



# Explanatory Note to Decisions 2022/022/R, 2022/023/R & 2022/024/R

## Development of and amendments to the acceptable means of compliance and guidance material to support the implementation of the U-space Regulation

RELATED NPA/CRD: 2021-14 — RMT.0230 SUBTASK B

### EXECUTIVE SUMMARY

The objective of Decisions 2022/022/R, 2022/023/R and 2022/024/R is to maintain a high level of safety for unmanned and manned aircraft operations in the U-space airspace.

The Decisions propose acceptable means of compliance (AMC) and guidance material (GM) to the U-space regulatory package (i.e. Commission Implementing Regulations (EU) 2021/664, 2021/665 and 2021/666).

Due to the novelty of the subject, it is important to provide the necessary means for the implementation of the above-mentioned Regulations as regards:

- the concept of the U-space airspace and its management by the Member States in terms of risk assessment and responsibilities;
- the dynamic reconfiguration of the U-space airspace, when applied;
- the operational functioning of the common information service and the certification process for both the providers of this service and the U-space service providers (USSPs);
- the set of performance requirements to be determined for the different U-space services;
- the exchange of all data and available information among the participants of the U-space airspace;
- the definition of relevant standard(s) for the connection to the common information service provider(s) to ensure interoperability and uniform implementation across the EU;
- detailed procedures for the flight authorisation service;
- the acceptable means for manned aircraft to be conspicuous when entering the U-space airspace in uncontrolled airspace;
- the expected coordination with local authorities, the security aspects to be covered in a specific U-space airspace, and the authorities' oversight programme as well as any other task related to the management of the U-space airspace under their responsibility.

The Decisions are expected to help in maintaining safety as regards operations of unmanned and manned aircraft in the U-space airspace and improve harmonisation among the Member States as regards the provision of U-space services.

<b>Domain:</b>	Unmanned aircraft systems (UAS)		
<b>Related rules:</b>	AMC and GM to Commission Implementing Regulations (EU) 2021/664, 2021/665 and 2021/666		
<b>Affected stakeholders:</b>	Member States; UAS operators (individuals and organisations); UAS manufacturers; manned aviation community; model aircraft community; air traffic management (ATM)/air navigation services (ANS) service providers; USSPs; aerodrome (ADR) operators; all airspace users		
<b>Driver:</b>	Safety	<b>Rulemaking group:</b>	Expert group
<b>Impact assessment:</b>	Yes		

### EASA rulemaking procedure milestones

Start	Public consultation	Decision
Terms of Reference	NPA 2021-14	Acceptable Means of Compliance and Guidance Material
22.4.2021 (ToR Issue 3)	16.12.2021	16.12.2022



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## 1. About these Decisions

The European Union Aviation Safety Agency (EASA) developed Decisions 2022/022/R, 2022/023/R and 2022/024/R in line with Regulation (EU) 2018/1139<sup>1</sup> (the 'Basic Regulation') and the Rulemaking Procedure<sup>2</sup>.

This Rulemaking Task (RMT).0230 is included in Volume II of the European Plan for Aviation Safety (EPAS) for 2022-2026<sup>3</sup>. The scope and timescales of the task were defined in the related Terms of Reference (ToR).

EASA developed the *draft* text of these Decisions based on the input of a dedicated group of experts. All the affected and interested parties were consulted through public consultation of Notice of Proposed Amendment (NPA) 2021-14<sup>4</sup>. Comments were received, including from industry, national competent authorities (NCAs), airspace users and all relevant entities affected by this Decision.

EASA reviewed the comments received during the public consultation with the support of the group of experts. The comments received and EASA's responses to them are presented in Comment-Response Document (CRD) 2021-14<sup>5</sup>.

EASA developed the *final* text of these Decisions with the acceptable means of compliance (AMC) / guidance material (GM) considering the feedback received and published them on its Official Publication website<sup>6</sup>.

The major milestones of this RMT are presented on the cover page.

<sup>1</sup> Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91 (OJ L 212, 22.8.2018, p. 1) (<https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1535612134845&uri=CELEX:32018R1139>).

<sup>2</sup> EASA is bound to follow a structured rulemaking process as required by Article 115(1) of Regulation (EU) 2018/1139. Such a process has been adopted by the EASA Management Board (MB) and is referred to as the 'Rulemaking Procedure'. See MB Decision No 01-2022 of 2 May 2022 on the procedure to be applied by EASA for the issuing of opinions, certification specifications and other detailed specifications, acceptable means of compliance and guidance material ('Rulemaking Procedure'), and repealing Management Board Decision No 18-2015 (<https://www.easa.europa.eu/the-agency/management-board/decisions/easa-mb-decision-01-2022-rulemaking-procedure-repealing-mb>).

<sup>3</sup> <https://www.easa.europa.eu/en/document-library/general-publications/european-plan-aviation-safety-2022-2026>

<sup>4</sup> In accordance with Article 115 of Regulation (EU) 2018/1139, and Article 6 of the Rulemaking Procedure.

<sup>5</sup> <https://www.easa.europa.eu/document-library/comment-response-documents>

<sup>6</sup> <https://www.easa.europa.eu/official-publication>



## 2. In summary — why and what

### 2.1. Why we need to develop AMC and GM — issue/rationale

The U-space regulatory package<sup>7</sup>, which creates the conditions necessary for both drones and manned aircraft to operate safely in the U-space airspace provides a high-level framework for the U-space to enable the first operations of UAS. This regulatory framework should now be complemented by the necessary means enabling the implementation of the U-space, i.e., to ensure interoperability and provide means to give the necessary flexibility to allow for regional or local implementation of U-space. The U-space concept is a novelty in aviation, and it is crucial that the first necessary means to support the U-space regulations are available before the latter is applicable.

### 2.2. What we want to achieve — objectives

The overall objectives of the EASA system are defined in Article 1 of the Basic Regulation. This Decision will contribute to achieving the overall objectives by addressing the issue(s) described in Section 2.1.

The specific objectives of this Decision are, therefore, to:

- establish a method and criteria supporting the Airspace Risk Assessment and proper designation of the U-space airspace;
- identify recommended set of performance requirements and means to achieve them by the USSPs and UAS operators;
- enable interoperability for the deployment of the U-space services;
- ensure the necessary proportionality to the risk and the category of operation which is foreseen for this first phase of U-space implementation as well as operational and technical flexibility; and
- facilitate the timely and harmonised implementation of the U-space regulatory package.

### 2.3. How we want to achieve it — overview of the proposed AMC and GM

#### AMC and GM to Regulation (EU) 2021/664 on a regulatory framework for the U-space

##### 2.3.1 Scope and applicability of the AMC and GM

During the NPA consultation, stakeholders were invited to express their opinion on the proposal by the Agency to limit the applicability and scope of the AMC and GM. Indeed, based on the state of maturity of the U-space concept, technological solutions contained in the AMC and GM, as well as the specific characteristics of UAS traffic and traffic complexity excluding the applicability for UAS operations carrying passengers, the Agency considers necessary to limit the application of the AMC and GM to cases of U-space implementation that concern U-space airspaces that are below 150 m (500 ft). Following the number of positive reactions received on this question, the AMC and GM

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<sup>7</sup> Regulations (EU) 2021/664 on a regulatory framework for the U-space, (EU) 2021/665 amending Implementing Regulation (EU) 2017/373 as regards requirements for providers of air traffic management/air navigation services and other air traffic management network functions in the U-space airspace designated in controlled airspace, and (EU) 2021/666 amending Regulation (EU) No 923/2012 as regards requirements for manned aviation operating in U-space airspace.

includes a provision on the limitation of the scope and applicability. This limitation is considered necessary to ensure safety of operations in the U-space airspace across the EU as the present status and maturity of the technical solutions are still evolving rapidly. The GM can be amended as soon as the solutions are demonstrated, and mature, and when more advanced services are available.

### 2.3.2 Subject matter and scope — Article 1

GM1 to Article 1(1) highlights the necessary coordination with the military organisations. While the Regulations for U-space does not directly apply to military organisations, the cooperation within the U-space may benefit both civil and military organisations. By introducing this GM, EASA expressly includes military organisations as relevant stakeholders in the U-space as a third party. The need for military cooperation is acknowledged to decrease the risk to both civil and military aircraft in the U-space airspace and to increase safety by sharing the relevant data between them.

GM2 to Article 1(1) specifies the link between U-space and Urban Air Mobility (UAM) and underlines that currently U-space is not foreseen to host human passenger operations. Therefore, the integration of such passengers would require a re-assessment of the entire U-space safety regulatory and operational approach.

GM1 to Article 1(3) explains the legal basis of the Regulation. Although the latter is based on Article 57 of Regulation (EU) 2018/1139 that only covers unmanned aircraft, it is important to explain the scope. The U-space airspace is not an airspace exclusively reserved for unmanned aircraft; manned aircraft may operate in the U-space airspace. Because of the impact of U-space on manned aviation, this GM underlines the necessary amendments to be introduced to the ATM/ANS rules and SERA requirements. Finally, this GM explains why some exemptions to the applicability of the rules apply.

GM2 to Article 1(3) recommends limiting the height of the U-space airspace, to ensure safety of operations in the U-space airspace across the EU as the present status and the early stages of the implementation.

### 2.3.3 Definitions — Article 2

GM1 to Article 2(6) relates to the term ‘short-term changes’ in the definition of ‘dynamic airspace reconfiguration’. It is considered necessary to underline that this term could be interpreted in a broad way and that therefore a balanced approach should be applied, as far as practicable, when deciding to dynamically reconfigure the U-space airspace.

### 2.3.4 The U-space airspace — Article 3

GM1 to Article 3 recalls the overall responsibilities of the Member States over their airspace and in particular list a number of elements that they need to assess for the designation of the U-space airspace.

AMC1 to Article 3(1) relates to the airspace risk assessment and what it should cover. Hazard identification, risk analysis and definition of mitigation actions are important elements to consider for the evaluation. Since there is no previous experience on UAS flights unlike for manned aviation, there are many unknown factors, and all the new risks need to be identified. The main drivers to perform the airspace risk assessment are safety, privacy, security, and environment. It is important to assess the risk posed in each of those areas and to propose mitigations. In addition, cases when a re-assessment should be done are listed.

GM1 to Article 3(1) provides elements of the risk assessment for the establishment of a U-space airspace to support Member States. Extensive guidance is provided as a core explanation of what is behind an airspace risk assessment and the elements constituting the basis for it. Apart from the safety risks, guidance material is provided to cover other types of risks such as security, environmental and privacy. This GM provides a non-exhaustive list of examples of cases of risk or annoyance/nuisance in these four domains that should be considered when deciding on the establishment of a U-space airspace.

GM2 to Article 3(1) provides general guidance to understand how an airspace risk assessment could be performed. It stresses the importance of the need to make use of information relevant for air and ground risks, based on a combination of qualitative and quantitative analysis. The applied methodology to attain the safety objectives should be acceptably safe, secure, and should comply with privacy and environmental concerns.

GM3 to Article 3(1) explains the three process phases: preparation phase, reference scenario phase and the assessment phase. The objective is to identify safety objectives that meet the safety target that each MS has identified. This phased approach has been kept generic due to different national environments, and further guidance is added on how to identify hazards as this is considered important to identify the ones that are more relevant in the specific airspace.

GM4 to Article 3(1) specifically underlines the safety part of an airspace risk assessment. In particular, this GM lists the important aspects to include in the assessment such as traffic density, mapping information related with population density and obstacles, collision consequences between unmanned aircraft, etc. Also, it is important, from a safety point of view, to describe the identification of hazards, to define the airspace safety specification and requirements. Additional explanation is provided to better understand the notion of ‘safety hazards’.

GM5 to Article 3(1) provides a template for the checklist that Member States may use when conducting an airspace risk assessment. The proposed checklist reflects different types of environments (e.g. air/ground risks, types of operations, stakeholders involved), for which hazards and impact may be considered.

GM6 to Article 3(1) provides a general approach to express the acceptable level of safety (ALS) for the U-space. The acceptable level of safety should be defined by Member States, which should consider the inputs from the needs and capacities of UAS operators and U-space Service Providers (USSPs). In order to set such acceptable levels of safety, it is proposed to set safety criteria as per regulation (EU) 2017/373 considering the singularities and specificities of the different types of risks posed by unmanned traffic in U-space. This GM defines a set of safety criteria to cover all possible detected risks and each criterion should be verifiable and expressed in terms of an explicit level of safety risk or another measure that relates to a specific safety risk. It also lists the different factors that can be adjusted to achieve the acceptable level of safety (type of traffic, performances, procedures, capacity, etc.)

GM7 to Article 3(1) explains how it is, at this stage of the U-space regulatory framework, not possible to define quantitative safety figures.

GM8 to Article 3(1) provides useful guidance regarding the associated security, privacy, and environmental risks that may support the competent authorities.



GM9 to Article 3(1) focuses on the role of the competent authorities in the risk assessment process and the link to the coordination mechanism foreseen in Article 18(f) of the U-space Regulation. In that regard they exchange and coordinated with the relevant actors of the U-space (USSPs, CIS providers, manufacturers, UAS operators, etc.) on required capabilities and performance requirements as well as on necessary interfaces with other providers, such as ATS providers.

GM10 to Article 3(1) explains the elaboration of the airspace risk assessment within the coordination mechanism at local level foreseen in Article 18(f) of the U-space Regulation. It underlines the intent of the public consultation (hearing process) as per said AMC to Article 18(f).

AMC1 to Article 3(4) lists the elements that the competent authority should establish and provide when they design the U-space airspace, such geographical limits, airspace structure and volumes and geographical zones as defined in Article 15 of Regulation (EU) 2019/947. This AMC also lists the elements to consider when defining the operational conditions and airspace constraints, such as contingency measures, weather conditions, procedures to disseminate the dynamic airspace, etc.

AMC2 to Article 3(4) relates to the performance requirements that a Member State should determine in accordance with the airspace risk assessment and related operational conditions and airspace constraints.

GM1 to Article 3(4) explains the link between the outcome of the airspace risk assessment and the acceptable level of safety as mentioned in GM6 to Article 3(1).

GM2 to Article 3(4) clarifies how the airspace design in the context of the U-space airspace structure should be understood.

GM3 to Article 3(4) explains the different geographical zones that may be part of a U-space airspace. A U-space airspace is a geographical zone.

GM4 to Article 3(4) recommends applying a residual air risk class (ARC-b) for the purpose of harmonised U-space airspace implementation.

GM5 to Article 3(4) details the link between the performances requirements and operational constraint and the U-space services.

GM6 to Article 3(4) explains that to ensure completeness of the acceptable level of safety, safety objectives as well as security objectives may be defined.

GM7 to Article 3(4) highlights that to ensure safety, efficiency, and fairness of the operations, the Member State may decide of some limitations with regard to the flight authorisation process.

GM8 to Article 3(4) explains the need and purpose of the 'deviation thresholds'.

GM9 to Article 3(4) explains how to define geographic 'proximity' and the 'surveillance volume', in which traffic information has to be provided.

GM10 to Article 3(4) provides conditions to potentially alleviate the scope of the infrastructure of the mean of receptions to be deployed in accordance with AMC1 to SERA.6005(c).

GM11 to Article 3(4) specifies that a maximum latency value may vary depending on the geography of the U-space airspaces, and the nature of expected operations.



GM12 to Article 3(4) provides guidance on terms expressed when determining UAS capabilities and performance requirements.

### 2.3.5 Dynamic airspace reconfiguration — Article 4

The dynamic airspace reconfiguration is a new operational concept in aviation to ensure the segregation principle in the U-space airspace. This concept referred to in Article 4 of the Regulation is considered as being an ‘umbrella’ provision, while the technical provisions related to this concept are found in the AMC and GM related to ATS.OR.127 and ATS.OR.237 of Regulation (EU) 2017/373 (introduced through Regulation (EU) 2021/665).

While the definition of dynamic airspace reconfiguration does not apply to a specific scenario, all the relevant provisions clearly indicate an involvement of air traffic control. The U-space airspace may be established in airspace of any class; however, if a U-space airspace is designated in controlled airspace, the regulation states that controlled manned aircraft and UAS shall be segregated ‘for safety reasons’, namely by means of dynamic reconfiguration. Therefore, four entities are expected to be involved: ATC units, manned aircraft operators, UAS operators and USSPs.

AMC1 to Article 4 aims at ensuring how segregation can be effectively applied when ATC units need to dynamically reconfigure the U-space airspace. It also clarifies how protection buffers should be applied when assessing the portion of the U-space airspace.

GM1 to Article 4 underlines that the envisaged operational concept for the coexistence of manned and unmanned traffic is based on the segregation of airspace volumes, rather than on the tactical separation of aircraft. In that respect, it would be analogous to the usage of airspace reservations, such as restricted areas. It also focuses on the importance of the design of the airspace to facilitate the dynamic reconfiguration of the U-space airspace and specifically the role of the USSP when granting UAS flight authorisations to its UAS operators. This GM also explains how the operational scenario should be understood and what are the roles and responsibilities of each of the entities involved in the dynamic airspace reconfiguration concept.

GM2 to Article 4 recommends focusing on the important elements to ensure proper segregation between manned and unmanned aircraft and clarifies what it would take to ensure segregation in terms of airspace volume and performance of the UAS.

AMC2 to Article 4 relates to the need to raise a preliminary in advance to the UAS operators in case of dynamic airspace reconfiguration.

GM3 to Article 4 it is recalled that the GM to Regulation (EU) 2021/665 ATS.TR.237, the alert may be raised 10 min before the reconfiguration. AMC3 to Article 4 clarifies that the implementation of the instructions of the ATC unit that established the dynamic airspace reconfiguration should be acknowledged.

### 2.3.6 Common information service (CIS) — Article 5

The CIS provides the means to get and to provide essential information that will be used for the U-space to work. The AMC and GM cover how all the information can be disseminated, in which format, and the latency. They also consider existing standards that can be used to provide the data stemming from the CIS. This should facilitate the exchange of information and the coordination between USSPs

and air traffic services (ATS) providers as well as any participants of the U-space. This information needs to be timely available and meeting certain data quality requirements.

GM1 to Article 5 provides an overview over what the CIS actually is, its function within the U-space concept and how it can be applied in a given U-space airspace. It also explains the difference between the centralised concept of a single CIS provider versus the distributed approach in which all the data is directly exchanged between the relevant operational stakeholders in a distributed architecture.

GM2 to Article 5 lists the relevant stakeholders that may provide to and/or retrieve from the CIS any information and data.

GM3 to Article 5 provides definition related to the Common Information Service.

AMC1 to Article 5(1) defines the relevant standard described in Chapter VIII 'UAS geographical zone data model' of and Appendix 2 to ED-269 'MINIMUM OPERATIONAL PERFORMANCE STANDARD FOR GEOFENCING' that can be used to provide the data in a specific format.

AMC2 to Article 5(1) relates to the identification of the necessary interfaces to support the access to the common information services.

GM1 to Article 5(1)(b) explains that Member States may define a format and data model to support the exchange of information using the JSON format defined in EUROCAE ED-269.

AMC1 to Article 5(1)(f) provides a latency figure of 30 seconds for the timeliness of information for static and dynamic airspace restrictions.

GM1 to Article 5(1)(f) explains that the NOTAM, AUPs/UUPs... are part of the CIS.

AMC1 to Article 5(2) describes a general approach regarding the latency necessary for the dissemination of the traffic information within the CIS, based on the U-space airspace risk assessment.

GM1 to Article 5(4)(a) indicates how quality feedback to the providers of CIS could be supported.

AMC1 to Article 5(5) relates to the need to provide the sufficient level of information to properly exchange information in the CIS.

GM1 to Article 5(6) lists elements that would need to be considered when setting up the arrangements between parties. This may include the objectives and the content of the contractual arrangements.

GM2 to Article 5(6) clarifies to specific arrangements that may be necessary between the Single CIS provider and the relevant ATSP.

AMC2 to Article 5(6) relates to the need to provide the sufficient level of information to properly exchange information between the CIS and USSP.

AMC1 to Article 5(7) is about the monitoring of the availability and quality of the providers of common information by the single CIS providers.

AMC2 to Article 5(7) is about the imminent information to be provided to the USSPs when the single CIS provider is aware of any degradation of its services.

GM1 to Article 5(7) recommends that in the case of a degradation of the common information service, the CIS providers inform the USSPs within 30 seconds.

AMC3 to Article 5(7) aims at preserving data integrity and quality of the information by the single CIS providers when they collect and distribute data.

### 2.3.7 UAS operators — Article 6

GM1 to Article 6 explains the obligations of the UAS operators in terms of capabilities and performance requirements and underlines the importance of entering in contractual arrangements with the USSP. Most of the paragraphs of this Article are covered under the AMC and GM on UAS flight authorisation service in Article 10.

AMC1 to Article 6(1)(a) aims at ensuring that UAS operators meet the UAS capabilities and performance requirements specified for the U-space airspace and assess their adaptations to weather conditions.

GM1 to Article 6(1)(a) clarifies that UAS operations may not be feasible in all U-space airspaces and that an evaluation by the manufacturers would be needed.

GM1 to Article 6(1)(b) explains that it is necessary that UAS operators guaranty the level of performance for the operation during the entire flight. This is important as the UAS operator has to ensure that the UAS has the capability to receive U-space service in a continuous manner and that the level of performance is adequate for the intended operation.

GM2 to Article 6(1)(b) recommends that UAS operators make use of the services of the same USSP. This is considered as essential to notably ensure data consistency along an activated UAS flight.

GM3 to Article 6(1)(b) is a reminder that a digital connection to the USSP is necessary to support operations.

AMC1 to Article 6(1)(b) concern the monitoring of the U-space services availability and lists the type of information that may affect safety so that the UAS operator can take the appropriate actions.

GM4 to Article 6(1)(b) provides general guidance on the link between the acceptable safety levels of U-space services and the capability of UAS operators to maintain their situational awareness, supported by assured information quality.

AMC2 to Article 6(1)(b) aims at ensuring consistency of the UAS configuration with the flight authorisation request.

AMC3 to Article 6(1)(b) relates to non-conformities to be acknowledged by the UAS operator using the means provided by USSPs. This AMC is important, as it provides a mean for UAS operators to anticipate any potential safety issues.

AMC4 to Article 6(1)(b) covers the interface between the USSP and the UAS operators' technical solutions and the assurance that their implementations continue to satisfy the U-space performance requirements to which they contribute. This AMC also provides means on how to ensure the effectiveness of such interface.

GM5 to Article 6(1)(b) explains the situation where an inadequate implementation of the interfaces or improper usage of U-space services may lead to and the impact on safety, while highlighting the responsibilities of the UAS operators in that regard.

AMC1 to Article 6(1)(c) puts the emphasis on the operating instructions and the need for UAS operators to operate accordingly.

GM1 to Article 6(1)(c) clarifies the origin of the operating instructions.

AMC2 to Article 6(1)(c) specifies what the UAS operator should do in case the UAS becomes non-compliant with the operational conditions or constraints.

GM2 to Article 6(1)(c) states that UAS operators may support the alternative proposes in GM1 to Article 8(2)(f), to compensate for the potential lack of automatic transmission of the UAS emergency.

GM1 to Article 6(3) recalls that for the ground risks, the SORA is still applicable in the U-space airspace. For the air risk, they may take credit for their SORA of the residual ARC determined by the airspace risk assessment but should apply accordingly the appropriate mitigations.

GM2 to Article 6(3) explains the situations where UAS operators may need to operate in UAS geographical zones where conditions are limited and that, to support the flight authorisation, they may be authorised to operate in the latter.

AMC1 to Article 6(5) covers the activation of the UAS flight authorisation by the UAS operator. This AMC is important as it gives the moment at which the operation starts and therefore when U-space services start being provided. The UAS operator should end the flight authorisation as soon as possible after landing. Specific cases of multi take-offs and landings are catered for as well.

GM1 to Article 6(5) clarifies that the moment when the activation would be triggered by the UAS operator would usually be almost immediately after receiving the confirmation by the USSP, provided that the MSs or the USSP do not constrain (the minimum and maximum time before take-off at which the activation is requested) for the specific U-space airspace.

AMC1 to Article 6(7) indicates the conditions which would lead the operators to replan its flight and request a new flight authorisation.

AMC1 to Article 6(8) specifies that the contingency plan as part of the flight authorisation.

GM1 to Article 6(8) lists the conditions under which the contingency measures and procedures may be activated. In addition to the situations already described in Regulation (EU) 2019/947<sup>8</sup> that addresses UAS operators when operating in the 'open' or 'specific' category, the list also contains some situations specific to U-space.

AMC2 to Article 6(8) specifies the action to be taken by the UAS operator in case of degradation of U-space services.

GM2 to Article 6(8) indicates the conditions which would allow the operators to continue the operations in case of degradation of services.

### 2.3.8 USSPs — Article 7

GM1 to Article 7 introduces the concept of USSP, a new entity in the aviation community, the need for this new entity to be certified as any other service provider intending to provide service in the EU. It clarifies USSPs' responsibilities when providing a bundle of services and the possibility for the latter to contract with any other entity for the provision of U-space services.

<sup>8</sup> Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft (OJ L 152, 11.6.2019, p. 45) (<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019R0947&qid=1638799731396>).

AMC1 to Article 7(2) specifies that USSPs should not only provide the 4 mandatory U-space services but also the two optional ones when required/contracted.

AMC2 to Article 7(2) concerns the interfaces between USSP and UAS operators. The interfaces provided to the UAS operators should enable them to ensure a number of tasks necessary for the safety of their operations.

AMC3 to Article 7(2) provides the mean to ensure that the information reaches the UAS operators for timely actions.

AMC4 to Article 7(2) is about the information to be disseminated to UAS operators when USSPs are aware of the degradation of their U-space services and the measures to be taken in that regard.

AMC5 to Article 7(2) defines the elements contained in the operating instructions that the USSP should develop and provide to the UAS operator. This AMC is very important for the efficient conduct of operations by the UAS operator.

GM1 to Article 7(2) explains why it is important for UAS operators to be connected to the USSPs for receiving the U-space services and what is needed to exchange data so that USSPs can effectively provide UAS operators with the U-space services during all phases of operations in the U-space airspace.

GM2 to Article 7(2) clarifies that USSPs may have various mean to develop and provide the UAS the required interfaces.

GM3 to Article 7(2) provides a list of critical information that requires immediate awareness of the UAS operators.

GM4 to Article 7(2) concerns the alerting means and explains the importance of the UAS operator being alerted very quickly to situational changes in the U-space airspace and of the lack of sufficient awareness that may compromise safety.

GM5 to Article 7(2) recommends that the degradation of the services is disseminated within 30s.

GM6 to Article 7(2) recommends the dissemination by the USSP of UAS operator's data so that the latter has access to it, in particular to get the history of the flight authorisation or when non-normal conditions happened during the course of the flight.

AMC1 to Article 7(3) proposes a means on what should be done when dynamic reconfiguration of the U-space airspace ends. It is expected that the arrangements between the USSP and the ATS provider detail the actions to be taken and the procedures to follow in that regard. This AMC provides the list of elements that should be covered in such coordination arrangements between both parties.

GM1 to Article 7(3) references the coordination procedures as well as the scope of the data and information to be shared between USSPs and ATS providers.

AMC1 to Article 7(5) concerns the common arrangements between USSPs in the same U-space airspace.

AMC2 to Article 7(5) covers the mean for the USSP to monitor the availability of the CIS providers and ATS providers.

AMC3 to Article 7(5) ensures the preservation of data integrity and quality.



AMC4 to Article 7(5) is about communicating to the CIS providers or other USSP of issues related to availability or quality of the information.

AMC5 to Article 7(5) specifies the kind of information that the USSP should exchange with other USSPs when providing services in the same U-space airspace.

AMC6 to Article 7(5) proposes a means to exchange information between USSPs and points out to the EUROCONTROL Specification for SWIM Technical Infrastructure (TI) Yellow Profile as well as the EUROCONTROL Specification for SWIM Service Description (SD) regarding the documentation of services facilitating the exchange of information. This AMC is expected to ensure harmonisation with the EU MSs by using a common secure interoperable open communication protocol.

GM1 to Article 7(5) clarifies that a common contract can be used for the arrangements between USSPs.

GM2 to Article 7(5) explains that the frequency at which the CIS and ATSP are monitored is commensurate with the level of risk that the lack of information may induce.

GM3 to Article 7(5) explains that, while some ground infrastructure may be originated through investment by USSP, the exchange of information received through e-conspicuity means, are subject to specific agreements between USSPs.

GM4 to Article 7(5) clarifies that the information exchange is expected to be based on open protocols and formats, using public IP-based networks as transport layers and recommends using a standard data encoding such as JSON for instance. In addition, this GM further explains the importance of transmission control protocols (TCPs).

AMC1 to Article 7(6) is important as it specifies what the USSP should do before starting its operation as many factors are to be considered after receiving the USSP certification, such as the airspace risk assessment outcome, performance requirements needed, etc. The USSP should demonstrate that it is capable of providing its services according to the 'complementary' requirements.

AMC2 to Article 7(6) concerns supporting operational records and the support from the USSP to the competent authority in making available operational data and events that may be encountered.

GM1 to Article 7(6) details the coordination steps that may be followed by USSP when starting its activities.

GM2 to Article 7(6) clarifies the main items that may vary between U-space airspaces, which is important for USSP to know for the configuration or adjustment in the provision of their U-space services.

GM3 to Article 7(6) provides a template form that can be used by the USSPs to report to the competent authority the start or the cease of their operations. The template includes the name of the USSP as well as the confirmation of the start and cease of operations.

GM4 to Article 7(6) provides a list of operational data and events that may be of interest for the competent authority in the supporting of operational records.

### 2.3.9 Network identification service — Article 8

GM1 to Article 8 explains the overall objective of the network identification service for U-space and what kind of information may be available through this service that supports the traffic information

service mainly. Importantly, this GM stresses that this service supports the U-space operational needs and complements the direct network identification of Regulation (EU) 2019/945<sup>9</sup> that supports authorities for security and privacy needs.

AMC1 to Article 8(1) concerns the aggregation of network identification data. USSPs should demonstrate that they are able to share data with all other USSPs active in a U-space airspace where they offer services. This means that a full picture of active UAS flights in an area can be provided independently of the USSP that any of the operators use.

AMC2 to Article 8(1) contains means to demonstrate a response time for providing the data. Considering that network identification data is provided to the traffic information service when necessary, setting up an independent value might have resulted in data exchange challenges. A response time of the network identification service to the need of the traffic information service has been therefore included.

AMC3 to Article 8(1) is about the duration of the flight, being understood as starting with the activation of the flight authorisation and ending when the operator ends its flight. Activation of the flight authorisation is defined in the regulation. It is a required step before starting an operation. However, the regulation does not specify a specific meaning for ending a flight. As flights might extend beyond their time limit approved by the UAS flight authorisation request, this value was not deemed appropriate for defining what it means to end a flight.

AMC4 to Article 8(1) provides a mean to disseminate the remote identification of the UAS in an aggregated manner using the interface defined in Annex 4 to ASTM F3411-22A 'Standard Specification for Remote ID and Tracking' to exchange data. This specification defines message formats, transmission methods, and minimum performance standards for broadcast and network identification. Network Remote ID is based on communication by means of the internet from a network Remote ID service provider that interfaces directly or indirectly with the UAS, or with other sources in the case of non-equipped network participants. Annex 4 to this standard covers open API YAML Description that can be used for the network identification service.

GM1 to Article 8(1) clarifies the manner how the definition of 'geographic proximity' may be used. This notion has been subject to various interpretation and questions. This GM should therefore clarify the meaning and understanding.

GM2 to Article 8(1) presents the testing infrastructure that may be used by USSPs for testing the data exchange performance. In this case, they may refer to Annex 2 to ASTM F3411-22A 'Standard Specification for Remote ID and Tracking' (Annex 2 is on 'Network Remote ID Interoperability Requirements, APIs, and Testing').

AMC1 to Article 8(2) proposes that USSPs provide authorised users with access to aggregated network remote identification data with an open and properly documented interface. This AMC aims at making sure that the development of solutions against network identification data are not hindered by poor practices in terms of development of the interface.

<sup>9</sup> Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems (OJ L 152, 11.6.2019, p. 1) (<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019R0945&qid=1638799853481>).

AMC1 to Article 8(2)(c) is about the conversion of WGS-84 to measure the altitude above mean sea level and exchange it with the ASTM F3411-22A standard.

GM1 to Article 8(2)(c) explains how to compute the GNSS AMSL from the WGS-84.

GM1 to Article 8(2)(f) explains the alternative measures that may be taken in the case of UAS emergency status for the UAS operators, in the case some capabilities would not be available at the entry into force of the U-space Regulation.

GM1 to Article 8(3) is addressed to the competent authorities that are required to determine the frequency at which the information will be updated. To support them in this task, this GM provides a reference value that can be found in ASTM F3411-22A 'Standard Specification for Remote ID and Tracking' for any updates target.

GM1 to Article 8(4) lists the specific paragraphs of ASTM F3411-22A 'Standard Specification for Remote ID and Tracking' that may be used by authorised users to access authorised data.

### 2.3.10 Geo-awareness service — Article 9

GM1 to Article 9 explains the objective of the geo-awareness service and what this service is meant to achieve to support UAS operators. Important to note is the difference made between the geo-awareness in the framework of this regulation and the geo-awareness function under Regulation (EU) 2019/945 for specific UAS classes.

AMC1 to Article 9(1) addresses the quality of the geo-awareness information in terms of timeliness and availability.

AMC1 to Article 9(2) defines the timeliness in relation with the data received from the common information services. Considering the variety of data shared as part of the geo-information service, a one-size-fits-all is not deemed appropriate. The requirements are, therefore, based on the data's update cycle and criticality level.

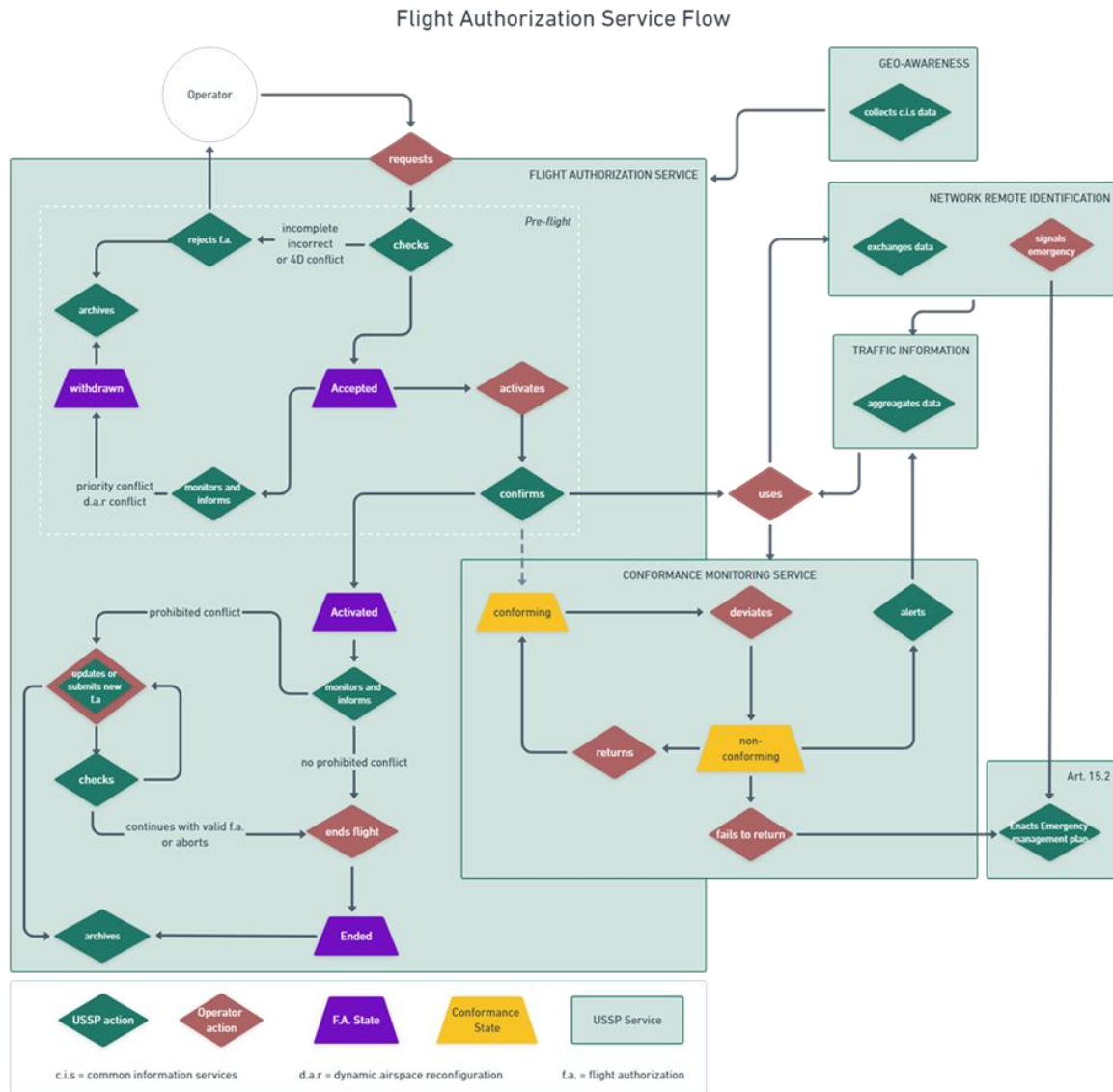
GM1 to Article 9(2) provides a table to illustrate some values that USSPs may use for different types of geo-awareness data, depending on the data type, the CIS update cycle, and the geo-awareness service update according to various scenarios. This table serves as a reference that may be used but is not to be considered as being the unique reference.

GM2 to Article 9(2) refers to the EUROCAE ED-269 'MINIMUM OPERATIONAL PERFORMANCE STANDARD FOR GEOFENCING' standard that may be used by USSPs with regard to time format and version number of the geo-awareness information. In particular, such as for the geographical zones, the reference is Chapter VIII of and Appendix 2 to said standard, which give the characteristics and codes for the format specifications.

### 2.3.11 UAS flight authorisation service — Article 10

GM1 to Article 10 explains that the flight authorisation is a process to obtain a single conflict-free reservation of airspace within a U-space airspace. It does not imply that the flight is safe nor that the flight is permitted. The flight authorisation should be understood in terms of the 'state machine' of the flight. The following diagram indicates the possible states of the flight after a request has been authorised:





AMC1 to Article 10(1) relates to the recording UAS flight authorisations as well as rejected flight authorisation requests by USSPs. It is expected that rejections will be followed by attempts to re-plan the flight. Giving the reason for the rejection is intended to guide the re-planning process.

AMC2 to Article 10(1) addresses the terms and conditions of a UAS flight authorisation service and lists the elements that a USSP should include in those terms and conditions.

GM1 to Article 10(1) recommends a retention period for the flight authorisation records.

GM1 to Article 10(2) defines the process of a flight authorisation request and underlines the importance of the 4D trajectory of the flights to avoid conflicts and no-fly zones.

AMC1 to Article 10(2)(a) & (b) addresses the check of a UAS flight authorisation by the USSP which should verify and accept the UAS flight authorisation only when certain conditions are met.

AMC2 to Article 10(2)(a) & (b) specifies to clearly inform the operators when the flight is planned through a restricted geo-zone, and conditions to accept the flight plan when the acceptance.



AMC1 to Article 10(2)(c) relates to the USSP providing the reason for any flight authorisation request rejection.

GM2 to Article 10(2)(c) underlines that when a USSP does not grant a flight authorisation, it should clearly explain the reasons to the UAS operator.

GM1 to Article 10(2)(d) clarifies that the deviation thresholds are defined by Member States considering various parameters.

AMC1 to Article 10(3) relates to the verification by the USSP of the weather forecast and consider the weather minima and limitations published by the competent authority.

GM1 to Article 10(3) explains the role of the USSP for cross-checking the weather minima and limitations.

GM1 to Article 10(4) explains that USSPs may support the planning of an acceptable alternative in suggesting the start time or change path.

AMC1 to Article 10(5) describes what action should the USSP take during the UAS flight authorisation to confirm the activation of the flight. It lays down a list of criteria to be checked for the activation of the flight.

GM1 to Article 10(5) relates to the request for activation and the relation that this has on the other U-space services. It also states the situation when no activation has been received for a flight. The flight authorisation would not be granted if found in conflict with another flight authorisation request.

GM2 to Article 10(5) explains the possibility for the USSP to constrain the minimum and maximum time window before take-off at which the activation is requested.

GM3 to Article 10(5) provides an explanation of the term ‘without unjustified delay’ referring to the ASTM F3548-21 standard.

AMC1 to Article 10(6) addresses the necessary coordination between all USSPs in order to work together effectively, as strategic conflict resolution is the core element of safe flights in U-space airspace.

GM1 to Article 10(6) underlines the necessity to ensure interoperability between USSPs. The ASTM standard (F3548-21 ‘Standard Specification for UAS Service Supplier (USS) Interoperability’) is expected to be widely used, as it is currently unique and supported by an open-source implantation. As the regulation requires USSPs to ‘establish proper arrangements’, this GM aims to guide stakeholders as to what ‘proper arrangements’ might be.

AMC1 to Article 10(7) clarifies what the USSP should do with regard to airspace restrictions and limitations.

GM1 to Article 10(7) clarifies that the UAS flight authorisation service can only inform the UAS operators that permission to enter a restricted airspace is required but will not refuse a flight authorisation if the flight is expected to enter a restricted airspace. UAS operators are ultimately responsible to get the permission to enter the U-space airspace.

AMC1 to Article 10(8) covers the priority that special operations have against any ‘normal’ UAS flight authorisation request. Indeed, a previously authorised flight can have its flight authorisation withdrawn when a higher-priority flight is found to conflict with it. In contrast to the case of submitting

an authorisation request and immediately having it rejected, the USSP cannot safely discard the flight authorisation. Instead, it is changed to a special state — withdrawn. The UAS operator will then try to update the flight to have it authorised.

GM1 to Article 10(8) lists, for information, the special operations contained in Article 4 of Implementing Regulation (EU) No 923/2012 (SERA). This GM is provided for the sole purpose of giving direct access to the provisions of said Article 4.

AMC1 to Article 10(9) provides means for defining the order of processing when two UAS flight authorisations request have the same priority, based on the first come first served principle.

GM1 to Article 10(9) clarifies the priority sequence when two or more conflicting flights authorisation are received.

AMC1 to Article 10(10) addresses the appropriate actions to be taken by USSPs with regard to flight authorisation to cater for manned aircraft in uncontrolled airspace.

GM1 to Article 10(10) explains the notion of ‘continuous check’ as periodic checking that occurs from when the flight is authorised until the flight is no longer active. The termination of an active flight is the responsibility of the UAS operator.

GM2 to Article 10(10) provides guidance about updated or withdrawn UAS flight authorisations, its notification to other USSPs and acknowledgement of any change in the flight authorisation.

AMC1 to Article 10(11) addresses the unique authorisation number for a flight authorisation. The USSP issues an authorisation number for each flight authorisation for which time periods for the issuing of the number are considered. GM1 to Article 10(11) explains the intent and objective of the unique authorisation number.

GM1 to Article 10(11) provides recommendations on how to achieve a unique authorisation number.

### **2.3.12 Traffic information service — Article 11**

GM1 to Article 11 explains the scope and intent of Article 11 by specifying that this service provides the alerts, air situation and known/predicted (e.g. if tracking service is available) traffic to the UAS operator.

GM2 to Article 11 recalls that it is the UAS operator that is ultimately responsible for its flight and cannot be transferred to the USSP who only supports the effective decision-making of the UAS operator.

AMC1 to Article 11(1) relates to the USSP’s responsibility to identify and provide any known traffic in real time and report it immediately to the UAS operator.

GM1 to Article 11(1) clarifies what is understood by ‘other conspicuous air traffic’ referred to in Article 11(1).

GM2 to Article 11(1) clarifies the notion of ‘proximity’ in relation to the defined performance requirements and the value provided in the relevant ASTM standard.

AMC1 to Article 11(2) lists the various sources by which the USSP should elaborate the traffic information service. These sources are traffic information from the ATS providers, e-conspicuity means, network-ID or any other sources that can support the service.

AMC2 to Article 11(2) relates to the capability of USSPs to be able to receive manned air traffic e-conspicuity information, either through external or own means.

GM2 to Article 11(2) reminds that the infrastructure required to acquire the conspicuous aircraft may be exceptionally alleviated.

GM2 to Article 11(2) lists the various situations on how the flow of traffic information can be provided by operators of unmanned aircraft, ATS providers and USSPs.

AMC3 to Article 11(2) introduces the need for USSP to adhere to a common secure interoperable open traffic information protocol. This is important to ensure harmonisation of the provision of data to any UAS operator that has or would like to enter into a contractual arrangement with a USSP.

AMC1 to Article 11(3) provide a latency for distributing the traffic information. This latency should be smaller than 5 seconds at least 99% of the time.

### 2.3.13 Weather information service — Article 12

Three main areas are considered important to be covered regarding the weather service. The first area is the origination of the weather information and being sure that the data comes from trusted sources. The second area is that the weather information needs to be available up to date for both forecast and actual weather data. Finally, the weather information needs to be reliable.

GM1 to Article 12 explains the objectives of Article 12 and the specificities of weather information for UAS traffic in the U-space airspace as well as the support to other U-space services such as the UAS flight authorisation service. The requirements on weather information for U-space do not indicate who is eligible to provide weather information services but only specifies a minimum content of weather information to be available for the purpose of UAS operations. It does not exclude the possibility that current aeronautical meteorological service providers could provide this service.

AMC1 to Article 12(1)(a) contains two means by which the USSP can confirm that the weather data and information is trustworthy, stemming from trusted sources. The principle is that the data and information should come from authoritative source. But weather data and information may also come from organisations not formally recognised by the MS to originate and/or publish data which meets the data quality requirements. In that case, the USSP should check through appropriate verification and validation methods that they conform to the reliability and the data quality requirements. This AMC ensures that the USSP can demonstrate that the weather data is reliable for the UAS operator.

GM1 to Article 12(1)(a) provides explanations about those organisations considered as being authoritative sources and those that are not. This GM is in line with the term ‘authoritative source’ defined in Regulation (EU) 2017/373 Annex I (Definitions).

AMC1 to Article 12(2)(f) specifies the criteria against which the location and time of the weather information should be measured, both for forecasts and observations. The ICAO designator and the reference to WGS-84 should be the main measurement references.

GM1 to Article 12(2)(f) underlines that the list of weather information included in Article 12 constitutes the essential information, but that this requirement does not prevent the USSP from providing a subset of the said weather information.

AMC1 to Article 12(3) relates to the performance requirements relevant to actual weather information as well as updated weather forecast. The 30 seconds for the actual weather information is considered to give enough time to the USSP to manage this information before sending it to the UAS operators. The 5 minutes for the forecast data is meant as being reasonable given the fact that the USSP would need to process it before sending. This AMC also covers the reliability aspects in terms of confidence level, when feasible.

GM1 to Article 12(3) clarifies that it is the responsibility of the USSP to ensure up-to-date weather data and information but not to ensure that the data received is the last available one. This GM also provides clarification on the reliability of the data and its

### **2.3.14 Conformance monitoring service – Article 13**

GM1 to Article 13 provides a general description of the objective of the conformance service as well as the action to be taken by the USSPs when non-conformities of the UAS flight are detected.

GM2 to Article 13 provides examples of non-conformities by a UAS flight.

AMC1 to Article 13(1) lists the actions of the USSPs when verifying the conformance, in the sequence listed, in particular for the determination of the deviation thresholds and the compliance of the aircraft flight with the relevant requirements on performances and operational conditions and constraints.

AMC2 to Article 13(1) addresses the confirmation by the USSP of the non-conformities when the UAS is outside the authorised 4D volume more than 5% of the time.

GM1 to Article 13(1) indicates that a preliminary alert may be raised to the UAS operators when the UAS approaches the boundaries of the 4D volume.

AMC3 to Article 13(1) lists two situations where a USSP should detect a non-conformity of the flight activation.

GM2 to Article 13(1) clarifies the notion of non-conformity with the regard to the flight authorisation/deactivation.

AMC4 to Article 13(1) provides a latency for the timeliness of this service indicating that a USSP should alert the UAS operators within 5 seconds, 99 % of the time, as soon as when the non-conformance is detected.

GM3 to Article 13(1) clarifies the elements of a non-compliance notification how it should be understood with respect to the flight authorisation.

AMC1 to Article 13(2) addresses the USSP's non-conformance alert to the relevant ATC unit in controlled airspace.

### **2.3.15 Application for a certificate — Article 14**

GM1 to Article 14 explains the purpose of a certificate, who issues it and underlines the introduction of a standard certification template for the USSP and the single CIS provider.

GM1 to Article 14(3) explains that the USSP certificate may contain operational conditions or limitations and provides some examples of such restrictions/limitations.

GM1 to Article 14(6) provides a template for the application form for a certificate. The applicant details as well as the reason for application are included in this template.

### 2.3.16 Conditions for obtaining a certificate — Article 15

In relation with Article 15, many AMC and GM support the requirements related to the conditions to obtain a certificate. The main areas subject to AMC and GM are on occurrence reporting, management system, security management system, contracted activities, personnel requirements, record-keeping, operations manuals, business plan, insurance cover, contingency plan, and emergency plan.

As the requirements in the U-space regulation refer to the provisions of Subpart B<sup>10</sup> (Management) and D<sup>11</sup> (specifically ATM/ANS.OR.D.010) of Annex III to Implementing Regulation (EU) 2017/373, the AMC and GM are based on those AMC and GM used under those subparts for the ATM/ANS domain. As the management system is the core element of the conditions to obtain the certificate, most of the AMC and GM in the ATM/ANS field are taken over.

In addition, an important element is included and relates to the concept of operations (CONOPS) that the applicant should develop to obtain a certificate. The content of the CONOPS is described at guidance level and is to be agreed with the competent authority. Other elements inspired by the ATM/ANS domain are covered for U-space, such as the development of a compliance matrix to provide the competent authority with a global view of the compliance demonstration, documented software assurance process to demonstrate that the software will behave as intended, and the assurance of information security based on a continued risk-based approach.

It is also indicated that the USSP/single CIS provider have to support the certification in performing a Safety Assessment and Safety Support Assessment based on the 'functional systems' defined upon the high-level criteria from the Risk Assessment and enriched by the USSP/single CIS provider. Accordingly, emphasis is put on the compliance activities that need to be undertaken by USSP/single CIS provider, such as development of a compliance matrix, verifications, and software and security assurance.

The AMC and GM related to the conditions for obtaining a USSP/single CIS provider certificate consider the fact that those providers are new aviation entities, often smaller organisations compared to known ANSPs today and that the scope of their activity is quite different from the ANSPs. Therefore, the AMC and GM take into consideration this difference and the Agency applied as much as possible proportionality and flexibility assurance.

### 2.3.17 Validity of the certificate — Article 16

GM1 to Article 16 explains that the certificate of the USSP/single CIS provider has an indefinite duration subject to the provider being in compliance with the applicable requirements. This is proposed to facilitate and promote the implementation of a risk-based oversight scheme by the competent authority and to ensure a continuous oversight based on identified risks instead of an oversight aiming at ensuring compliance and closing findings only at the stage of re-certification process. This approach is in line with the approach taken in other aviation domains such as the OPS or ATM/ANS fields.

<sup>10</sup> Subpart B 'Management' (ATM/ANS.OR)

<sup>11</sup> Subpart D 'Specific organisational requirements for ANS and ATFM providers and the Network manager' (ATM/ANS.OR.D)

AMC1 to Article 16(3) proposes the criteria for the assessment of the financial performance that the USSP/single CIS provider are subject to. The use of an appropriate accounting system and of balance sheets and accounts are the main elements for the MSs to monitor this financial performance.

### 2.3.18 Capabilities of the competent authorities — Article 17

GM1 to Article 17 explains that the competent authorities must ensure that they are able to perform their duties by meeting a number of requirements to properly accomplish their function.

### 2.3.19 Tasks of the competent authorities — Article 18

GM1 to Article 18 explains that the competent authorities have various tasks which are not exclusively related to their 'normal' duties as a certifying authority, but that Article 18 requires them to take operational action/decision in relation to U-space development directly.

AMC1 to Article 18(f) specifies the roles and responsibilities of the competent authority within the coordination mechanism. The AMC outline the importance of ensuring the impartiality of the U-space Coordinator as well as to ensure allocation of clear roles and responsibilities in the implementation of the coordination mechanism so that the interest of all U-space actors and authority layers are well represented and managed in a non-discriminatory manner.

GM1 to Article 18(f) explains the distinction of roles and responsibilities between the various actors involved in the U-space, notably with regard to the U-space coordinator and local authorities.

GM2 to Article 18(f) provides an overview of the coordination mechanism that includes three phases. The planning phase is the starting point where there is this need to create a U-space airspace; the coordination mechanism is then activated to allow for a decision agreed by all the actors involved. During the execution phase, UAS operations are taking place in the U-space airspace and the coordination between all the actors is ensured in a continuous manner — this is the routine coordination. Finally, the review phase will allow all the actors to benefit from lessons learned, improve what can be done better, exchange views and experiences, take feedback from operational actors and reflect the societal embracement necessary for the public acceptance of U-space deployment.

GM3 to Article 18(f) explains the coordination mechanism process combining the actors, the phases, and the activities throughout the life cycle of the U-space deployment and the need to fit the regional and local wellbeing needs of citizens. For this, a detailed figure is provided showing the main task of coordination among stakeholders across the different levels of governance and activity for the three phases.

GM4 to Article 18(f) describes in more detail the three phases. The planning phase is the starting point, and the competent authority is responsible for engaging the coordination mechanism. This involves the designation of a U-space coordinator that manages the 'hearing' process to ensure inclusion and consultation by all stakeholders affected by the U-space deployment. The hearing process ends with the transmission of the recommendation from the U-space coordinator to the competent authority, which should take the statement into account in the following U-space deployment decision-making process and formal U-space airspace designation. The execution phase starts after the formal designation of the U-space at the time of the actual operations. There is no predetermined end, as long as the U-space is in effect. There may be temporary restrictions or limitations on the U-space

airspace by the competent authority at national level or by specific authorities at all levels requesting/demanding time-critical changes due to safety or security concerns (emergencies). This may trigger a dynamic airspace reconfiguration by ATC. The level of the acting authority depends on the kind of the emergency and the organisational structure of the respective MS. The Review phase aims at continuous U-space improvement through a feedback loop on topics dealt with during the Plan phase. If the modification creates new concerns, the Plan phase should start again. The result of the review phase could lead to maintaining or restricting certain U-space operations as well as to reshaping it in terms of either opening new opportunities for its expansion or even its decommissioning.

GM5 to Article 18(f) clarifies the involvement of the U-space coordinator and how it contributes to the overall coordination mechanism framework and multi-level governance.

GM6 to Article 18(f) provides a table explaining the scope of tasks in the frame of multi-level governance for the three phases. It details “who, when and how” during the different phases of the U-space coordination mechanism and how they participate to such mechanism. This table is meant to support stakeholders in understanding their involvement in that regard.

GM1 to Article 18(g) explains that the competent authority can oversight the fair and equitable access to the airspace and may look at the arrangements between USSPs in that regard.

#### **2.3.20 Annex IV ‘UAS flight authorisation request referred to in Article 6(4)’**

GM1 to Annex IV provides a table including the specificities that are expected to be understood within the information disseminated within the UAS flight authorisation service. Specificities are related to the information type and possible examples. This table is provided to explain what information is expected to be covered under the elements of Annex IV.

#### **2.3.21 Annex V ‘Exchange of relevant operational data and information between U-space service providers and air traffic service providers in accordance with Article 7(3)’**

AMC1 to Annex V(2) relates to the obligation to exchange operational data and information between USSPs and ATS. To comply with the requirement, EUROCONTROL ‘Specification for SWIM Technical Infrastructure (TI) Yellow Profile’ should be used, while the documentation should adhere to the EUROCONTROL ‘Specification for SWIM Service Description (SD)’ with some limitations.

AMC1 to Annex V(3) refers to conformance according to the requirements in Annex A to the latest version of EUROCONTROL ‘Specification for SWIM Technical Infrastructure (TI) Yellow Profile’ as a means to ensure the protection of the data.

GM1 to Annex V(3) provides guidance on the transport layers security compliance.

AMC1 to Annex V(4) refers to EUROCONTROL ‘Specification for SWIM Technical Infrastructure (TI) Yellow Profile’ for the technical infrastructure when using a common secure interoperable open communication protocol.

#### **AMC and GM to Regulation (EU) 2021/665 of 22 April 2021 amending Implementing Regulation (EU) 2017/373 as regards requirements for providers of air traffic**



## management/air navigation services and other air traffic management network functions in the U-space airspace designated in controlled airspace

### 2.3.22 Dynamic reconfiguration of the U-space airspace

AMC1 ATS.OR.127(a) contains that ATS providers establish arrangements with manned aircraft operators operating special operations. These arrangements should allow for timely notification of the intended manned operation.

AMC1 ATS.TR.237(a) defines that dynamic airspace reconfiguration causing the forced landing of unmanned aircraft should only be applied by ATC when so dictated by safety reasons connected to manned traffic, in order to avoid unnecessary risks.

AMC2 ATS.TR.237(a) relates to prioritisation of traffic in the U-space airspace. It is noted that, although ATC is understood to have the final decision on applying dynamic airspace reconfiguration, there may be instances where manned traffic does not necessarily have priority over unmanned. While it would be premature, at this stage, to engage in establishing a detailed order of priority, the subject should be addressed in the relevant soft law.

GM1 ATS.TR.237(a) explains that the decision to dynamically reconfigure the U-space airspace should not be applied as a unilateral action by the ATC unit (except for contingency situations, e.g. manned aircraft known or believed to be in a state of emergency, or operations of aircraft engaged in public service such as HEMS operations, police, fire fighting, etc.). In consideration of the need to take into account both actual priorities, and UAS performance and capability to comply, direct coordination among ATC and USSPs should be explored, likely within the framework of letters of agreement.

GM2 ATS.TR.237(a) explains why Member States should consider dynamic reconfiguration of the U-space airspace in a three-dimensional multi-phased manner and provides explanation for the vertical and lateral limitations of the U-space airspace as well as the entire deactivation of the U-space airspace. Airspace design criteria imply the inclusion in airspace structures (e.g. ATZs, CTRs) of volumes of airspace, mostly at very low level, which are not actually of use to manned traffic. While the application of established protection buffers is paramount in manned aviation, additional criteria might be safely used with reference to the operational performance of specific classes of unmanned aircraft, thus allowing for the designation of U-space airspace in controlled airspace with a reasonable assurance that both domains will efficiently coexist in the context of segregation.

AMC1 ATS.TR.237(b) relates to effectively ensuring the coordination between ATS providers and USSPs. The early notification by the ATC unit is crucial for the activation or deactivation of the U-space airspace to allow ATC units to anticipate any decision about it and to agree on possible arrangements with manned operators to receive this information as quickly as possible.

GM1 ATS.TR.237(b) explains that ATC should initiate coordination with involved USSPs as early as possible, in view of anticipated airspace reconfiguration (e.g. in conjunction with weather forecast). Establishing a pre-set, minimum advance notice could be difficult in many instances; however, analogy may be found in this respect in EUROCAE ED-269 'Minimum Operational Performance Standard for UAS Geo-Fencing', which specifies the minimum performance expected from a geo-fencing function to ensure that it will perform its intended sub-functions satisfactorily under all conditions normally encountered in routine aeronautical operation.

## AMC and GM to Regulation (EU) 2021/666 of 22 April 2021 amending Regulation (EU) No 923/2012 as regards requirements for manned aviation operating in U-space airspace

### 2.3.23 e-conspicuity

The requirement in SERA.6005(c) introduces the new obligation for manned aircraft operating in U-space airspace. In case they are not provided with an air traffic control service, they shall make themselves continuously electronically conspicuous to the USSPs. The central part of the AMC and GM is the introduction of a minimum position information message standard for the transmissions by manned aircraft to make themselves conspicuous. Additionally, the AMC refers to the new EASA technical specification that will apply to the transmissions using SRD 860 frequency band. This to ensure a mutual interoperability among the various systems using that spectrum today but transmitting often in different incompatible protocols. Some devices will need to be adapted to comply with the EASA new technical specification to fulfil the objective of the requirement in SERA.6005(c). A GM provides some recommendations on the GNSS position source and some clarification on the declaration of compliance/conformity by the manufacturer, the carriage of non-installed equipment on board the aircraft, mobile telecommunication services for aerial use, military, and state aircraft operations and what a USSP may do to safeguard continuous transmissions.

The AMC recommends alternative means for transmissions of minimum position information by operators of manned aircraft:

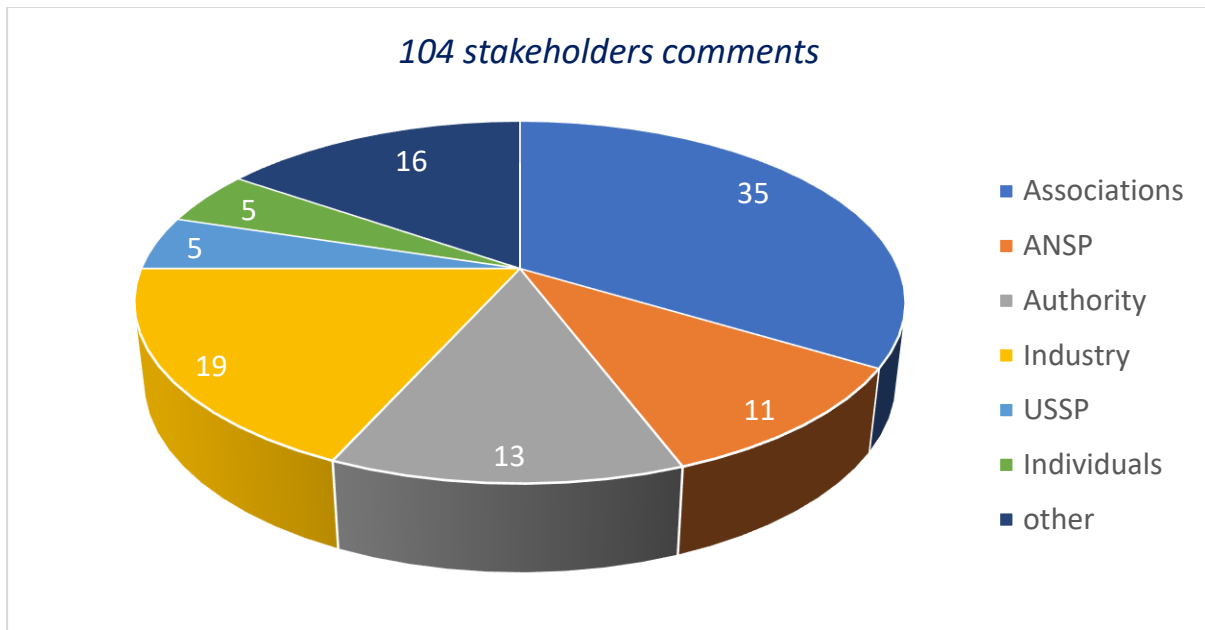
1. Certified ADS-B out systems compliant with ICAO Annex 10: This option covers ADS-B out certified solutions transmitting on 1090 MHz frequency.
2. A certified ADS-B out system compliant with ICAO Annex 10, Volume III, Chapter 12 (Universal Access Transceiver) 12 months after its implementation and deployment in all Member States
3. Systems transmitting on SRD 860 frequency band: This option covers the existing systems transmitting on SRD 860 frequency if voluntarily adapted to comply with the new minimum position information standard as well as with the referenced EASA technical specification defining the required transmission protocol to ensure message readability by USSPs.
4. Systems transmitting via standardised mobile telecommunication network services coordinated for aerial use in Europe: This option covers the use of mobile telephony devices utilising the existing application-based mobile telephony services and transmitting position information via (free) applications adapted to the new minimum position information standard.

The overall principle introduced by the proposal is that any USSP will need to support all specified means of transmissions by operators of manned aircraft.

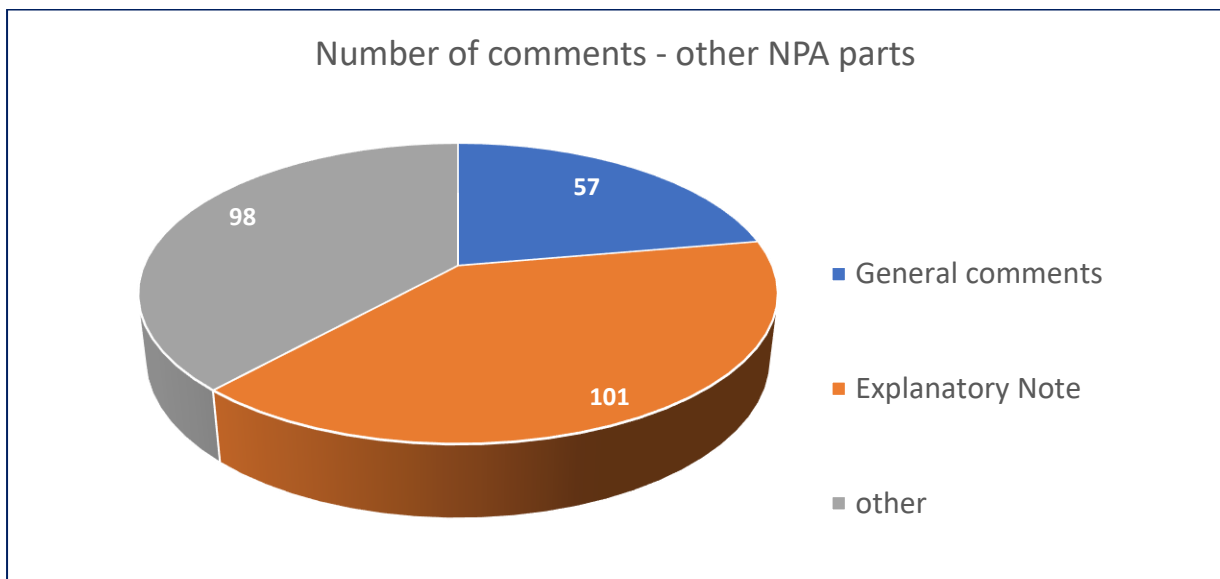
### 2.4. What are the stakeholders' views — outcome of the consultation

A total number of 2610 comments were received on NPA 2021-14 from 104 different stakeholders.

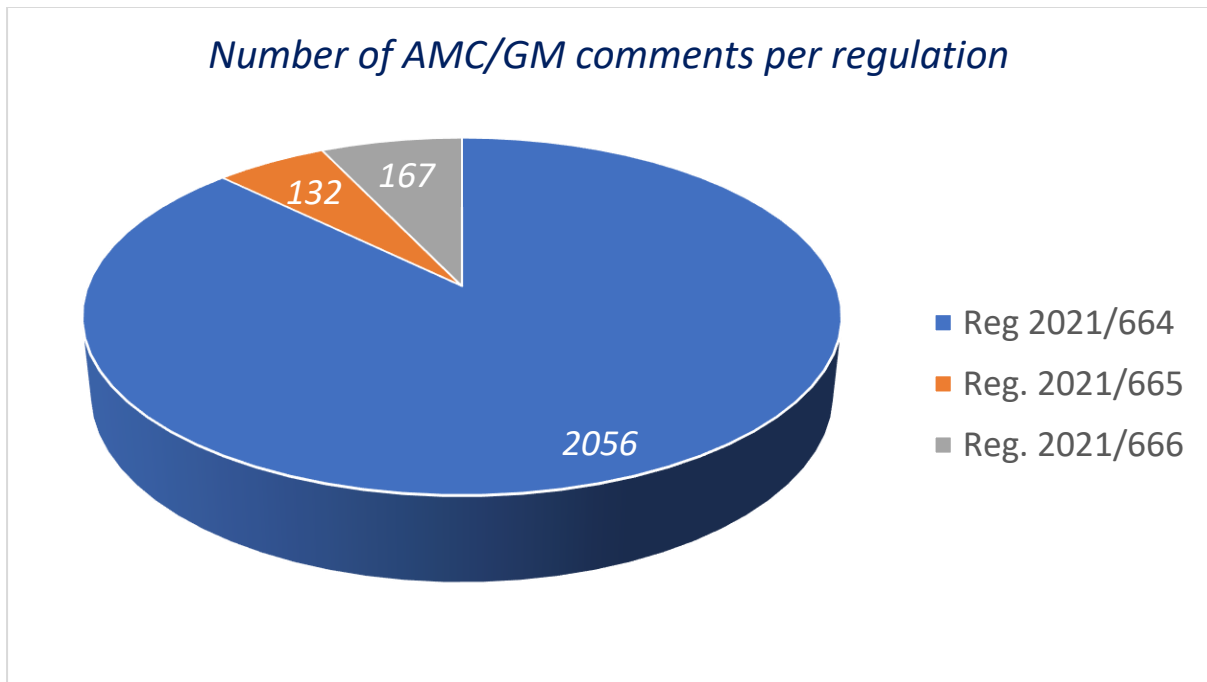




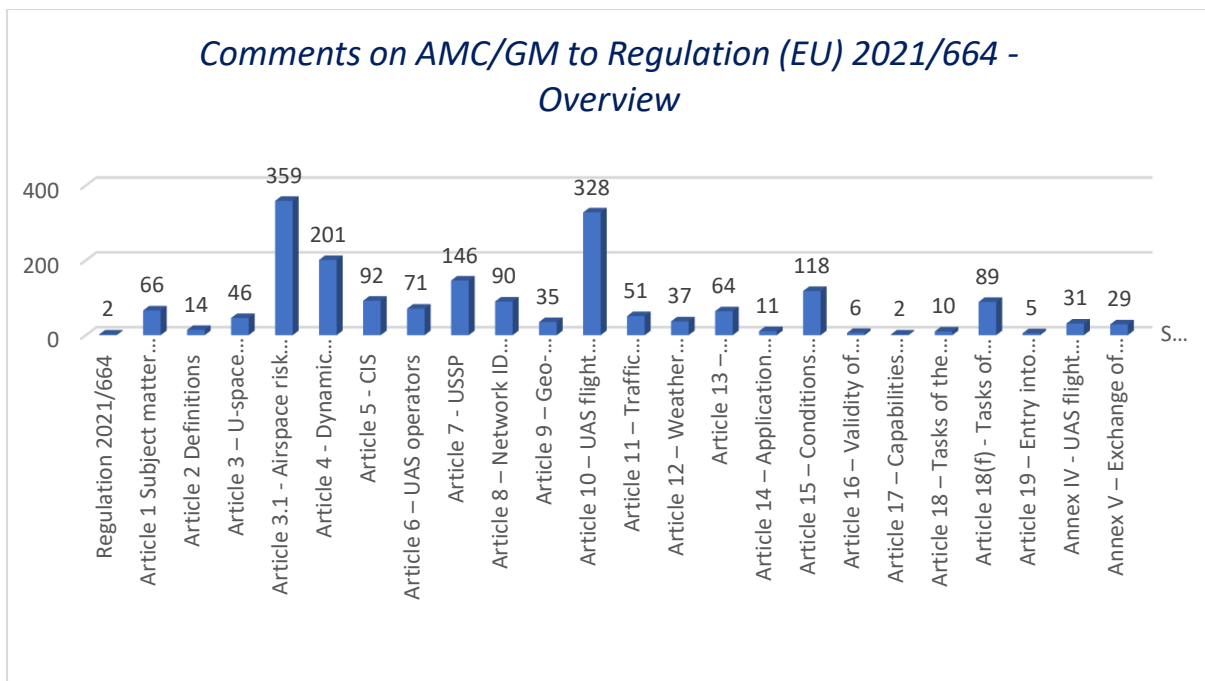
This diagram specifies the distribution among the different stakeholders



The Explanatory Note has been subject to many comments with more than a hundred.



The majority of the comments relate to the AMC/GM to Regulation (EU) 2021/664. This is due to the fact that this Regulation contains the main regulatory package including all the U-space services, the concept of U-space airspace and its management by the Member States in terms of risk assessment and responsibilities, the dynamic reconfiguration of the U-space airspace, the operational functioning of the common information services and the certification scheme for USSPs, among others.



This graphic shows the most commented provisions. The most commented subject relates to the airspace risk assessment, followed by the AMC/GM on the UAS flight authorisation service, and the proposals on the dynamic airspace reconfiguration.

The comments received and EASA's responses to them are presented in Comment-Response Document (CRD) 2021-14. Due to the great number of comments received (~2600) and to maintain the effectiveness of the CRD effective (readability), the following review strategy has been followed:

- All the comments were equally processed.
- Comments resulting in an obvious resolution and text changes (e.g. typos, or text suggestion) are not embedded in the CRD.
- Comments in the form of statements or opinions, without request of resolution are not embedded in the CRD.
- Duplicated comments are not repeated in the CRD.
- Comments related to the same issue may have been aggregated or summarised to ease the provision of a unique consolidated answer.

The major comments, related considerations, and resolution are summarised hereafter.

### General Comments

- Comments hinted the need for standardisation and harmonisation across U-space actors (all Member states, USSPs...), to ensure a fair, consistent and interoperable U-space implementation over EU. EASA brought technical clarifications in numerous areas (e.g. AMC/GM to Article 3(4),6, 7, 15(1) of Regulation (EU) 2021/664 to ensure the consistency of the approach over U-space airspaces. Meanwhile, EASA has launched a task force with the Member States to support harmonisation of practices over Europe.
- Comments pointed that the NPA 2021-14 includes more concept description than providing compliance means and many aspects were still open or not addressed, and the fact that in many cases, the AMC/GM were repeating the content of the articles of the IR, without providing additional useful information. The lack guidance provided in the NPA which was not deemed sufficient to clarify the concept of operation. Significant rework was engaged by EASA to provide a better structured and complete framework, encompassing more operational aspects (e.g. AMC/GM to Article 6, 7, 10, 11 of Regulation (EU) 2021/664).
- Based on the question and answers provided about the height limitation for U-space it has been proposed to recommend a limitation in height of 150 m (500 ft).
- Commenter expressed the concern that U-space airspace should enable the drones operation not to restrict them. EASA considers that U-space design has necessarily to establish boundaries and acceptability criteria to ensure a safe design and safe management of the operations, as other criteria such as interoperability, therefore technical solutions may not be all acceptable. EASA reminds that U-space is meant to safely enable dense and complex drones operation (e.g. BVLOS).
- Major comments challenged the relevance of the standards (e.g. ASTM) called in the AMC/GM (which was deemed not 'open' as required by Regulation (EU) 2021/664 Annex I (1)). EASA has reminded that the standards are originated by recognised standardisation bodies (through the EUSCG) and therefore eligible to be referenced in the EASA's AMC/GM, if appropriate.

### U-space airspace and airspace risk assessment

- Numerous comments were provided on the method proposed for the Air risk Assessment, the criteria and checklist, that triggered rework and clarification of the AMC/GM.
- Major comments hinted the difficulty to properly define relevant safety objectives using the proposed method for the new U-space system. Accordingly, the determination of an adequate “Target Levels of Safety” was deemed hardly achievable, for instance in developing standardize safety criteria (e.g. quantitative figure). EASA reworked the method supporting the risk assessment to transit from “Target level of safety” , to a determination of an “Acceptable Level of Safety” focussed on satisfaction of performances ensuring safety of the operations.
- Clarification was requested on the execution of SORA by UAS operators, regarding their role and the inputs from the airspace risk assessment. EASA clarified the link with the SORA and recommended a residual “ARC-b” as in input for the air risk of the operators.
- The link and the consistency of the U-space airspace risk assessment with the existing Regulation (EU) 2017/373 was questioned. EASA clarified that the method is partially common but assessing different aspects, for U-space the introduction of UAS operations in an airspace is assessed while in (EU) 2017/373 changes to the ATM/ANS functional systems assessed. The U-space is nevertheless independent from the Regulation (EU) 2017/373.
- Comments pointed the lack of AMC/GM to the Article 3(4) of Regulation (EU) 2021/664 preventing the understanding of what is concretely expected in term of performances requirements and operational constraints.

### Dynamic airspace reconfiguration

- Numerous comments were received, as well as answers on the questions EASA raised as part of the NPA about the protection buffer. It has been also proposed that protection buffers can be dynamically estimated based on the operational risk and aircraft performances. Based on the comments received, the recommendation to integrate protection buffer internal to the U-space Airspace, has been maintained, and complementary considerations were integrated in the AMC/GM to the Article 3(4) of Regulation (EU) 2021/664 on the design of the U-space airspace.
- Numerous commenters indicated that the upper limit of the U-space airspace should not be considered part of the U-space airspace. EASA reconsidered the initial recommendation and deleted the sentence.
- Clarifications were requested on the interactions between the ATC/USSP and USSP toward the operators in case of DAR (e.g. timings, actions of operators, acknowledgment, impact on the flight authorisation, structure of the airspace considering the DAR, etc.). The AMC/GM have been clarified and complemented. In addition a new AMC has been deemed useful to recommend sending a preliminary alert to the operators to let them safely anticipate the DAR.
- It was also asked to clarify who is responsible for a dynamic airspace restriction the Single CIS provider or the USSP. EASA reminded that only the ATC can raise a dynamic airspace reconfiguration.

### Common Information Services

- Numerous comments were received on the providers of Common Information (e.g. ATSP), Single CISP and other user of the CIS, such as their roles in U-space models with or without Single CISP. Clarifications were provided throughout the AMC/GM. In addition, new AMC/GM were added to clarify the role and responsibility of the Single CISP and improve the definition of the CIS. It was also reminded in the CRD that there is a single CISP per U-space.
- Comments pointed the relevance of referring to ED-269 and clarifications about its application. EASA reminded in the CRD that the standard is useful in providing a common way to exchange data.
- About the latency, the commenters did not disagree with the goal of having an AMC but recommended a performance-based approach linked to the Air Risk Assessment. The AMC has been revised accordingly.
- Numerous commenters requested the need to explicitly mention in the AMC/GM the role of the Single CSIP, as a centralised and coordinating entity. EASA generally answered that the Single CISP is merely an aggregator or router of information provided by the ‘Providers of Common Information’ which are each still responsible for the origin of their CIS information. The U-space Regulation (EU) 2021/664 does not specify any coordination role to be ensured the Single CISP.
- Similarly, commenters requested that the exchanges inter USSPs to be supported by the CIS. EASA reminded that even if not prohibited, per the regulation the CIS is not intended to support the exchanges between USSPs.

### UAS operators

- The notion of “external services” was deemed confusing. The term was referring to the U-space services and has been removed.
- The monitoring of service performance by UAS operators was not deemed practicable. AMC/GM were added to significantly clarify and complete the responsibility of the UAS operators about the proper usage of the U-space services, based on information provided by the USSP.
- Commenters asked for clarification about the added value of the flight activation in comparison with the flight authorisation. It has been clarified that the flight authorisation and the flight activation are distinct steps, potentially significantly separated in time.
- Commenters questioned the need and related details about contingency procedure of a UAS operators. EASA reminded that contingency procedure is a requirement in the regulation and is necessary to make the USSP aware of their capability to overcome a dangerous situation in the case they are confronted to one of the examples given. Definitions and clarifications were brought in new GMs.
- Commenters deemed that the definition of a ‘flight’ in the U-space context was not clear (e.g. case of a multiple take-off landing), and the flight deactivation was not specified. The related AMC/GM have been clarified.

## U-space service providers

- Commenters asked whether a USSP could provide one, some, or all mandatory 4 services. EASA clarified, that whilst there is no explicit wording in the regulation to require the provision of all four services of a USSP, the intention of the regulation is to require a USSP to provide all four mandatory U-space services. A new AMC captures the need for the USSPs to provide the services in form of bundles of 4 (mandatory services), or 5,6 (when considering the optional services) services.
- Commenters hinted the need to organise the feedback to the providers of CI, that may be provided by the UAS operators. This aspect has been integrated in the AMC/GM to Articles 7 and 5 of Regulation (EU) 2021/664.
- Commenters hinted the need to inform the UAS operators about the degradation of the traffic information services (in Article 11 of Regulation (EU) 2021/664). The need for the USSP to inform the UAS operators about degradation of the provision of services has been generalised in new AMC/GM to Article 7, 6 of Regulation (EU) 2021/664.
- Comments were received on the contractual aspects between ATSP and USSPs requiring more operational and concrete consideration. A series of changes were brought to the initial content and structure of the AMC/GM. For instance, the initial AMC has been changed into GM, while as suggested the AMC ensures linkage with Regulation (EU) 2021/665.
- Comments questioned the overall regulatory framework and the coupling between Articles 7 and 14 of Regulation (EU) 2021/664, and for instance the fact that certificate is valid across Europe while the performance requirements may vary between U-space airspaces. Strong concerns were expressed about the significant differences between performance requirements that USSPs may face when transiting to a new U-space airspace. EASA reminded that even if the airspace characteristics and performance requirements may vary between airspace, the new AMC/GM provided to Art 3(4) are meant to harmonise the set of performance requirements to be defined for a given U-space airspace.
- In addition, concerns were expressed about the decoupling of the certificate obtained in showing the satisfaction of a certain level of performances expressed for a given U-space airspace, the recognition of the certificate across Europe, and the possibility for a USSP to easily provide services among several U-space airspace. Accordingly, questions were raised on the involvement of local authorities before a USSP can start providing service in a U-space airspace. EASA clarified the potential confusion between, the conditions for a USSP to meet certification requirements as laid out in Article 15 of Regulation (EU) 2021/664 and its ability to meet the required U-space service performance requirements as laid out in Article 3(4)(c) of Regulation (EU) 2021/664. EASA clarified that USSP is certified only once against a particular level of U-space service performance as per Article 15(1) of Regulation (EU) 2021/664. USSPs are certified only once as per Article 15(1) of Regulation (EU) 2021/664. New AMC/GM about “onboarding process” detail the analysis, and potential adjustments, that USSPs need to perform), when moving to a new U-space and before to report starting and ceasing/restart of operations to the Competent Authority .



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- The need for Member States to keep sovereignty over their airspace, in having the freedom to select (designate) the USSPs for their U-space airspace has been mentioned by the commenters. EASA clarified that the commenters' view does not comply with the Regulation (EU) 2021/664. USSPs are not selected/designated and are free to provide services in any U-space airspace when they their services satisfy the U-space airspace performance requirements.

#### **U-space services - Network identification service**

- Questions were received on the various parameters to be transmitted and the potential misalignment with the content of the ASTM standard F3411-19. EASA reconciled the content in transiting to the version -22A of the standard, adding new AMC/GM addressing the altitude conversion AGL to AMSL, and clarifying the initial content of the AMC/GM.
- Comments highlighted the confusion created by the notion of “geographic proximity” at which the USSP have to share the network remote ID. The AMC has been clarified in indicating that the information has to be shared with all the USSPs sharing the same airspace.

#### **U-space services - Geo-awareness service**

- Commenters hinted the potential for confusion between the Geo-awareness service defined in Article 9 of Regulation (EU) 2021/664 and the Geo-Awareness function of the UAS class markings. Clarifications were brought to the AMC/GM.
- It was also requested to clarify the role and responsibility of the USSP with regard to the geoawareness information. EASA requests in a new AMC the USSP to preserve the integrity received from the CIS

#### **U-space services – Flight authorisation service**

- Commenters recommended to involve in the flight authorisation, the Single CISP, , ATC in controlled Airspace, or public authority. EASA disagrees, it is not the role of the Single CISP to be involved in the flight authorisation, according to the Regulation (EU) 2021/664 the flight authorisations are to be managed by the USSPs.
- Commenters asked for clarification about the notion of “deviation thresholds”, separation requirement, UAS volume of operation or trajectory and 4D trajectory. It was recommended to link the deviation thresholds with the Air Risk Assessment. EASA clarified that it is considered acceptable that the probability for a drone flight to be outside the planned volume is less than 5%. The determination of the deviation thresholds has been included to the AMC/GM to Article 3(4) of Regulation (EU) 2021/664. In addition, it has been also clarified that the deviation threshold has to be added to the UAS volume or UAS trajectory within the flight authorisation.
- Comments were received on the need to ensure fairness in the attribution of the flight authorisation, for instance to avoid illegitimate and unjustified rejections of the flight authorisation by the USSPs; as the need to ensure transparent coordination between and proper collaboration of different USSPs. EASA agrees that it is an essential principle of U-space. Numerous adjustments were brought in the AMC/GM, such as operational constraints (Article 3(4) of Regulation (EU) 2021/664), clarification of the arrangements between USSP, clarification

of the operational records to be kept by the USSPs. The arrangements between USSP about the flight authorisation are necessary to detect potential conflicts in time and space as to implement an adequate priority management of the flight authorisations.

- Commenters expressed concerns about the potential lack of safety if the flight authorisations are directly managed by the USSP. EASA disagrees, the U-space regulation (EU) 2021/664 requires the USSP to provide the flight authorisation service. Safety is ensured by the continuous synchronisation of the flight authorisations and is supported by technical standards. Clarifications were brought to the AMC/GM.
- It was also recommended to check the flight requests against presence of manned aircraft. Adjustments were brought to the AMC/GM.

### U-space services - Traffic information service

- Numerous commenters requested to clarify the responsibilities about avoidance of mid-air collision. GM were developed to clarify that the operator is responsible, has the obligation to ensure separation, ultimately the operator should not violate flight authorisations.
- Commenters asked clarification about the parameters to be derived by the USSP surveillance system especially about non-cooperative aircraft. It has been reminded that according to the appendix of Regulation (EU) 2021/664, manned aircraft are only allowed in U-space airspace when sharing their positions with USSP. USSPs do not perform non-cooperative surveillance. AMC/GM defined the sources upon which the USSP have to elaborate the traffic information ATSP, Network ID/N-RID, SERA.6005c, and other authoritative sources (e.g. state and military traffic)
- Commenters associated the U-space traffic information service to a conventional “TIS”. EASA clarified that the services even if similar in the intent are different by nature. The U-space traffic information service is meant to provide information only to the UAS operators in U-space, not to manned aircraft, and consequently is not a “TIS”.
- Comments highlighted lack of understanding about the need to acquire manned aircraft in uncontrolled airspace, despite the dynamic airspace reconfiguration. EASA clarified that in uncontrolled airspace the dynamic reconfiguration of the airspace cannot be applied, as per the SERA.6005(c) manned aircraft must be made visible to USSP in using the appropriate e-conspicuity means.

### U-space services - Weather information service

- Commenters proposed that the weather information could be also provided by the Single CISP. EASA indicated that the Single CIS provider is not a U-space service provider and therefore is not expected to provide weather information service.
- Commenters indicated that existing MET providers may also provide suitable weather information. EASA has clarified that MET providers may also provide weather information to U-space. However, the USSP are expected to fill the possible gaps (provide weather data for micro weather, low-level, around buildings....) to ensure accurate weather information for wider operational use.



- Commenters considered that weather information requirements for U-space are light compared to MET requirements in Regulation (EU) 2017/373. EASA answered that the AMC/GM related to weather information (as well as the regulation) cannot be as stringent than those under the ATM/ANS regulatory framework. The proposal is to identify which information need to be provided for drone operations.

#### **U-space services - Conformance monitoring service**

- Commenters hinted that the confirmation of compliance is redundant and not in line with the U-space regulation (EU) 2021/664. The AMC proposing the confirmation of the compliance has been removed and the conditions triggering the alert have been clarified.
- Commenters considered that the failure to provide conformance monitoring service on the USSP side should not result in contingency on the operator's side. EASA disagrees, when the service is required to support safety of the operations, any degradation may represent a threat for safety. Therefore, the UAS operators should react appropriately and potentially in performing the necessary contingency measures.

#### **Certification scheme**

- Comments indicated that applying the ATM/ANS framework defined in Regulation (EU) 2017/373 is not proportionate nor pragmatic. The links to the ATM/ANS requirements of Regulation (EU) 2017/373 were deemed confusing. EASA clarified that the AMC/GM have been adapted to the specificities of USSP and Single CIS providers organisations, amendments have been introduced to ensure that the AMC/GM to the Regulation (EU) 2021/664 do not exceed what is necessary in terms of costs and efficiency for both the industry and the competent authorities. The AMC/GM from Regulation (EU) 2017/273 were selected and adapted to ensure a pragmatic approach. The reference to the ATM/ANS requirements of Regulation (EU) 2017/373, that were initially included to identify the source of the content were removed in the AMC/GM to Regulation (EU) 2021/664.
- Commenters asked to reference the ISO standards related to U-space. EASA answered that at his stage of the implementation, it is not foreseen as the standards are not yet released. When published the use of ISO standards on U-space will require deep evaluation to ensure they are compatible with the U-space Regulation (EU) 2021/664 and useful to support the U-space framework.
- Commenters requested for their business plan that the provision of services to non-commercial operators, including model aircraft operators, clubs and associations is free of charge. EASA disagrees as it is not the purpose of the AMC/GM to include provisions on the financing of the services to any U-space actors (e.g. USSPs or UAS operators).
- Commenters requested clarifications about potential overlapping or incompatible areas of responsibilities between ATM and U-space about obligations related to the emergency management plan. EASA answered that the responsibilities between ATCO and USSP are clear according to the regulation and ATCO shall not be liable for incidents/accidents resulting from UAS operations. The U-space regulatory framework is applicable to unmanned aircraft only and ATCO remain responsible to manage manned traffic.

- General comments requested clarifications and justifications regarding the certification of the single CISP and the identification of the competent authority. EASA that per the U-space Regulation (EU) 2021/664 the single CISP has to be certified as is a new service provider introduced with the U-space regulatory framework. There is only one single CISP per U-space airspace. It is expected that this service will be provided mostly by current ANSPs who are already certified against the ATM/ANS Regulation (EU) 2017/373 but will need to seek for a Single CIS provider certificate in accordance with the U-space Regulation (EU) 2021/664. However, as the latter is mirroring the ATM/ANS Regulation (EU) 2017/373, it is expected that such applicants are already familiar with the certification requirements that they are already applying. The identification of the competent authority is indeed embedded in the Basic Regulation, but has been considered necessary to be mentioned as many U-space stakeholders are not as familiar with the ATM/ANS framework g. It was reminded that due to the novelty of the subject, EASA decided to include, to the most extensive way, any explanation possible to support stakeholders.
- Commenters expressed concerns about the potential lack of competitive framework. The requirements to become a certified USSP were deemed very strict and restrictive, which could prevent a lot of actors from being able to satisfy them; ultimately inducing an unbalance competition. It has been clarified that the USSP will be subject to the same AMC/GM and certification activities, fairness will be thus ensured between competitors. The AMC/GM have been developed to enable drones' operation while maintaining safety continuum with manned aviation. The overall level of safety should not be compromised, it may indeed induce that some companies will not be eligible to provide services until they satisfy a certain level of quality and performances. Nevertheless, the U-space framework and the AMC/GM to Regulation (EU) 2021/664 has been adjusted as safely practicable to enable wide access to the implementation.

### Competent authorities and coordination mechanism with local authorities

- Comments were received on the importance of ensuring the impartiality of the U-space Coordinator in view of safeguarding both involvement of all relevant stakeholders and a harmonised implementation of the U-space Coordination Mechanism across Member States. It was suggested that the U-space coordinator had to be different from competent authority as it needs to be an independent and neutral entity. EASA clarified in the AMC the importance of ensuring the impartiality of the U-space Coordinator as well as to ensure allocation of clear roles and responsibilities in the implementation of the coordination mechanism so that the interest of all U-space actors is well represented and managed in a non-discriminatory manner. Nevertheless, the coordinator could be part of the competent authority.
- Commenters strongly highlighted, due to the impact of U-space (down to the EU citizen and their local authorities), that the role of local and regional authorities in determining when the different phases for planning different U-space areas should take place have to be ensured. For that the U-space coordinator needs to involve all the layers of governance, local and regional authorities before deciding where to start planning and executing a U-space airspace. EASA clarified the role and responsibilities of the U-space Coordinator in a new AMCs, as wherever needed throughout the GM to Article 18(f) of Regulation (EU) 2021/664, the importance of involving all relevant stakeholders in having the opportunity to express their views during the



coordination process managed by the U-space Coordinator. EASA also highlighted the importance of multilevel governance throughout the life cycle phases of the U-space airspace and to ensure that transparency and evidence are in place in view of safeguarding an informed decision-making and arbitration process by the competent authority.

- Commenters mentioned that some Member States may not have the capacity or time to implement the required coordination mechanisms, as to establish the proper coordination rules (who will make the decisions in case of very divergent U-Space designation requests with conflicting interests? What are the conflict resolution mechanisms?). EASA reminded the importance of harmonisation across Member States in terms of both establishing multi-level governance and dealing with all life cycle phases of the U-space airspace. About to conflict resolution, the task of the U-space coordinator is to seek alignment as much as possible through the consultation of various stakeholders. The issues of the required timing, resources and skills are acknowledged but they are out of the scope of this NPA as they fall under Member States activities and initiatives. The acclaimed additional tasks and complexity brought forward by Article 18(f) of Regulation (EU) 2021/664 aim to ensure that not only technological and operational maturity and readiness of U-space airspace are in place but also societal acceptance. It is of the essence of Article 18(f) of Regulation (EU) 2021/664 to plan and involve stakeholders thoroughly before implementation in view of nurturing the required levels of social acceptance.

### e-conspicuity

- For safety reasons commenters envisaged to manage the manned aircraft in within U-space airspace through a USSP. EASA answered that at this stage of the U-Space implementation manned aircraft and UAS shall remain separated/segregated, meaning that U-space airspaces are segregated from manned aviation (in controlled airspace), USSP are not meant to manage deconfliction with manned traffics, ATC remains fully in charge of manned aviation and deconfliction in controlled areas.
- Commenter expressed concerns about enforcement to USSPs to support all specified means of transmissions by operators of manned aircraft, as it represents a significant burden and barrier, and may drastically increase the cost of the infrastructure. EASA reminded, that the proposal needed to reach a fine balance among the following principles:
  - From manned aircraft perspective - Affordability (to end users), Technology is available now (aviation & other), Single device policy, Simple installations, Enable airborne collision risk mitigation for manned aircraft.
  - From USSP perspective - Provides minimum necessary position information (incl. from 3rd parties), Affordable infrastructure (ideally compatible with UAS needs), Minimum performance meeting U-space objectives.
  - From resources perspective - Existing international standards (aviation & other), Pan-European applicability, ITU regulated spectrum, Machine readable, Open standards (non-proprietary or free of royalties).
- Considering that UAT is a well proven technology, commenters asked what prevents the adoption of UAT in the EU. EASA clarified the UAT technology is included in the proposal



because it is deemed technically suitable for the use by manned aircraft in U-space. Its deployment will be possible only after the associated spectrum will be made available for this purpose in all Europe, and especially for cross borders. This principle is necessary to ensure safety of manned aircraft when flying in any U-space. The use of various (selected) technologies in different U-space airspaces could otherwise lead to situations that manned aircraft could become invisible to UAS operators operating in the same airspace where such technology is not supported.

- Commenters asked to complement the approach with other existing and affordable alternatives to ADS-B 1090Mhz (e.g. Low power ADS-B, SSR transponder mode-S (without ADS-B)). EASA answered that the alternatives mostly rely on the licenced protected aviation spectrum 1090 MHz, which is too stringent for wide alternative and may neither be suitable in urban and low-level airspace due to possibility of interferences cause by obstacles and large objects. Additionally, such technology would need to be supported in any U-space for safety reasons, which would require installation of new infrastructure not affordable for USSPs.
- Commenters challenged the maturity of alternatives to ADS-B out 1090Mhz. Only ADS-B out 1090Mhz was considered technically fit to guarantee a sufficient availability and reliability to support e-conspicuity. The alternatives foreseen being based on future evolution of the technology, and due to many unsolved questions about the use of the SRD 860 frequency band and mobile telecommunication technology, could not be available in a near future, and for the entry into force of Regulation (EU) 2021/664 in January 2023. EASA answered that the technology to support transmissions using SRD-860 frequency band and mobile telephony is already available. The existing devices/systems using SRD-860 frequency band will need a software adaptation to comply with ADS-L technical specification. There is sufficient amount of data collected to demonstrate feasibility of the selected means of compliance. All relevant OEMs (also involved in the development of ADS-L specification for SRD-860) confirmed their intention to update the existing devices so that these could be used in compliance with ADS-L specification in a short time. The transmitted information in accordance with EASA technical specification will be accessible to USSPs and any other entity without any proprietary limitations or royalties. The OEM of existing devices/systems indicated their intention and ability to adapt their devices to ADS-L technical specification.
- The introduction of the new protocol ADS-L, has been challenged by the commenters as it is perceived as an additional layer of burden coming on top of the complex existing aviation technological framework, being not cost effective for the industry. EASA clarified that the technical specification for electronic conspicuity function for U-space airspace via SRD-860 in the existing devices will only require firmware update similar to other regular updates these devices are already subject to.
- Numerous comments on the feasibility to support e-conspicuity over GSM, and several technical and legal challenges were identified (coverage, discontinuity of service, required modification of the ground infrastructure, accuracy of the GPS, unwillingness of TELCO or radiofrequency authorities to support aviation application). EASA reminded that the commissioned feasibility study, specifically focused on this specific use case (electronic conspicuity of uncontrolled manned aircraft in U-space airspace) and confirmed the technical feasibility of mobile telephony technology under certain conditions that need to be specified in coordination with the



telecommunication regulators. Therefore, the possibility of utilising this technology for this specific function depends on meeting those conditions (including country specific) within U-space airspace. There is no additional liability for mobile network operators in this context.

- Numerous comments were received on the ADS-L specification. The related GM were clarified accordingly.

## 2.5. What are the benefits and drawbacks of the amendments?

No particular benefits and drawback were identified on the implementation of Regulation (EU) 2021/665 on the existing ATM/ANS framework. Regarding the U-space Regulation (EU) 2021/664, the core benefits resulting from the U-space implementation are:

- To enable faire and efficient usage of the airspace
- To enable complex and long distance UAS operations (BVLOS)
- To enable airspace sharing between manned/unmanned aircraft
- To ensure robust separation between manned/unmanned aircraft
- To ensure that UAS can safely fly in the airspace

The first drawback is the potential lack of access to funding which may prevent stakeholders to adequality support the U-space implementation (e.g. to support the cost of the certification). Even if the funding aspects are out of the scope of the EASA remits, EASA is working with the industry and the first candidates to USSP certification, is developing a proportionate approach which would help, for instance welcoming the existing evidence showing that the digital systems are behaving as intended while ensuring an appropriate level of security. Some other drawbacks are the lack of maturity in certain areas such as the lack of experience in the air risk assessment and the determination of adequate performance requirements, as the uncertainty and risks related to the brand novel approach. The first and concrete exposures to the implementation will help to gain technical experience in the U-space. EASA is committed to work in partnership with the Member States, their competent authorities, and the industry, to consolidate and consider the feedback that will be provided along the first years of the U-space implementation to improve in a near term the AMC/GM of Regulation (EU) 2021/664 and ultimately refine the U-space Regulation (EU) 2021/664.

About, the impact of Regulation (EU) 2021/666, there were no additional drawbacks identified as stemming from the proposed AMC and GM, which will support the application of the requirement in SERA.6005(c). The final AMC and GM for that requirement, which was developed on the basis of regular exchanges with affected stakeholders<sup>12</sup>, forms the initial element of a wider iConspicuity<sup>13</sup> strategy aiming at mitigating the airborne collision risk affecting manned aircraft. The next steps are expected to expand the functionalities beyond what is required by SERA.6005(c) to address the GA iConspicuity issue more generally, including the possibility to use the information transmitted by the GA traffic for enhancing the existing flight information service.

<sup>12</sup> General Aviation, military, and State aircraft operators, USSPs and original equipment manufacturers.

<sup>13</sup> 'In-flight capability' to transmit position and/or to receive, process and display information about other aircraft, airspace, or weather in real time with the objective of enhancing pilots' situational awareness.



The key element of the introduction of the new minimum position information message standard for transmissions by manned aircraft. The new minimum position information standard was derived from the ADS-B out international standard so that there is a mutual interoperability between the two.

From the manned aircraft operators' perspective, the alternative means (according to the user's preference) for required transmissions of minimum position information in U-space airspace. Any of the alternatives is effective and achieves the respective objectives of SERA.6005(c).

1. Certified ADS-B out systems compliant with ICAO Annex 10

This option utilises the previous investments made by airspace users in response to pan-European 1090 MHz ADS-B mandate and other users using this technology on a voluntarily basis. Among the three alternatives this one is considered the most expensive for the aircraft currently not equipped with any of the proposed systems. This option could cover also other internationally standardised solutions (e.g. UAT) if implemented and deployed for that purpose in all the EU.

2. Systems transmitting on SRD 860 frequency band adapted to comply with the new EASA technical specification

This option utilises the previous investments of 50.000+ airspace users of existing systems originally developed for similar purposes but for specific user groups. These solutions will need to be adapted to the new technical specification for minimum position information. The original equipment manufacturers (OEMs) of existing systems will be closely involved in the development of the new specification so that as many as possible from existing systems could be adapted to the new specification. The cost of the adaptation for aircraft operators is expected to be minimal as was confirmed at the workshop with affected OEMs<sup>14</sup>.

3. Systems transmitting via standardised mobile telecommunication network services coordinated for aerial use in Europe

The aerial use of mobile telephony is an affordable alternative for airspace users who prefer to use the existing mobile telephony devices and application-based mobile telephony technology services. The feasibility of this option was confirmed by the feasibility study commissioned by EASA for this purpose<sup>15</sup>. The existing, usually free, applications would need to be adapted, and new applications may be developed to transmit information required by the new minimum position information message standard to make their users conspicuous to USSPs.

The overall principle is that any USSP will support all proposed means of transmissions by manned aircraft as described above. That should ensure, from the perspective of manned aircraft not provided with an air traffic control service by the ANSP, a harmonised implementation of U-space airspace anywhere in the EU with a view to guaranteeing a seamless operation of these aircraft regardless of their geographical location. For the complete system, this is also the most affordable way forward to allow a fully harmonised and pan-European introduction of U-space airspace in a very short time frame. It is expected that USSPs will utilise as much as possible the existing infrastructure (e.g. ANSP surveillance systems, mobile telecommunication networks) and install a new but affordable

<sup>14</sup> EASA workshop 'Use of existing electronic conspicuity devices for U-space' held on 28 October 2021.

<sup>15</sup> EASA Feasibility Study about the possibility of using mobile telecommunication technologies for making manned aircraft electronically conspicuous in U-space, September 2021.



infrastructure only, when necessary, e.g. for reception of signals in SRD 860 frequency band. This approach was presented to USSPs at the dedicated workshop<sup>16</sup> where it was confirmed that it is consistent with their plans for making manned aircraft electronically conspicuous in U-space airspace.

The overarching benefit of this proposal is that it provides for full interoperability among the many existing and any future systems for making aircraft electronically conspicuous in an airspace. It is expected that the overall safety and efficiency benefits are well above the potential investment needed by airspace users. In addition, this proposal would further enable the development of U-space.

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<sup>16</sup> EASA workshop - 'What are USSP's needs for aircraft to be electronically conspicuous in U-space' held on 22 July 2021



### 3. How we monitor and evaluate the new and amended AMC and GM

Monitoring is a continuous and systematic process of data collection and analysis with regard to the implementation/application of a rule/activity. It generates factual information for future possible evaluations and impact assessments and helps to identify actual implementation issues. EASA proposes the following monitoring plan:

What to monitor	How to monitor it	Who should monitor it	How often
Number and main causes of occurrences (accidents/serious incidents) related to U-space implementation /operations	Reports in the repository of information and information collected at MS level	EASA and national competent authorities	On a recurrent basis
Relevance of the U-space rules and regulations	Number of U-space airspaces and certified USSP in a Member State	EASA and national competent authorities	On a recurrent basis

## 4. References

### 4.1. Related EU regulations

- Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91 (OJ L 212, 22.8.2018, p. 1)
- Commission Implementing Regulation (EU) 2021/664 of 22 April 2021 on a regulatory framework for the U-space (OJ L 139, 23.4.2021, p. 161)
- Commission Implementing Regulation (EU) 2021/665 of 22 April 2021 amending Implementing Regulation (EU) 2017/373 as regards requirements for providers of air traffic management/air navigation services and other air traffic management network functions in the U-space airspace designated in controlled airspace (OJ L 139, 23.4.2021, p. 139)
- Commission Implementing Regulation (EU) 2021/666 of 22 April 2021 amending Regulation (EU) No 923/2012 as regards requirements for manned aviation operating in U-space airspace (OJ L 139, 23.4.2021, p. 187)
- Commission Implementing Regulation (EU) 2017/373 of 1 March 2017 laying down common requirements for providers of air traffic management/air navigation services and other air traffic management network functions and their oversight, repealing Regulation (EC) No 482/2008, Implementing Regulations (EU) No 1034/2011, (EU) No 1035/2011 and (EU) 2016/1377 and amending Regulation (EU) No 677/2011 (OJ L 62, 8.3.2017, p. 1)
- Commission Implementing Regulation (EU) No 923/2012 of 26 September 2012 laying down the common rules of the air and operational provisions regarding services and procedures in air navigation and amending Implementing Regulation (EU) No 1035/2011 and Regulations (EC) No 1265/2007, (EC) No 1794/2006, (EC) No 730/2006, (EC) No 1033/2006 and (EU) No 255/2010 (OJ L 281, 13.10.2012, p. 1)
- Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft (OJ L 152, 11.6.2019, p. 45)
- Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems (OJ L 152, 11.6.2019, p. 1)

### 4.2. Related EASA decisions

- Executive Director Decision 2017/001/R of 8 March 2017 issuing Acceptable Means of Compliance and Guidance Material to Commission Implementing Regulation (EU) 2017/373 — ‘Common requirements for providers of air traffic management/air navigation services and other air traffic management network functions and their oversight’



- DECISION 2013/013/R OF THE EXECUTIVE DIRECTOR OF THE EUROPEAN AVIATION SAFETY AGENCY of 17 July 2013 adopting the Acceptable Means of Compliance and Guidance Material to Commission Implementing Regulation (EU) No 923/2012 of 26 September 2012 laying down the common rules of the air and operational provisions regarding services and procedures in air navigation and amending Implementing Regulation (EU) No 1035/2011 and Regulations (EC) No 1265/2007, (EC) No 1794/2006, (EC) No 730/2006, (EC) No 1033/2006 and (EU) No 255/2010 — ‘Acceptable Means of Compliance and Guidance Material to the rules of the air’

#### 4.3. Other reference documents

n/a



## 5. Related document

CRD to NPA 2021-14

