack can schematically be illustrated as shown in Figure 2.

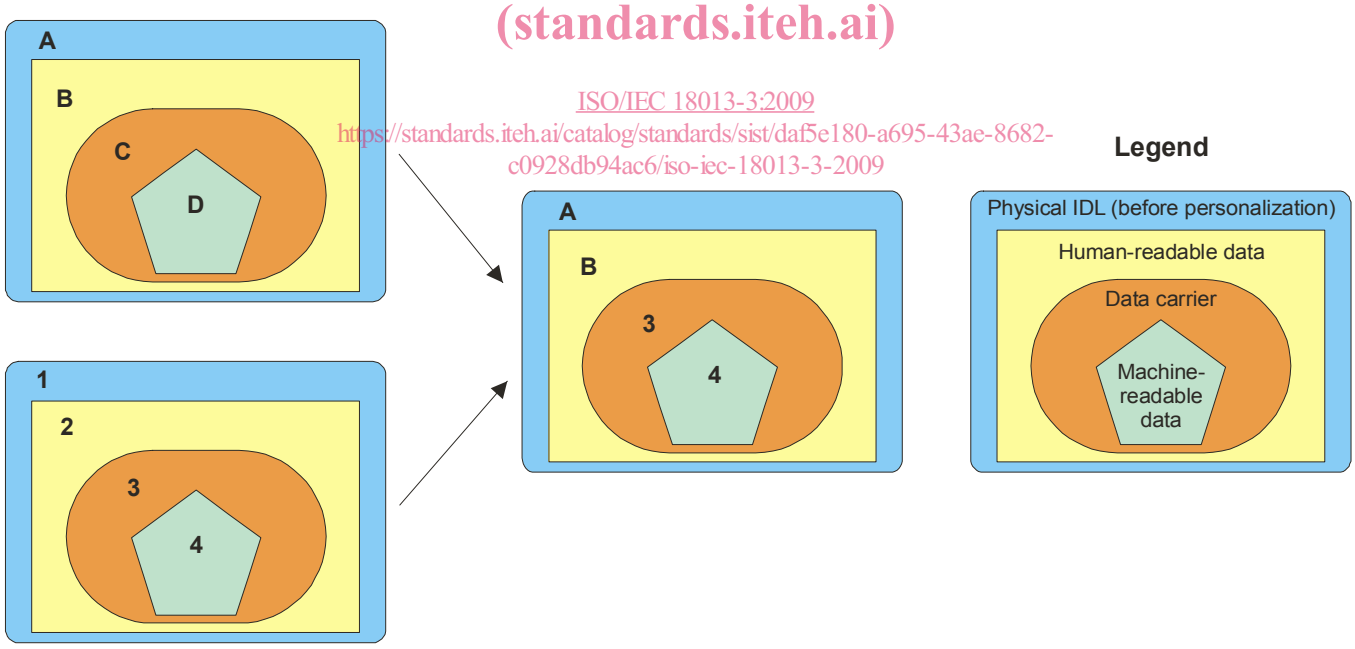

Figure 2 — Data integrity validation: Data carrier exchange or twinning

[1] This guards (amongst others) against an IC "twinning" attack. This type of attack is of particular concern in inspection environments where machine-readable data and human-readable data is not compared (or only cursorily compared by an operator using e.g. a portrait image). Finding a biometrically similar driver is possible by skimming the data of a few thousand IDL PICs.

c) Verify that the physical IDL and the machine-readable data thereon were issued (belong) together. This type of attack can schematically be illustrated as shown in Figure 3.

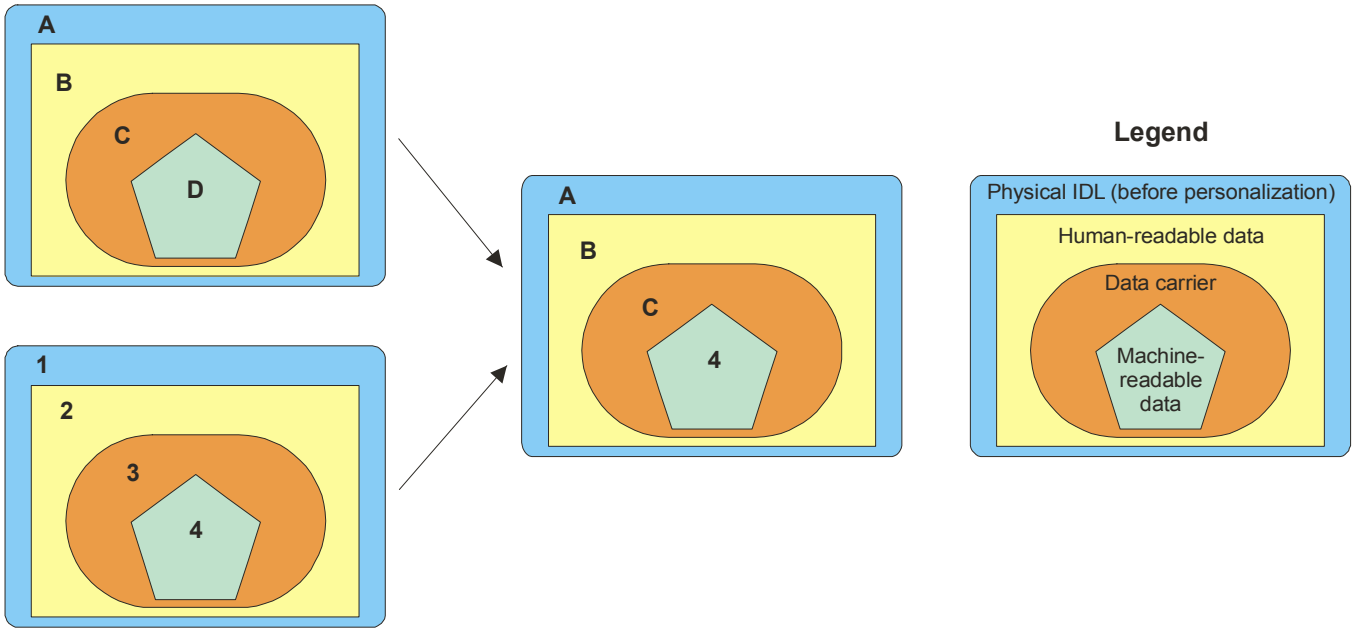

Figure 3 — Data integrity validation: Machine-readable data exchange

d) Validate the integrity of the human readable data (i.e. confirm that the human-readable data has not changed since issuing). This type of attack can schematically be illustrated as shown in Figure 4.

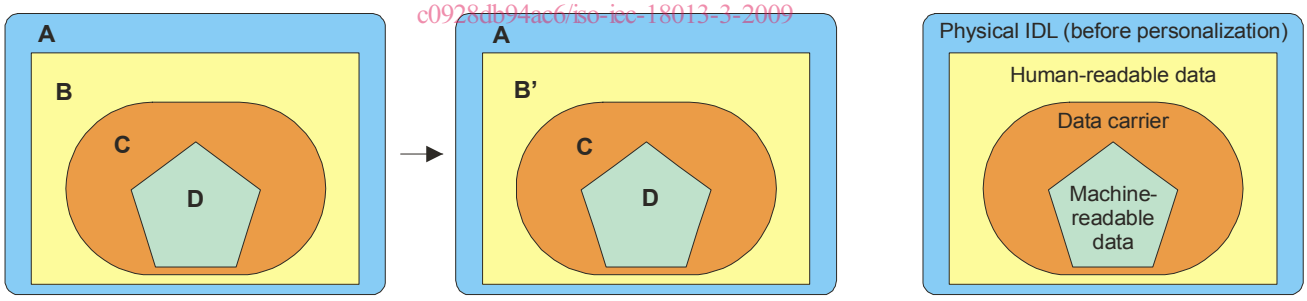

Figure 4 — Data integrity validation: Human-readable data alteration