



Human Factors (HF); Age Verification Pre-Standardization Study Part 2: Solutions and Standards Landscape

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Foreword

This Technical Report (TR) has been produced by ETSI Technical Committee Human Factors (HF).

The present document is part 2 of a multi-part deliverable covering Age Verification Pre-Standardization Study, as identified below:

- Part 1: "Stakeholder Requirements";
- Part 2: "Solutions and Standards Landscape";**
- Part 3: "Proposed Standardization Roadmap".

Modal verbs terminology

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Executive summary

The present document reviews and analyses existing solutions and standards for age verification in Europe: technological solutions; national/regional implementations and regulations, and existing standardization (IEC, others, etc.). The range of technical solutions and existing implementations (national and regional) is reviewed from the perspective of the stakeholders' requirements identified in ETSI TR 104 077-1 [i.7].

Introduction

The present document aims to identify the existing solutions and standards landscape for age verification, laying the groundwork for future European standards in this field as requested in the Digital Services Act. A heterogeneous landscape of age-verification solutions exists from "Click here to confirm that you are 18 years old or older" to sophisticated technical solutions involving the verification of official documents (machine-readable ID cards). Regulation (EU) 2022/2065 [i.51] mandates the development of standards for targeted measures to protect minors online (Article 44 (j)), including age verification systems and parental control tools (Article 35 (j)).

However, achieving a unified European solution for age verification might be challenging due to disparate national systems. Thus, establishing a comprehensive understanding of the landscape for age verification and parental controls, as well as standardized interfaces for service providers to access verified age data, is crucial for protecting minors online. International organizations like ITU/IEC/ISO/IEEE, national standards bodies, and the euConsent NGO have explored age verification and protection of minors. Their research provides a basis for assessing current solutions and identifying gaps.

While the euConsent project explored age verification in-depth, its solutions primarily focus on agency-supported verification, with follow-on projects for age verification exploring unanswered questions. For example, the direct sharing of verified age data between parents, minors, and digital service providers without the need for third-party age assurance providers is an area that requires further study.

The present document will focus on identifying and understanding the existing and proposed solutions plus the standards landscape in age verification. The present document aims to understand how the existing solutions and standards can be used to meet the stakeholder requirements for age verification as identified in ETSI TR 104 077-1 [i.7], this includes standards and solutions that are not specifically aimed at age verification as many of the stakeholder requirements are the same as other cybersecurity, privacy and data protection requirements found throughout many different industries and services.

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1 Scope

The present document reviewed from a perspective of the stakeholder requirements identified in ETSI TR 104 077-1 [i.7] is a study of the landscape of international, regional and national existing solutions (identified in ETSI TR 104 077-1 [i.7]), approaches (frameworks/architecture) and standards for age verification in Europe.

2 References

2.1 Normative references

Normative references are not applicable in the present document.

2.2 Informative 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.

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

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 103 305-1 \(V4.1.2\) \(2022-04\)](#): "Cyber Security (CYBER); Critical Security Controls for Effective Cyber Defence; Part 1: The Critical Security Controls".
- [i.2] [ETSI TR 103 305-2 \(V2.1.1\) \(2018-09\)](#): "CYBER; Critical Security Controls for Effective Cyber Defence; Part 2: Measurement and auditing".
- [i.3] [ETSI TR 103 305-4 \(V3.1.1\) \(2022-11\)](#): "Cyber Security (CYBER); Critical Security Controls for Effective Cyber Defence; Part 4: Facilitation Mechanisms".
- [i.4] [ETSI TR 103 305-5 \(V2.1.1\) \(2023-02\)](#): "Cyber Security (CYBER); Critical Security Controls for Effective Cyber Defence; Part 5: Privacy and personal data protection enhancement".
- [i.5] [ETSI TR 103 935 \(V1.1.1\) \(2023-12\)](#): "Cyber Security (CYBER); Assessment of cyber risk based on products' properties to support market placement".
- [i.6] [ETSI TS 103 457 \(V1.2.1\) \(2023-03\)](#): "CYBER; Trusted Cross-Domain Interface: Interface to offload sensitive functions to a trusted domain".
- [i.7] [ETSI TR 104 077-1](#): "Human Factors (HF); Age Verification Pre-Standardization Study; Part 1: Stakeholder Requirements".
- [i.8] [ETSI TR 103 370 \(V1.1.1\) \(2019-01\)](#): "Practical introductory guide to Technical Standards for Privacy".
- [i.9] [ETSI TS 103 485 \(V1.1.1\) \(2020-08\)](#): "CYBER; Mechanisms for privacy assurance and verification".
- [i.10] [ETSI TR 103 642 \(V1.1.1\) \(2018-10\)](#): "CYBER; Security techniques for protecting software in a white box model".
- [i.11] [ETSI TR 103 309 \(V1.1.1\) \(2015-08\)](#): "CYBER; Secure by Default - platform security technology".
- [i.12] [ETSI TS 102 165-1 \(V5.2.5\) \(2022-01\)](#): "CYBER; Methods and protocols; Part 1: Method and pro forma for Threat, Vulnerability, Risk Analysis (TVRA)".

- [i.13] [ETSI TS 103 992 \(V1.1.1\) \(2024-05\)](#): "Cyber Security (CYBER); Implementation of the Revised Network and Information Security (NIS2) Directive applying Critical Security Controls".
- [i.14] [ETSI TR 103 838 \(V1.1.1\) \(2022-01\)](#): "Cyber Security; Guide to Coordinated Vulnerability Disclosure".
- [i.15] [ETSI EG 203 499 \(V3.1.1\) \(2024-07\)](#): "Human Factors (HF); User-centred terminology for existing and upcoming ICT devices, services and applications".
- [i.16] [ETSI EN 301 549 \(V3.2.1\) \(2021-03\)](#): "Accessibility requirements for ICT products and services".
- [i.17] [ETSI TR 103 349 \(V1.1.1\) \(2016-12\)](#): "Human Factors (HF); Functional needs of people with cognitive disabilities when using mobile ICT devices for an improved user experience in mobile ICT devices".
- [i.18] [ETSI EG 203 350 \(V1.1.1\) \(2016-11\)](#): "Human Factors (HF); Guidelines for the design of mobile ICT devices and their related applications for people with cognitive disabilities".
- [i.19] [IEEE 2089™-2021](#): "IEEE Standard for an Age-Appropriate Digital Services Framework Based on the 5Rights Principles for Children".
- [i.20] [IEEE P2089.2™](#): "IEEE Standard for Terms and Conditions for Children's Online Engagement".
- [i.21] [IEEE 2089.1™-2024](#): "IEEE Standard for Online Age Verification".
- [i.22] CNIL (2022): "[Demonstration of a privacy-preserving age verification process](#)".
- [i.23] Agcom (2024): "[Linee guida parental control \(Delibera n. 9/23/CONS\)](#)".
- [i.24] Coimisiún na Meán (2024): "[Online Safety Code](#)".
- [i.25] AEDPD (2023): "[Decalogue of principles - Age verification and protection of minors from inappropriate content](#)".
- [i.26] KJM (2022): "[Criteria for evaluating concepts for age verification systems as elements for ensuring closed user groups in telemedia in accordance with § 4 para. 2 sentence 2 Interstate Treaty on the Protection of Human Dignity and Minors in Broadcasting and Telemedia \(JMStV\) \("AVS-MATRIX"\)](#)".
- [i.27] ICO: "[Age appropriate design: a code of practice for online services](#)".
- [i.28] ICO: "[Age assurance for the Children's code](#)".
- [i.29] Ofcom (2023): "[Guidance on age assurance and other Part 5 duties for service providers publishing pornographic content on online services](#)".
- [i.30] Ofcom (2024): "[Quick guide to children's access assessments](#)".
- [i.31] [Regulation \(EU\) No 1025/2012](#) of the European Parliament and of the Council of 25 October 2012 on European standardisation, amending Council Directives 89/686/EEC and 93/15/EEC and Directives 94/9/EC, 94/25/EC, 95/16/EC, 97/23/EC, 98/34/EC, 2004/22/EC, 2007/23/EC, 2009/23/EC and 2009/105/EC of the European Parliament and of the Council and repealing Council Decision 87/95/EEC and Decision No 1673/2006/EC of the European Parliament and of the Council (Text with EEA relevance).
- [i.32] [CEN and CENELEC Workshop Agreement \(2023\) CWA 18016](#): "Age appropriate digital services framework".
- [i.33] ISO/IEC DIS 27566-1: "Information security, cybersecurity and privacy protection — Age assurance systems — Part 1: Framework".
- [i.34] ISO/IEC PWI 27566-2 (Ed 2): "Age assurance systems — Part 2: Technical approaches and guidance for implementation".
- [i.35] ISO/IEC AWI 27566-3 (Ed 3): "Age assurance systems — Part 3: Benchmarks for benchmarking analysis".

- [i.36] ITU (2020): "[Digiworld An example of how the ITU Guidelines on Child Online Protection can be delivered in practice](#)".
- [i.37] Ministry for the Digital Transformation and Civil Service (2024): "Digital Wallet; Specification for the use of the "Age of majority" credential Age verification system for access to online content".
- [i.38] Ministry for the Digital Transformation and Civil Service (2024): "Digital Wallet; Age verification protocol Age verification system for access to online content".
- [i.39] [ISO/IEC JTC 1/SC 27 TR 15443-1:2012](#): "Information technology — Security techniques — Security assurance framework Part 1: Introduction and concepts".
- [i.40] [ISO/IEC JTC 1/SC 27 TR 15443-2:2012](#): "Information technology — Security techniques — Security assurance framework Part 2: Analysis".
- [i.41] [ISO/IEC JTC 1/SC 27 29115:2013](#): "Information technology — Security techniques — Entity authentication assurance framework".
- [i.42] ISO/IEC JTC 1/SC 27 29128-1:2023: "Information security, cybersecurity and privacy protection — Verification of cryptographic protocols — Part 1: Framework".
- [i.43] [ISO/IEC JTC 1/SC 27 27551:2021](#): "Information security, cybersecurity and privacy protection — Requirements for attribute-based unlinkable entity authentication".
- [i.44] [ISO/IEC JTC 1/SC 37; 30136:2018](#): "Information technology — Performance testing of biometric template protection schemes".
- [i.45] [ISO/IEC JTC 1/SC 37; 24714:2023](#): "Biometrics — Cross-jurisdictional and societal aspects of biometrics — General guidance".
- [i.46] [ISO/IEC JTC 1/SC 37; TR 30110:2015](#): "Information technology — Cross jurisdictional and societal aspects of implementation of biometric technologies — Biometrics and children".
- [i.47] AgeAware; euConsent (2024), AgeAware® Specification, Consultation Document: "WP1: Business Requirements".
- [i.48] Produced by Childnet International for The National Lottery Heritage Fund, Digital Skills for Heritage: "[Working with Children and Young People Online](#)".
- [i.49] NCSC: "[Cyber Essentials](#)".
- [i.50] [BSI PAS 1296:2018](#): "Online age checking. Provision and use of online age check services. Code of Practice".
- [i.51] [Regulation \(EU\) 2022/2065](#) of the European Parliament and of the Council of 19 October 2022 on a Single Market For Digital Services and amending Directive 2000/31/EC (Digital Services Act).
- [i.52] [Regulation \(EU\) 2016/679](#) of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).
- [i.53] [ETSI TS 119 461 \(V1.1.1\) \(2021-07\)](#): "Electronic Signatures and Infrastructures (ESI); Policy and security requirements for trust service components providing identity proofing of trust service subjects".
- [i.54] ETSI TS 119 462: "Electronic Signatures and Trust Infrastructures (ESI); Wallet interfaces for trust services and signing".
- [i.55] ETSI TS 119 471: "Electronic Signatures and Trust Infrastructures (ESI); Policy and Security requirements for Providers of Electronic Attestation of Attribute Services".
- [i.56] ETSI TS 119 475: "Electronic Signatures and Trust Infrastructures (ESI); Relying party authorizations for access to EUDI Wallet".

- [i.57] [ETSI EN 319 411-2 \(V2.5.1\) \(2023-10\)](#): "Electronic Signatures and Infrastructures (ESI); Policy and security requirements for Trust Service Providers issuing certificates; Part 2: Requirements for trust service providers issuing EU qualified certificates".
- [i.58] IEEE 2089.3™: "Online Parental Consent".
- [i.59] ETSI TR 104 077-3: "Human Factors (HF); Age Verification Pre-Standardization Study; Part 3: Proposed Standardization Roadmap".
- [i.60] [ETSI TR 104 031 \(V1.1.1\) \(2024-01\)](#): "Securing Artificial Intelligence (SAI); Collaborative Artificial Intelligence".
- [i.61] [ETSI TR 104 032 \(V1.1.1\) \(2024-02\)](#): "Securing Artificial Intelligence (SAI); Traceability of AI Models".
- [i.62] [ETSI TR 104 225 \(V1.1.1\) \(2024-04\)](#): "Securing Artificial Intelligence TC (SAI); Privacy aspects of AI/ML systems".
- [i.63] [ETSI TR 104 048](#): "Securing Artificial Intelligence; Data Supply Chain Security".
- [i.64] [ETSI TR 104 221](#): "Securing Artificial Intelligence; Problem statement".
- [i.65] ETSI TR 104 062 (V1.2.1) (2024-07): "Securing Artificial Intelligence; Automated Manipulation of Multimedia Identity Representations".
- [i.66] [ETSI TS 104 223](#): "Securing Artificial Intelligence TC (SAI); Baseline Cyber Security Requirements for AI Models and Systems".
- [i.67] [ETSI TS 104 224](#): "Securing Artificial Intelligence TC (SAI); Explicability and transparency of AI processing".
- [i.68] [Regulation \(EU\) 2022/2480](#) of the European Parliament and of the Council of 14 December 2022 amending Regulation (EU) No 1025/2012 as regards decisions of European standardisation organisations concerning European standards and European standardisation deliverables.

3 Definition of terms, symbols and abbreviations

3.1 Terms

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

age assurance: methods used to determine the age or age range of an individual, including age verification, estimation, and self-declaration

NOTE: From ISO 27566-1 [i.33]: "set of processes and methods used to verify, estimate or infer the age or age range of an individual, enabling organizations to make age-related eligibility decisions with varying degrees of certainty".

age estimation: age assurance method-based analysis of biological or behavioural features of humans that vary with age

age inference: age assurance method based on verified information which indirectly implies that an individual is over or under a certain age or within an age range

Age Verification (AV): process to determine an individual's age or age range

NOTE: From ISO 27566-1 [i.33]: "age assurance method based on calculating the difference between a verified year or date of birth of an individual and a subsequent date". Also, in some cultures, an alternate calculation (such as use of birth year rather than birth date) may be applicable.

inclusivity: capability of a product to be utilized by people of various backgrounds include (and are not limited to) people of various ages, abilities, cultures, ethnicities, languages, genders, economic situations, education, geographical locations and life situations

practice statement: documentation of the practices, procedures and controls employed by an organization to fulfil a service

relying party: entity that relies on an age assurance result to make an age-related eligibility decision

3.2 Symbols

Void.

3.3 Abbreviations

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

ABUEA	Attribute-Based Unlinkable Entity Authentication
AENOR	Asociación Española de Normalización y Certificación
AEPD	Agencia Española de Protección de Datos
AFNOR	Association Française de Normalisation
Agcom	Communications Regulatory Authority
AI	Artificial Intelligence
AIA	AI Agents
AV	Age Verification
BSI	British Standards Institution
CCPN	Standardization Coordination and Steering Committee
CEI	Comitato Elettrotecnico Italiano
CEN	European Committee for Standardization
CENELEC	European Committee for Electrotechnical Standardization
CIA	Confidentiality, Integrity, Availability
CNIL	Commission nationale de l'informatique et des libertés
COP	Child Online Protection
COS	Strategic Committees
CSC	Critical Security Control
DID	Decentralized Identifier
DKE	Deutsche Kommission Elektrotechnik Elektronik Informationstechnik im DIN und VDE
DNE	Digital Networked Economy
EG	ETSI Guide
EN	European Standard
ESI	Electronic Signatures and Trust Infrastructures
ESO	European Standard Organisation
ETSI	European Telecommunications Standards Institute
EUDI	European Digital Identity
GDPR	General Data Protection Regulation
HF	Human Factors
ICO	Information Commissioner's Office
ICT	Information and Communications Technology
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Organization for Standardization
ISS	Internet Society Services
ITU	International Telecommunication Union
JMStV	Interstate Treaty on the Protection of Minors in the Media
KJM	Kommission für Jugendmedienschutz
LoA	Levels of Entity Authentication
NCSC	National Cyber Security Centre
NIS2	Revised Network and Information Security Directive
NSAI	National Standards Authority of Ireland
NSB	National Standards Bodies
PAS	Publicly Available Specification
SAI	Securing Artificial Intelligence
SDO	Standards Development Organization
TC	Technical Committee

TR Technical Report
 TS Technical Specification
 UNI Ente Nazionale Italiano di Unificazione
 WBC White Box Cryptography

4 Overview and Diagram of Age Assurance Systems

4.1 Overview

Age-related eligibility decisions are required when a person should either be a certain age, older or younger than a given age or be within an age range, where ages are counted in years and where these criteria are dependent upon the type of goods, content, services, venues or spaces to be provided. Although an individual's age is an attribute of their identity, it is not necessarily the case that establishing the full identity of an individual in a global context is needed to gain age assurance. As such, the process of age assurance may in some instances be connected to identity verification but can also be performed in ways other than via identity verification.

An age assurance system should be capable of meeting the stated and implied needs of relying parties when it is used under specified conditions. A functionally complete age assurance system comprises of one or more age assurance methods selected or designed to provide the relying party with the necessary information to make an age-related eligibility decision. The functional characteristics (performance, privacy, security and acceptability) describe what a relying party, intermediary or age assurance provider is supposed to accomplish as set out in their practice statement.

4.2 Diagrams

Both figures 1 and 2 are from ISO/IEC DIS 27566-1:2025 [i.33].

Age assurance methods		
Age verification methods	Age estimation methods	Age inference methods
Calculating the difference between a verified year or date of birth of an individual and a subsequent date	Analysis of biological or behavioural features of humans that vary with age	Verified information which indirectly implies that an individual is over or under a certain age or within an age range

Figure 1: Illustration of the three age assurance methods

Figure 1 describes the three different age assurance methods, which when taken together with the binding of evidence to the individual can be used to generate an age assurance result leading to an age-related eligibility decision.

Figure 2 shows the different characteristics of an age assurance system with examples of standards, solutions and frameworks from clauses 5 and 6 that align with the different characteristics.