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Aeronavtika - Letalski sistemi brez posadke - 002. del: Neposredna identifikacija na daljavo

Aerospace series - Unmanned Aircraft Systems - Part 002: Direct Remote identification

Luft- und Raumfahrt - Unbemannte Luftfahrzeugsysteme - Teil 002: Anforderungen an die direkte Fernidentifizierung

Série aérospatiale - Aéronefs télépilotés - Partie 002 : Exigences d'identification directe à distance

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This European Standard was approved by CEN on 28 August 2023.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Ref. No. EN 4709-002:2023 E

Contents

European foreword

This document (EN 4709-002:2023) has been prepared by the Aerospace and Defence Industries Association of Europe — Standardization (ASD STAN) and is now under the responsibility of CEN/TC 471 'Unmanned aircraft systems.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2024, and conflicting national standards shall be withdrawn at the latest by April 2024.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

After enquiries and votes carried out in accordance with the rules of this Association, this document has received the approval of the National Associations and the Official Services of the member countries of ASD-STAN, prior to its presentation to CEN.

A list of all parts in the 4709 series can be found on the CEN website: https://www.cencenelec.eu/.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZA, which is an integral part of this document.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Introduction

The European Commission adopted on the 12th of March 2019 the Delegated Regulation (EU) 2019/945 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems.

This document gives all economic operators (such as manufacturers, importers and distributors and their trade associations as well as bodies involved in the conformity assessment procedures) a viable way to prove compliance with the requirements laid out in the Delegated Regulation of 12th, March 2019.

The end user of this document assumes all responsibility for the safe application of these test methods. All relevant safety/quality procedures should be considered. Special consideration should be considered when operating the UAS for evaluations. All local, state, federal, and country laws should be considered when operating UAS.

For repeatability, it is assumed that environmental conditions (temperature, wind, pressure, humidity) are recorded during any tests and it is further assumed tests conducted unless otherwise noted within the following conditions: Temperature – 18 °C-28 °C, Pressure – Atmospheric from sea level up to 2 000 m, Humidity – 10 %-60 %, Wind Speed – Calm (less than 0,3 m/s or zero on the Beaufort Scale).

DRI display software

The following information is provided to clarify the assumptions made on the capability of compatible mobile receiver devices to get DRI data interpretation and display capability.

As described in 4.1 the interested third party uses a receiver mobile device (such as a smartphone) with specific RID Display Software to receive and display the information contained in Remote ID broadcasted by an UA.

To be easily accessible, the display software is expected to be largely available to all interested third parties.

The software is expected to display all mandatory information described in 4.2. A way to display remote ID could be a map view showing the position of the UA(s) together with the position of the smartphone.

All transport methods for remote ID described in Clause 5 is expected to be processed and displayed by the software to be used as a testing tool. As the transport methods have different hardware requirements, a specific mobile receiver device may not be able to receive all transport methods. The software is expected to show the user which transport methods are supported by the present mobile receiver device.

1 Scope

1.1 General

This document provides means of compliance with the “Direct Remote Identification” requirements set in Regulation (EU) 2019/945 on Unmanned Aircraft Systems.

“Direct remote identification” means a system that ensures the local broadcast of information about a UA in operation.

More specifically, this document addresses drone’s capability to be identified during the whole duration of the flight, in real time and with no specific connectivity or ground infrastructure link, by existing mobile devices when within the broadcasting range. Such functionality, based on an open and documented transmission protocol (described in this document) contributes to address security threats and to support drones’ operators’ obligations with respect to citizens’ fundamental rights to privacy and protection of personal data. It can be used by law enforcement people, critical infrastructure managers, and public to get an instantaneous information on the drone flying around, providing various information such as UA serial number, UA navigation data and operational status, UAS Operator registration number and position as defined in the Delegated Regulation (EU) 2019/945.

Since Regulation (EU) 2019/945 requires DRI information to be broadcasted using an “open and documented protocol”, this document does not define technological measures to protect the confidentiality and integrity of the data broadcasted.

1.2 Security

This document is limited to ensure conformity of the UAS with the requirements set in Parts 2, 3, 4 and 6 of Regulation (EU) 2019/945. Therefore:

— this document does not include the capability to protect communication against user and/or malicious modification of sensors output values involved in DRI information computation (like GNSS, barometer, magnetometer, and accelerometer…) and the DRI radio-transmitter interface;

— this document does not include the capability to protect against user and/or malicious software and hardware modification of the geographical position, the timestamp, the height, the take-off position, the speed, or the route course of the UA/add-on;

— this document does not include the capability to ensure DRI data integrity verification, or the capability to ensure detection that the UA/Add-on’s serial number is unique, when received by the receiver mobile device. However, to provide such capabilities, a digital signature may be added to the DRI message;

— this document does not include the capability to ensure DRI data received by the receiver mobile device are genuine and come from a UA/add-on belonging to a registered UAS operator, or the capability to ensure detection of spoofing of the UAS operator registration number. However, to provide such capabilities, a digital signature may be added to the DRI message.

1.3 DRI display software

Direct remote identification display software is not in the scope of this document. However, it is assumed that compatible mobile receiver devices will support DRI data interpretation and display capability.

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.

ETSI EN 300-328, V2.2.2:2019-07, *Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz band; Harmonised Standard for access to radio spectrum*

ETSI EN 300-440, V2.2.1:2018-07, *Short Range Devices (SRD); Radio equipment to be used in the 1 GHz to 40 GHz frequency range; Harmonised Standard for access to radio spectrum*

ETSI EN 301-893, V2.1.1:2017-05, *5 GHz RLAN; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU*

EN ISO 3166-1:2020, *Codes for the representation of names of countries and their subdivisions - Part 1: Country code (ISO 3166-1:2020)*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

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

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 https://www.electropedia.org/

3.1.1
add-on
standalone direct remote ID broadcast device integrating a GNSS function and a communication function, being able to provide position, height, speed over ground, track clockwise with true north, of the UA, and the remote pilot position or it's take-off position

3.1.2
direct remote identification
DRI
system that ensures the local broadcast of information about a UA in operation so that this information can be obtained without physical access to the UA

3.1.3
UAS operator registration number
identifier delivered by the National Aviation Authority, upon UAS operator eRegistration procedure

Note 1 to entry: in this document UAS operator registration number is equivalent to UAS Operator ID or UAS operator registration ID.

3.2 List of abbreviated terms

AGL	Above Ground Level
ASD-STAN	Aerospace and Defence Industries Association of Europe - Standardization
C0, C1, C2, C3, C4	Class 0 to Class 4 eligible for operations in the "Open" Category of UAS operations
C2 link	Command and Control link between UA and the GCS
C5, C6	Class 5 and Class 6 eligible for operations in the "Specific" Category under Standard Scenarios
CAA	Civil Aviation Authority
DRI	Direct Remote ID/Identification
EASA	European Union Aviation Safety Agency
EC	European Commission
EDPS	European Data Protection Supervisor
EMC	Electro-Magnetic Compatibility
EMI	Electro-Magnetic Interference
GCS	Ground Control Station (EU regulation uses the equivalent term CU – Command Unit)
GNSS	Global Navigation Satellite System
GTRF[1]	Galileo Terrestrial Reference Frame
ICAO	International Civil Aviation Organization
ID	Identification
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
LE	Little Endian
LSB	Least Significant Byte
MS	Member State
MSB	Most Significant Byte
NAN	(Wi-Fi) Neighbour Awareness Networking
NM	Nautical Miles
OEM	Original Equipment Manufacturer
RID	Remote ID Display
RPAS	Remotely Piloted Aircraft System
SDF	Service Discovery Frame

[1] GTRF is the reference ellipsoid for Galileo European satellite navigation system. GPS uses the WGS84 reference ellipsoid. The maximum difference between WGS 84 and GTRF has been calculated to be less than 4 cm (around 3,6 cm 2 sigma) – see [16]. This is considered negligible with respect to the typical GNSS accuracy requirements for aviation, which are in the order of several metres.

TU	Time Unit (1 TU = 1024 microsecond)
UA	Unmanned Aircraft
UAS	Unmanned Aircraft System
UTC	Coordinated Universal Time
UTM	UAS Traffic Management
UUID	Universally Unique Identifier based on IETF RFC4122

4 General design requirements

4.1 Conceptual overview

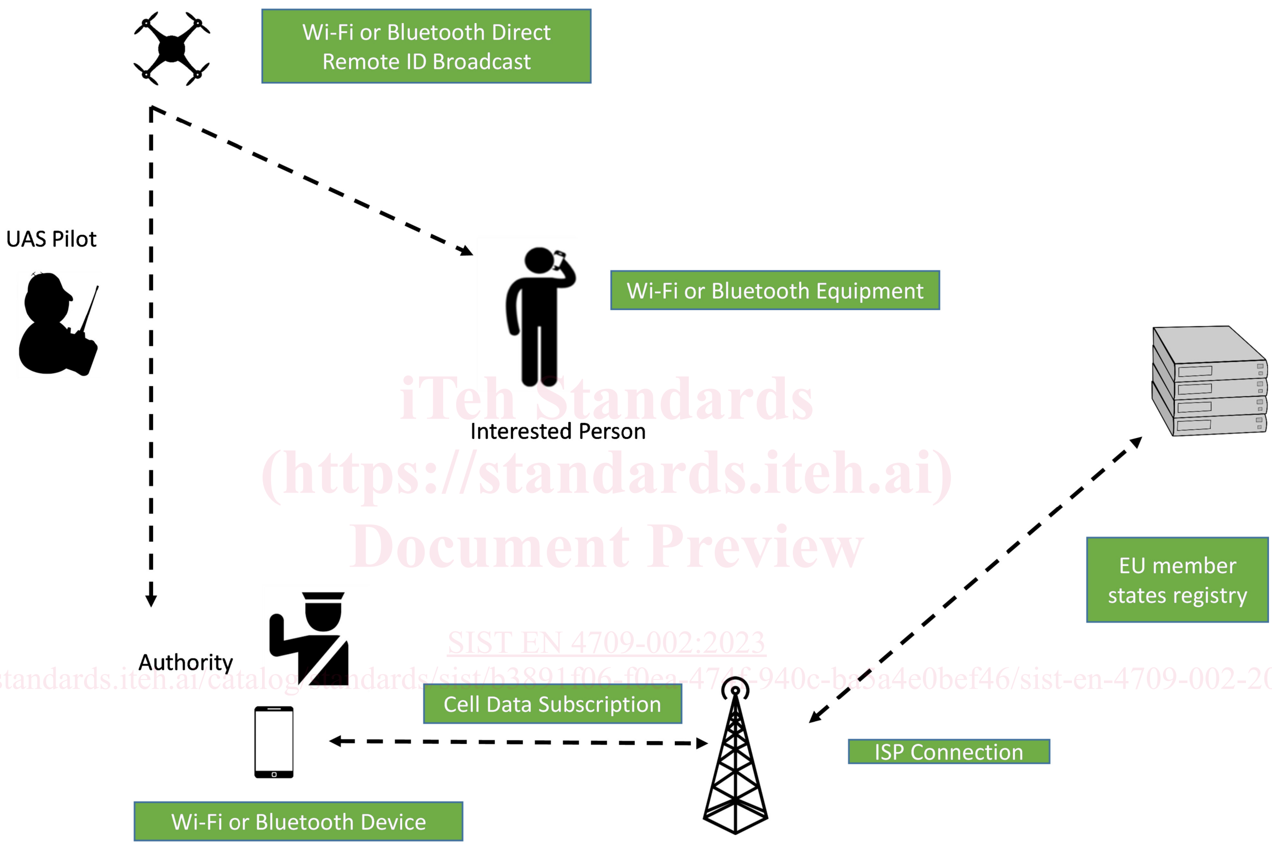

Figure 1 — DRI conceptual overview diagram

One or more UA are operating and broadcasting direct remote ID data. An interested third party or the authority wants to identify the UA.

The UA continuously broadcasts remote ID data using one of the methods described in Clause 5.

The interested third party accesses a remote ID Display software (RID software) on a receiver mobile device. This display software shows UA location and remote pilot position or take-off position if not available, and a trail of position reports on a map, and associated identification information when a particular UA is selected.

When the interested third party opens the remote ID software on a receiver mobile device (such as a smartphone), remote ID data are acquired as follows:

1. the broadcast UA is transmitting its remote ID advertisements continuously. The receiver mobile device (such as smartphone) uses its internal radios to listen for the advertisements from the UA, extract the remote ID data, and show the location of the UA on the map and the position of the pilot, or the take-off position according to requirement matrix. As new position updates are received, the prior position reports become part of a trail representing where the UA most recently flew, beginning from the position that was received first;

2. the interested third party selects the Broadcast UA and views the corresponding ID information.

4.2 Mandatory information

The direct remote ID system shall broadcast locally the mandatory information listed below:

— identification information:

  — the UAS operator registration number,

  — the unique serial number of the UA (or exclusively the add-on);

— geolocation information:

  — the time stamp, the geographical position of the UA and its height above the ground or its take-off point,

  — the route course measured clockwise from true north and ground speed of the UA,

  — the geographical position of the remote pilot, or if not available, the geographical position of the take-off point;

— UA status information:

  — the UAS emergency status for Class C1, C2, C3. Not required for add-on.

The conformity to this requirement shall be proven by testing as specified in 6.2, “DRI generic test procedure”.

4.3 Security of the DRI system

General security requirement:

— the direct remote identification system shall reduce the ability of tampering with the functionality of the direct remote identification system.

  NOTE The direct remote identification system is the on-board feature in the UA/add-on that is formatting and transmitting over the air the DRI information to a compatible receiver mobile device.

  The scope of this document does not include the receiver mobile device; thus, this security requirement does not apply to the receiver mobile device itself.

Specific security requirements:

— the UA and the add-on come with a unique serial number; this number is loaded at factory level and shall not be modified anymore afterwards. The protection of the unique serial number of the UA/Add-on shall be done by design. The serial number shall be stored in a secure memory area;

— the design of the DRI shall not allow the user to modify the Geolocation information part of the DRI message, as defined in 4.2 above.

The conformity to those requirements shall be proven per the OEM's design documentation.

4.4 Upload of UAS operator registration number

UAS class C1, C2, C3 and the DRI Add-on shall have functionality that allows the upload of the UAS operator registration number. The number is exclusively provided following the process for registration based on Art. 14 of Regulation 2019/947. The detailed procedure to load the number in the DRI system shall be defined by the manufacturer and covered by the instructions delivered to the customer.

The DRI system shall not accept to upload an invalid UAS operator registration number.

a) As shown in Figure 2, the unique UAS operator registration number issued by the Member States (MS) shall consist of 16 alphanumeric characters in total organized as the following:

   1) three first alphanumeric characters corresponding to the EN ISO 3166-1:2020 Alpha-3 code of the MS of registration (upper case only); and

   2) twelve following characters randomly generated consisting of alphanumeric characters (lower cases only);

   3) one character corresponding to checksum generated in line with point (c).

b) MS shall randomly generate additional three alphanumeric characters (lower cases only). They are separated from the sixteen characters defined in (a) by a hyphen "-" (ASCII code DEC 45).

c) MS shall generate a checksum by applying the Luhn mod-36 algorithm to the fifteen alphanumeric characters resulting from the concatenation in the following order of:

   1) the twelve last alphanumeric characters of the UAS operator registration number defined in (a) (2); and

   2) the three randomly "xyz" generated additional alphanumeric characters defined in (b).

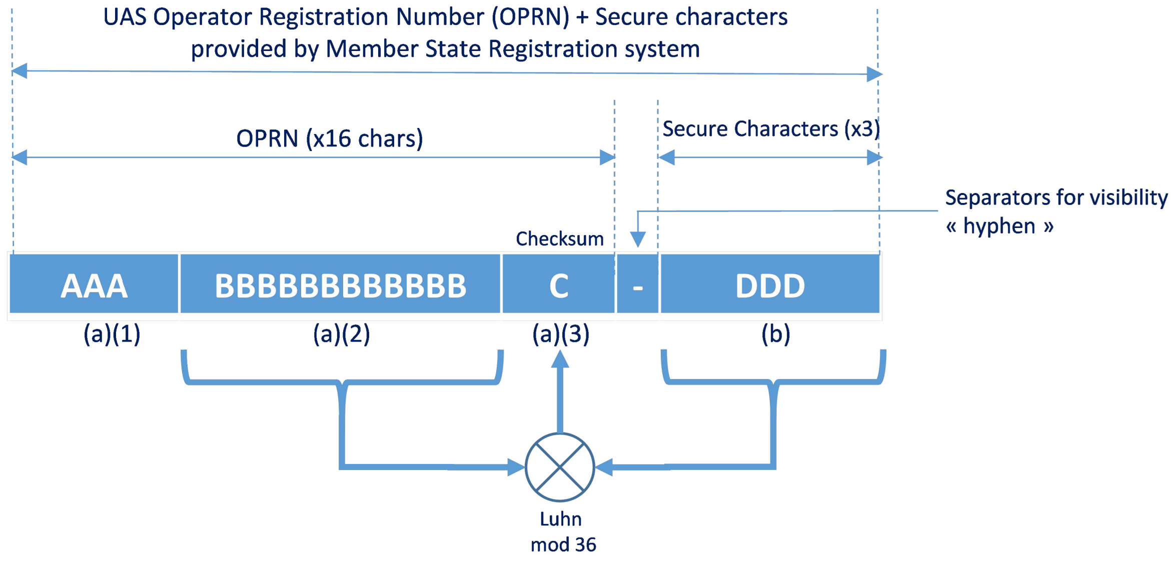

Figure 2 — UAS operator registration number format

For the Luhn mod-36 algorithm, the mapping characters to code-points starts with the digits, then the lower-case letters as shown below:

Table 1

Character	*0*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*a*	*b*	*c*	*d*	*e*	*f*	*g*	*h*
Code-point	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Character	*i*	*j*	*k*	*l*	*m*	*n*	*o*	*p*	*q*	*r*	*s*	*t*	*u*	*v*	*w*	*x*	*y*	*z*
Code-point	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35

EXAMPLE An example of the UAS operator registration number is: "FIN87astrdge12k8" where:

- 'FIN' is the EN ISO 3166-1:2020 Alpha-3 code of Finland;

- '87astrdge12k' are an example of the twelve (12) alphanumeric characters, as specified in (a)(2) in AMC1 Article 14(6) Registration of UAS operators and 'certified' UAS;

- '8' is the checksum value, i.e. the result of the application of the Luhn mod-36 algorithm to the 15 alphanumeric characters resulting from the concatenation of the 12 last alphanumeric characters of the UAS operator registration number defined in (a)(2) and the 3 randomly generated additional alphanumeric characters defined in (b) (i.e. 87astrdge12kxyz). Please note that the three alphanumeric characters corresponding to EN ISO 3166-1:2020 Alpha-3 code, (in the example, the string "FIN"), are not used as a part of the checksum calculation, nor the hyphen character "-".

An example of the full string point (e) of the AMC1 Article 14(6), to be provided by a Member State is 'FIN87astrdge12k8-xyz' where:

- 'FIN87astrdge12k8' is the UAS operator registration number;

- 'xyz' are an example of 3 randomly generated alphanumeric characters;

- '8' is the checksum provided value, to be verified during the UAS operator registration number upload procedure.