



BSI Standards Publication

Uncrewed aircraft systems — UAS traffic management (UTM) — Study on functional and performance requirements for UTM systems

National foreword

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Uncrewed aircraft systems — UAS traffic management (UTM) — Study on functional and performance requirements for UTM systems

*Systèmes d'aéronefs télé-pilotés — Gestion du trafic UAS (UTM)
— Étude des exigences fonctionnelles et de performance des
systèmes UTM*

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Foreword

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Introduction

The implementation and operation of uncrewed aircraft system (UAS) traffic management (UTM) systems are progressing in many countries with the rapid development and penetration of UAS technology and usage. The International Civil Aviation Organization (ICAO) has published the fourth edition of its UTM guidance^[1], which describes the principal guidelines and services for UTM implementation in each country, as well as gaps and issues related to UTM implementation.

ISO/TC 20/SC 16 has also been working on the definition of UTM based on UAS operations as defined in ISO 21384-3:2023^[1]. It has developed standards such as ISO 23629-5:2023^[2], ISO 23629-12:2022^[4] and ISO 23629-9:2023^[5], and other standards have been developed to clarify the composition of services and functions of the overall UTM system configuration.

The purpose of this document is to survey the current implementation status and requirements of UTM in different countries, classify possible services and functions not defined in existing standards, and identify the quality, safety and security requirements for each service or function.

Based on the different implementations of these UTMs in different countries and by different private UTM providers, this document identifies the classification of the services, stakeholders involved, functions encompassed and data handled, and examines the quality, safety and security requirements for these data to determine how much quality, safety and security each service requires, and security requirements for each service.

Uncrewed aircraft systems — UAS traffic management (UTM) — Study on functional and performance requirements for UTM systems

1 Scope

This document comprehensively examines information grounded in International Standards applicable to uncrewed aircraft system (UAS) traffic management (UTM) systems and the operational frameworks for UTM systems across various countries. It systematically catalogues the current entities involved in UTM systems, including the actors, services, functions and data. Additionally, it delineates the safety, security and quality specifications for these services, focusing on data management and referring, where appropriate, to standards developed by other standard development organizations (SDOs).

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 21384-4, *Uncrewed aircraft systems — Part 4: Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21384-4 and the following apply.

ISO and IEC maintain terminology 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

UAS traffic management

UTM

uncrewed aircraft system traffic management

set of traffic management and air navigation services aiming at safe, secure and efficient integration of multiple crewed and uncrewed aircraft flying inside the respective *designated operational coverage* (3.9) of each service

[SOURCE: ISO 23629-7:2021, 3.11, modified — “crewed and uncrewed” replaced “manned and unmanned”.]

3.2

UTM service

uncrewed aircraft system traffic management service

result of at least one *activity* (3.7) necessarily performed at the interface between the *UTM service provider* (USP) (3.3) and the *UTM user* (3.4), which consists in the provisions of digital data and information, in the context of *UTM* (3.1)

[SOURCE: ISO 23629-9:2023^[5], 3.2]

3.3

UTM service provider**USP****uncrewed aircraft system traffic management service provider**

organization playing the role of a *UTM actor* (3.5), which provides, normally in exchange for a fee, digital data and information to *UTM users* (3.4) who may choose to take advantage of the offered service

[SOURCE: ISO 23629-9:2023^[5], 3.3]

3.4

UTM user**uncrewed aircraft system traffic management user**

organization or system which uses digital data and information offered by a *UTM service provider (USP)* (3.3) to fulfil their mission, that is neither a USP nor an *operation support service* (3.9) provider

[SOURCE: ISO 23629-9:2023^[5], 3.4]

3.5

UTM actor**uncrewed aircraft system traffic management actor**

role played by an *UTM user* (3.4) or *UTM service provider (USP)* (3.3) or provider of operation support that interacts with the *UTM subject* (3.6)

[SOURCE: ISO 23629-12:2022^[4], 3.8, modified — Notes 1 and 2 to entry deleted.]

3.6

UTM subject**uncrewed aircraft system traffic management subject**

information technology (IT) entity (including subsystem, component, or even class) representing a software system residing on a physical system or platform, supporting the exchange of digital data and information among several *UTM users* (3.4) and several *UTM service providers (USPs)* (3.3), and to which a set of use cases applies in the *UTM* (3.1) context

[SOURCE: ISO 23629-12:2022^[4], 3.11, modified — “or operation support SPs” deleted. Notes 1 and 2 to entry deleted.]

3.7

activity

set of cohesive tasks of a process

[SOURCE: ISO/IEC TR 27550:2019^[6], 3.1]

3.8

designated operational coverage**DOC**

geographic volume of airspace within which an *uncrewed aircraft system traffic management (UTM) service* (3.2) is available in compliance with designation by competent authorities if applicable, with sufficient performance including *availability* (3.20), continuity, *integrity* (3.22) and timeliness and, if applicable, with sufficient radio signal quality and protection from other users of the electromagnetic spectrum

[SOURCE: ISO 23629-12:2022^[4], 3.2, modified — Note 1 to entry deleted.]

3.9

operation support service

web-based tools and information provided by a service provider (SP) to an uncrewed aircraft system (UAS) operator or its staff, to support safe and efficient planning and execution of a flight mission, as well as post-flight *activities* (3.7)

[SOURCE: ISO 23629-12:2022^[4], 3.4, modified — Note 1 to entry deleted.]

3.10

safety-critical UTM service

safety-critical uncrewed aircraft system traffic management service

UTM service (3.2) providing functions that, if lost or degraded, or as a result of incorrect or inadvertent operation, could result in catastrophic consequences

[SOURCE: ISO 23629-12:2022^[4], 3.5]

3.11

safety-related UTM service

safety-related uncrewed aircraft system traffic management service

UTM service (3.2) providing functions that have the potential to contribute to the violation of or achievement of a safety goal, but whose loss of degradation would not in itself produce catastrophic consequences

[SOURCE: ISO 23629-12:2022^[4], 3.6]

3.12

UTM service base operation

uncrewed aircraft system traffic management service base operation

base operation providing access to functionality implemented within an *UTM service* (3.2) and used in each UTM service and *UTM subject* (3.6)

[SOURCE: ISO/IEC 21000-10:2006^[7], 3.4, modified — “UTM service” replaced “Digital Item” in the term, and “MPEG-21 environment” in the definition. “each UTM service and UTM subject” replaced “authoring a Digital Item Method”. Note 1 to entry deleted.]

3.13

data model

model that describes how data is represented and accessed

[SOURCE: ISO/IEC/IEEE 8802-3-2:2021^[8], 3.1]

3.14

functional safety

safety that is part of the overall safety relating to the equipment under control (EUC) and the EUC control system that depends on the correct functioning of the electrical/electronic/programmable electronic (E/E/PE) safety-related systems and other risk reduction measures

[SOURCE: IEC 61508-4:2010^[10], 3.1.12]

3.15

information security

preservation of *confidentiality* (3.21), *integrity* (3.22) and *availability* (3.20) of information

[SOURCE: ISO 20252:—¹⁾, 3.60]

3.16

quality of service

QoS

<network> ability to provide different priority to different applications, users or data flows, or to guarantee a certain level of performance to a data flow

[SOURCE: ISO 20205:2015, 1.6.3, modified — domain “<network>” added.]

1) Under revision. Current stage: ISO/DIS 20252:2025.

3.17

ground risk

combination of the frequency (probability) of an occurrence and its associated level of severity, specifically concerning fatal injuries to third parties on the ground resulting from incidents such as a crash of an uncrewed aircraft

Note 1 to entry: The definition is adapted from SAE ARP 4754A^[12] and JARUS SORA v2.0^[13].

3.18

air risk

combination of the frequency (probability) of an occurrence and the associated level of severity, particularly concerning fatal injuries to third parties in the air resulting from events such as a mid-air collision with an uncrewed aircraft

Note 1 to entry: The definition is adapted from SAE ARP 4754A^[12] and JARUS SORA v2.0^[13].

3.19

reliability

ability to perform as required, without failure, for a given time interval, under given conditions

[SOURCE: IEC 60050-192:2015^[9], 192-01-24]

3.20

availability

property of being accessible and usable on demand by an authorized entity

[SOURCE: ISO/IEC 27000:—²⁾, 3.4]

3.21

confidentiality

property that information is not made available or disclosed to unauthorized individuals, entities or processes

[SOURCE: ISO/IEC 27000:—²⁾, 3.2]

3.22

integrity

property of accuracy and completeness

[SOURCE: ISO/IEC 27000:—²⁾, 3.3]

3.23

chronological order

arrival order along the sequence of dates in time

[SOURCE: ISO 5127:2017, 3.1.1.64, modified — “arrival order” replaced “order”.]

3.24

bi-directional

capable of operating in either of two directions, which are the opposite of each other

[SOURCE: ISO/IEC 19762:2025, 3.5.2.664, modified — EXAMPLE deleted.]

2) Under revision. Current stage: ISO/IEC DIS 27000:2025.