

# **Detailed Specifications and Acceptable Means of Compliance & Guidance Material for certification or declaration of design compliance of ATM/ANS ground equipment (DS-GE.CER/DEC)**

Issue 1

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## PART 1 — General

### DS GE.GEN.001 Scope

These Detailed Specifications (DSs) and the related acceptable means of compliance (AMC) and guidance material (GM) are applicable to the design, or changes to the design, of ATM/ANS equipment for which certification is to be required in accordance with Regulation (EU) 2023/1768 or a declaration is to be made by an approved organisation involved in the design or production of ATM/ANS equipment (DPOs) in accordance with Regulation (EU) 2023/1769.

### DS GE.GEN.002 Information security

(See AMC1 GE.GEN.002 and GM1 GE.GEN.002)

The ATM/ANS equipment provides information security appropriate for the intended use in the intended environment.

### AMC1 GE.GEN.002 Information security

Information security should include one of the following measures as a minimum:

- (a) System isolation
  - System interfaces may be isolated from critical servers, flows and specific security zones by:
    - (1) data isolation (e.g. firewalls) and dependency on network layout (physical layer); and/or
    - (2) physical isolation (server rooms, disaster recovery requirements).
- (b) Authentication
  - (1) Authentication and encryption mechanisms to protect, control and filter exchanges
  - (2) Specific logon settings, particularly in the case of system restart
- (c) System configuration record and security register
  - (1) Systems support the recording of security events.
  - (2) Systems should have the ability to export and to fully restore the system configurations.
- (d) Interfaces
  - (1) Systems and interfaces should be designed to reduce the overall attack surface (audits of access privileges, disabling certain network protocols, non-necessary network ports, network services, etc.).
  - (2) Usage of data integrity checks
  - (3) Security threats on internal and external interfaces should be addressed.

*Note: The term 'interfaces' may refer to physical or network interfaces, and to external or internal equipment interfaces.*

## GM1 GE.GEN.002 Information security

The framework provided by EUROCAE ED-205A — *Process standard for information security certification and declaration of ATM/ANS ground systems* may be used to support the definition of the required level of information security.

## DS GE.GEN.003 Software

(See AMC1 GE.GEN.003, GM1 GE.GEN.003 and GM2 GE.GEN.003)

- (a) The software is to be suitable for the intended use.
- (b) A software portability specification or equivalent is provided.

## AMC1 GE.GEN.003 Software

- (a) Software should be developed with an assurance level that is commensurate with the severity of the effect of failure.
- (b) The software portability specification or equivalent should provide all the features required by the target hardware to ensure that software can run correctly.

*Note 1: The development assurance level for software supporting ATM/ANS functions is derived from the assurance level to be defined for these ATM/ANS functions.*

*Note 2: Software development assurance should be understood to ensure that the likelihood of development errors causing or contributing to ATM/ANS failures is minimised with an appropriate level of rigour. In this respect, assurance applies also to the selection and installation of commercial off-the-shelf (COTS) software.*

## GM1 GE.GEN.003 Software

Software includes different types of software such as COTS software, as well as previously and newly developed specific software.

## GM2 GE.GEN.003 Software

- (a) EUROCAE ED-153 — *Guidelines for ANS Software Safety Assurance* may be used to support the allocation of software assurance level (SWAL) associated with the assessment of failure conditions as defined in DS GE.GEN.007.
- (b) EUROCAE ED-109A including Corrigendum 1 — *Software Integrity Assurance Considerations for CNS/ATM Systems* may be used to support the allocation of SWAL associated with the assessment of failure conditions as defined in DS GE.GEN.007.



## DS GE.GEN.004 Hardware

(See AMC1 GE.GEN.004 and GM1 GE.GEN.004)

The hardware is to be suitable for the intended use.

## AMC1 GE.GEN.004 Hardware

Evidence regarding the ability of the hardware to behave as intended and to support the intended use (commensurate with the associated assessment of failure conditions) should be provided. The hardware architecture design should be considered in the assessment.

## GM1 GE.GEN.004 Hardware

- (a) Hardware includes different types of hardware such as COTS hardware, as well as previously and newly developed specific hardware.
- (b) Hardware may be a single piece or a set of pieces (e.g. network, switches, routers).

## DS GE.GEN.005 Human-machine interface

(See GM1 GE.GEN.005)

As required for the intended use, a means is provided for:

- (a) Annunciations
  - (1) Aural and/or visual indications upon receipt of a message intended for display to or use by the operator(s)
  - (2) Indication to the operator(s) of ATM/ANS equipment failure, including interface failures (degraded mode or loss of function)
- (b) Controls
  - (1) Means for the operator(s) to activate or deactivate ATM/ANS equipment
  - (2) Means for the operator(s) to view information, and to create, store, retrieve, edit, delete, and send messages.

## GM1 GE.GEN.005 Human-machine interface

- (a) To a large extent, a human-machine interface is needed to monitor and control the functions of the ATM/ANS equipment as required by the DSs.
- (b) Human-machine interface requirements are applicable to ATM/ANS equipment which require or allow user interaction and/or automation in the accomplishment of a task.

## DS GE.GEN.006 Environmental conditions

(See AMC1 GE.GEN.006 and GM1 GE.GEN.006)

ATM/ANS equipment is to be designed so that it performs as intended under the operating and environmental conditions expected in service.

### AMC1 GE.GEN.006 Environmental conditions

The ATM/ANS equipment should comply where applicable with:

- (a) ETSI EN 300 019-1-3 (V2.4.1) (2014-04) 'Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-3: Classification of environmental conditions; Stationary use at weather protected locations';
- (b) ETSI EN 300 019-1-4 (V2.2.1) (2014-04) Environmental Engineering (EE); Environmental conditions and environmental tests for telecommunications equipment; Part 1-4: Classification of environmental conditions; Stationary use at non-weather protected locations';
- (c) ETSI EN 301 489-1 (V2.2.3) (2019-11) 'Electromagnetic Compatibility (EMC) standard for radio equipment and services - Part 1: Common technical requirements';
- (d) ETSI EN 301 489-22 (V2.1.1) (2020-10) 'Electromagnetic compatibility (EMC) standard for radio equipment and services - Part 22: Specific conditions for ground-based VHF aeronautical mobile for fixed radio equipment'.

### GM1 GE.GEN.006 Environmental conditions

Depending on the intended environment (e.g. the ATM/ANS equipment may be located in a ground station equipment room, a remote equipment shelter, or outside), the environmental conditions may include criteria such as, but not limited to, temperature, relative humidity, radio frequency susceptibility (radiated and conducted).

## DS GE.GEN.007 Assessment of failure conditions

(See AMC1 GE.GEN.007, GM1.GE.GEN.007, GM2.GE.GEN.007, GM3.GE.GEN.007, GM4.GE.GEN.007 and GM5.GE.GEN.007)

The ATM/ANS equipment is to be designed such that the probability of a failure condition is low when the severity of the effect of the failure is high, with respect to its intended use.

### AMC1 GE.GEN.007 Safety (support) assessment

- (a) A failure mode effects analysis (FMEA) should be performed to evaluate the failure conditions.
- (b) The FMEA should be performed at different levels (e.g. system, subsystem, constituent, etc.), by postulating the ways the chosen level's specific implementation may fail. The effect of each failure condition should be determined at the given level and the next higher level, if applicable, for each operating mode. Specific operating scenarios should be considered when performing

such analysis. It should account for all safety-/service-related effects. In cases where it is not possible to identify the specific nature of a failure mode, the worst credible effect should be assumed.

(c) The following major FMEA steps should be taken:

- preparation;
- analysis;
- documentation.

## GM1 GE.GEN.007 Assessment of failure conditions

A failure condition could be considered as a condition influencing ATM/ANS systems either directly or consequentially, which is caused by or contributed to one or more failures or errors, considering the use and relevant adverse operational or environmental conditions, or external events.

## GM2 GE.GEN.007 Assessment of failure conditions

An FMEA is a systematic, bottom-up method to identify the failure modes of a system, item, function, or piece-part, and to determine the effects on the next higher level of the design. It is used to address failure effects resulting from single failures, including the effect of software errors that can also be analysed qualitatively. The detection methods (if any) for each failure mode may also be determined. This analysis may be quantitative or qualitative and may be performed on all types of systems/constituents (e.g. electrical, electronic, or mechanical systems). If quantitative aspects are considered, it will be possible to determine a failure rate for each failure mode.

## GM3 GE.GEN.007 Assessment of failure conditions

### PREPARATION

The FMEA includes a systematic evaluation of the failure effects of the ATM/ANS equipment. For that purpose, the analysis requires the availability of information related to the ATM/ANS equipment under analysis to ensure the correctness and completeness of the result. The following sources may be necessary before starting the activity:

- (a) ATM/ANS equipment requirements including safety-related requirements and failure effects, and specific operating modes of interest;
- (b) specifications;
- (c) current drawings or schematics;
- (d) parts lists for each system or item;
- (e) functional block diagrams;
- (f) explanatory material including the theory of operation;
- (g) an applicable list of failure rates;

- (h) FMEA for previous versions of the system/item.

## GM4 GE.GEN.007 Assessment of failure conditions

### ANALYSIS

Every identified failure mode should be analysed to determine its effect on a given level and usually on higher levels as well, and assigned to an effect category.

Failures modes or failure conditions are failures or malfunctions of a function. This means either the loss or corruption of some intended function, e.g. a function that is considered to be:

- (a) more than (quantity, information);
- (b) less than (quantity, information);
- (c) additional to;
- (d) faster than;
- (e) slower than;
- (f) part of;
- (g) reverse of;
- (h) other than;
- (i) not;
- (j) earlier than;
- (k) later than;
- (l) before; or
- (m) after.

If the function of the ATM/ANS equipment is altered in any way because of the malfunctions, the altered function needs to be accounted for.

The means by which the failure is detected should be determined and documented. Examples of detection methods include detection by hardware or software monitors, operator detection, power up tests, and/or maintenance checks.

For a quantitative analysis, a failure rate could be assigned to each failure mode. Whenever possible, failure rates should be determined from failure data of similar ATM/ANS equipment already in use.

There are two types of FMEA, functional and piece-part:

- **Functional analyses** are typically performed to support the analysis with piece-part contributions performed as necessary to provide further refinement of the failure rates.
- **Piece-part analyses** are typically performed when the more conservative failure rates from a functional analysis will not allow the ATM/ANS equipment to meet the target probability. This type of analysis may also be useful for ATM/ANS equipment that relies on redundancy, since

the functional one may not reveal single component failures affecting more than one redundant element.

- **Functional FMEA** may be performed at any level. The appropriate level of subdivision is determined by the complexity of the system and the objectives of the analysis. If the required analysis is on a section of circuitry or mechanical devices larger than a particular function, it should be broken down into functional blocks. From an overall perspective, this may mean defining each line replaceable unit (LRU) or sub-system or constituent as a functional block. Once the functional blocks have been determined, a functional block diagram may be created, including the identification of internal and interface functions relative to system operation.

The next step is postulating the failure modes for each functional block. It is to determine the failure modes by thinking about the intent of the functional block and to try to determine how that function might fail regardless of the specific parts used. It is necessary to ensure that no significant failure modes have been overlooked, including single component failures that could affect more than one redundant functional block. Often, given a clear description of the block's function, many of the failure modes will become apparent.

The effect of each failure mode is determined by considering how the function fits into the overall design. Failure effect categories may be created for each effect type and a failure effect category code can be assigned. All failure modes that cause this identical effect are assigned to the effect category. Software and fault monitoring must be considered when determining failure effects and means of detection. As part of this analysis, it is necessary to verify that the monitoring can indeed detect the failure mode.

If a quantitative analysis is performed, a failure rate is assigned to each failure mode. One technique may be to perform a failure rate prediction for each block and apportion the failure rate across the various failure modes based on past experience of similar functions or other sources allowing determination of probability of occurrence.

**Piece-part FMEA** is similar to the functional one except that instead of analysing at the functional or block diagram level, the failure modes of each individual component contained in the ATM/ANS equipment are analysed. A piece-part analysis can be used to determine the failure effects of potential electrical, electronic, or mechanical failures. For example, the effect of failures of an integrated circuit or a mechanical part can be considered as part of a piece-part analysis. Piece-part analysis on electronic equipment is usually performed only as necessary when the more conservative results of a functional analysis will not allow the item to meet the target probability. This is due in part to the difficulty in determining the failure modes for complex components.

The first step in a piece-part analysis is to create the list of all components to be covered. The next step is to determine the failure modes of each component type. This is the most demanding part of the piece-part analysis, particularly when performed on electronic items containing complex integrated circuits. Determining all the failure modes of any but the simplest components (where industry data is available) may be difficult. When in doubt, the worst-case assumptions of part failure modes may be made.

The next step is to determine the effect of the failure on the next higher-level assembly and assign a failure effect category to the failure. The detailed description of each failure effect category can then

be described in the analysis. All failure modes that cause this identical effect are assigned to the effect category. Software and fault monitoring must be considered when determining failure effects and means of detection. As part of this analysis, it is necessary to assess whether the monitoring can indeed detect the failure mode. To properly perform such analysis, detailed knowledge of the system requirements and software design including internal fault management techniques as applicable is necessary.

If a quantitative analysis is performed, a failure rate should be assigned to each failure mode.

## GM5 GE.GEN.007 Assessment of failure conditions

### DOCUMENTATION

These FMEAs are typically documented in worksheets where the following information is presented:

- (a) Identification of component, signal, and/or function;
- (b) Failure modes and associated hardware failure rates (numerical or categorical);
- (c) Failure effects (directly and/or at the next higher level);
- (d) Detectability and means of detection;
- (e) Compensating actions (i.e. automatic or manual);
- (f) Operational mode in which the failure occurs;
- (g) Severity of failure effects.

In addition, other information may also be recorded for future evolutions of the FMEA such as the justification of each failure mode or the rationale for the assigned failure rate.

## DS GE.GEN.008 ATM/ANS equipment documentation

- (a) Instructions for the continued operation of the ATM/ANS equipment as specified in this DS GE and any information related to the interfaces with other ATM/ANS equipment are to be provided.
- (b) The manuals, or similar documentation, provide:
  - (1) the list of capabilities;
  - (2) operation procedures to be applied;
  - (3) limitations; and
  - (4) preventive and corrective maintenance procedures.
- (c) If there are deviations from these specifications which result in limitation(s), they are to be clearly stated in the manuals or similar documentation.

## DS GE.GEN.009 Definitions

*reserved*

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## PART 2 — ATM/ANS equipment subject to certification

### DS GE.CER.GEN.001 Scope

These Detailed Specifications (DSs) and the related acceptable means of compliance (AMC) and guidance material (GM) are applicable to the certification of the design, or changes to the design, of ATM/ANS equipment supporting:

- (a) air traffic control (ATC) services when enabling the separation of aircraft or the prevention of collision.
- (b) controller – pilot communications.

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**Subpart A — Air traffic services****Section 1 — General****DS GE.CER.ATS.101 Scope**

This Section defines the functional and performance standards applicable to the certification of the design, or of changes to the design, of ATM/ANS equipment, supporting air traffic control (ATC) services when enabling the separation of aircraft or the prevention of collision in relation to:

- (a) flight data processing;
- (b) advanced surface movement guidance and control system (A-SMGCS);
- (c) data link applications;
- (d) surveillance data processing.

**DS GE.CER.ATS.110 ATS recording**

(See GM1 GE.CER.ATS.110)

ATM/ANS equipment specified in this Subpart is to provide recording and replay capability of technical and operational data, and status.

**GM1 GE.CER.ATS.110 ATS recording**

Additional information for recording can be found in EUROCAE ED-111 — *Functional Specifications for CNS/ATM Ground Recording*.



## Section 2 — Flight data processing

### APPLICABILITY

#### DS GE.CER.FDP.201 Scope

This Section provides the functional and performance standards applicable to flight data processing (FDP) equipment.

### FUNCTION

#### DS GE.CER.FDP.210 Flight data processing equipment

(See AMC1 GEC.CER.FDP.210)

FDP equipment supports notification, coordination, and transfer of flights between air traffic control units.

#### AMC1 GE.CER.FDP.210 Flight data processing equipment

For the notification, coordination, and transfer of flights between air traffic control units, FDP equipment should comply with following specifications:

- (a) EUROCONTROL SPEC-106 Specification for On-Line Data Interchange (OLDI), Edition 5.1, Chapter 4, Chapter 6, and Chapter 10;
- (b) EUROCONTROL SPEC-107 Specification for ATS Data Exchange Presentation (ADEXP), Edition 3.4, Sections 1.4. points 3 and 4.

### PERFORMANCE

#### DS GE.CER.FDP.220 FDP equipment performance

(See AMC1 GE.CER.FDP.220)

The performance of the FDP equipment supports the intended use.

#### AMC1 GE.CER.FDP.220 FDP equipment performance

- (a) FDP equipment should comply with EUROCONTROL-SPEC-106 Specification for On-Line Data Interchange (OLDI), Edition.5.1, Sections 4.6 and 5.2.
- (b) Additional performance conditions applicable to the intended use of FDP equipment may be defined as required. Such potential additional performance conditions may be derived from activities related to DS GE.GEN.002, DS GE.GEN.003, DS GE.GEN.004 and DS GE.GEN.007, for which the possible effects of the severity of the effect of failure on safety should be assessed.

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## INTERFACE

### DS GE.CER.FDP.230 FDP equipment interfaces

(See AMC1 GE.CER.FDP.230 and GM1 GE.CER.FDP.230)

FDP equipment interfaces support the functions and levels of performance as required in DS GE.CER.FDP.210 and DS GE.CER.FDP.220.

### AMC1 GE.CER.FDP.230 FDP equipment interfaces

For the notification, coordination, and transfer of flights between air traffic control units, FDP equipment should comply with Part 3, Subpart A, Section 4 ‘Flight message transfer protocol (FMTP)’ of this DS.

### GM1 GE.CER.FDP.230 FDP equipment interfaces

Interfaces should include communications supporting external information exchanges and the human-machine interface (HMI) as defined in DS GE.GEN.005.

## Section 3 — Advanced surface movement guidance and control system (A-SMGCS)

### APPLICABILITY

#### DS GE.CER.ASMGCS.301 Scope

(See GM1 GE.CER.ASMGCS.301)

This Section provides the functional and performance standards applicable to advanced surface movement guidance and control systems (A-SMGCS).

#### GM1 GE.CER.ASMGCS.301 Scope

A-SMGCS support the control of aircraft and vehicles in the aerodrome environment to maintain the declared surface movement rate under all weather conditions within the aerodrome visibility operational level (AVOL).

### FUNCTION

#### DS GE.CER.ASMGCS.310 A-SMGCS

(See AMC1 GE.CER.ASMGCS.310 and GM1 GE.CER.ASMGCS.310)

A-SMGCS provide:

- (a) surveillance service capable of:
  - (1) using cooperative or non-cooperative sensors;
  - (2) automatically and manually correlating targets (with call signs);
  - (3) including surveillance information for aircraft on approach;
- (b) airport safety support service;
- (c) routing service.

#### AMC1 GE.CER.ASMGCS.310 A-SMGCS

A-SMGCS should comply with EUROCAE ED-87E — *Minimum Aviation System Performance Standard (MASPS) for Advanced Surface Movement Guidance and Control Systems (A-SMGCS)*, Sections 2.1.2, 2.1.3 and 2.1.4.

#### GM1 GE.CER.ASMGCS.310 A-SMGCS

Additional information can be found in the following:

- (a) EUROCONTROL-SPEC-171, Edition 2.0, EUROCONTROL Specification for Advanced-Surface Movement Guidance and Control System (A-SMGCS) Services;
- (b) EUROCAE ED-128 — *Guidelines for Surveillance Data Fusion in Advanced Surface Movement Guidance and Control Systems (A-SMGCS) Levels 1 and 2.*

## PERFORMANCE

### DS GE.CER.ASMGCS.320 A-SMGCS performance

(See AMC1 GE.CER.ASMGCS.320)

The performance of A-SMGCS supports the intended use.

### AMC1 GE.CER.ASMGCS.320 A-SMGCS performance

- (a) A-SMGCS should comply with:
- (1) EUROCAE ED-87E — *Minimum Aviation System Performance Standard (MASPS) for Advanced Surface Movement Guidance and Control Systems (A-SMGCS)*, Section 3;
  - (2) ETSI EN 303 213-5-1 (V1.1.1) (2020-03) *Advanced Surface Movement Guidance and Control System (A-SMGCS)*; Part 5: Harmonised Standard for access to radio spectrum for Multilateration (MLAT) equipment; Sub-part 1: Receivers and Interrogators;
  - (3) ETSI EN 303 213-5-2 (V1.1.1) (2022-04) *Advanced Surface Movement Guidance and Control System (A-SMGCS)*; Part 5: Harmonised Standard for access to radio spectrum for Multilateration (MLAT) equipment; Sub-part 2: Reference and Vehicle Transmitters;
  - (4) ETSI EN 303 213-6-1 (V3.1.1) (2019-07) *Advanced Surface Movement Guidance and Control System (A-SMGCS)*; Part 6: Harmonised Standard for access to radio spectrum for deployed surface movement radar sensors; Sub-part 1: X-band sensors using pulsed signals and transmitting power up to 100 kW.
- (b) Additional performance conditions applicable to the intended use of A-SMGCS may be defined as required. Such potential additional performance conditions may be derived from activities related to DS GE.GEN.002, DS GE.GEN.003, DS GE.GEN.004 and DS GE.GEN.007, for which the possible effects of the severity of the effect of failure on safety should be assessed.

## INTERFACE

### DS GE.CER.ASMGCS.330 A-SMGCS interfaces

(See GM1 GE.CER.ASMGCS.330 and AMC1 GE.CER.ASMGCS.330(a))

- (a) The interfaces of A-SMGCS support the functions and levels of performance as required in DS GE.CER.ASMGCS.510 and DS GE.CER.ASMGCS.520.
- (b) A clear and unambiguous means is provided:
- (1) to inform the controller of:
    - (i) the aerodrome environment; and
    - (ii) traffic information (position and identity);
  - (2) for input clearances.

## GM1 GE.CER.ASMGCS.330 A-SMGCS interfaces

Interfaces include the communications supporting external information exchanges and the human-machine interface (HMI) as defined in DS GE.GEN.005.

Additional information can be found in EUROCONTROL-SPEC-171, Edition 2.0, EUROCONTROL Specification for Advanced-Surface Movement Guidance and Control System (A-SMGCS) Services.

## AMC1 GE.CER.ASMGCS.330(a) A-SMGCS interfaces

A-SMGCS should comply with EUROCAE ED-87E — *MASPS for A-SMGCS including Airport Safety Support Service and Routing Service*, Sections 2.1.2.3, 2.1.2.4, 2.1.3.3, 2.1.4.1, 2.1.4.3 and 2.4.

## Section 4 — Data link services

### APPLICABILITY

#### DS GE.CER.DLS.401 Scope

This Section provides the functional and performance standards applicable to data link equipment supporting ATS B2 and ATN B1 services.

### FUNCTION

#### DS GE.CER.DLS.410 DL equipment

(See AMC1 GE.CER.DLS.410 and GM1 GE.CER.DLS.410)

DL equipment provides capabilities to:

- (a) establish CPDLC and ADS-C transactions;
- (b) exchange operational CPDLC and ADS-C messages;
- (c) transfer CPDLC authority;
- (d) terminate CPDLC and ADS-C transactions;
- (e) update ADS-C data;
- (f) forward logon parameters.

#### AMC1 GE.CER.DLS.410 DL equipment

DL equipment should comply with:

- (a) EUROCAE ED-228A — *Safety and Performance Requirements Standard for Baseline 2 ATS Data Communications (Baseline 2 SPR Standard)*, Sections 3.1, 3.2, 3.3, 3.4, 3.7, 3.9, 4, 5.1, 5.2, 6.1 and 6.2 for the services ATC communications management (ACM), Clearance Request and Delivery (CRD), Information Exchange and Reporting (IER), and ATC microphone check (AMC) in line with CPDLC version 2 (v2) and for the downlink of EPP through ADS-C in line with ADS-C version 1 (v1);
- (b) EUROCAE ED-229A — *Interoperability Requirements Standard for Baseline 2 ATS Data Communications (Baseline 2 Interop Standard)*, Sections 2, 3, 4, 5.1 and 5.3 for the services ATC communications management (ACM), Clearance Request and Delivery (CRD), Information Exchange and Reporting (IER), and ATC microphone check (AMC) in line with CPDLC version 2 (v2) and for the downlink of EPP through ADS-C in line with ADS-C version 1 (v1);
- (c) EUROCAE ED-231A — *Interoperability Requirements Standard for Baseline 2 ATS Data Communications and ATN Baseline 1 Accommodation (ATN Baseline 1 - Baseline 2 Interop Standard)*, Sections 4 and 5.1 for the services ATC communications management (ACM), ATC clearances (ACL), Clearance Request and Delivery (CRD), Information Exchange and Reporting

(IER), and ATC microphone check (AMC) in line with CPDLC version 1 for ATN B1 and CPDLC version 2 for ATS B2;

- (d) EUROCONTROL-SPEC-106, Edition 5.1, EUROCONTROL Specification for On-Line Data Interchange (OLDI), Chapter 10 for LOF (Log-On Forwarding) and NAN (Next Authority Notified) messages.

## GM1 GE.CER.DLS.410 DL equipment

The ATS B2 referred to in this Section supports the services ATC communications management (ACM), Clearance Request and Delivery (CRD), Information Exchange and Reporting (IER) and ATC microphone check (AMC) through the CPDLC application and the downlink of extended projected profile (EPP) through the ADS-C application. The implementation for CRD and IER is to cover the scope of the ATC clearances (ACL) service of ATN B1.

DL equipment supports ATN B1 ACM, ACL, and AMC data link services through the ATS B2 / ATN B1 backward compatibility.

The context management (CM) application and supporting datalink initiation and capability (DLIC) service are prerequisites for the initiation of CPDLC and ADS-C applications and consequently are part of this Section.

### PERFORMANCE

## DS GE.CER.DLS.420 DL equipment performance

(See AMC1 GE.CER.DLS.420)

The performance of DL equipment supports the intended use.

## AMC1 GE.CER.DLS.420 DL equipment performance

- (a) DL equipment should comply with EUROCAE ED-228A — *Safety and Performance Requirements Standard for Baseline 2 ATS Data Communications (Baseline 2 SPR Standard)*, Sections 5.3 CPDLC Safety and Performance Requirements, and 6.3 ADS-C Safety and Performance Requirements.
- (b) Additional performance conditions applicable to the intended use of DL equipment may be defined as required. Such potential additional performance conditions may be derived from activities related to DS GE.GEN.002, DS GE.GEN.003, DS GE.GEN.004 and DS GE.GEN.007, for which the possible effects of the severity of the effect of failure on safety should be assessed.

## INTERFACE

### DS GE.CER.DLS.430 DL equipment interfaces

(See AMC1 GE.CER.DLS.430(a))

- (a) DL equipment interfaces support the functions and levels of performance as required in DS GE.CER.DLS.610 and DS GE.CER.DLS.620.
- (b) A clear and unambiguous means is provided to the air traffic controller to:
  - (1) initiate and to terminate CPDLC and ADS-C;
  - (2) know in real time the identifiers of the connected aircraft;
  - (3) prepare and transmit uplink messages (UM);
  - (4) inform when downlink messages (DM) are received;
  - (5) inform that pending or open messages are waiting for a response;
  - (6) display all CPDLC messages (UM and DM) and ADS-C flight information, with minimal human action, in a format that is easy to comprehend and distinguishable from each other;
  - (7) determine the status of the data link equipment (CPDLC and ADS-C).
- (c) A means is provided to the air traffic controller to prohibit the deletion, confirmation, or clearance of a message until the entire message is displayed.

### AMC1 GE.CER.DLS.430(a) DL equipment interfaces

DL equipment should comply with:

- (a) Part 2, Subpart B, Section 1 'Data communications' of this DS; and
- (b) Part 3, Subpart A, Section 4 'Flight message transfer protocol (FMTP)' of this DS.



## Section 5 — Surveillance data processing

### APPLICABILITY

#### DS GE.CER.SDP.501 Scope

(See GM1 GE.CER.SDPE.501)

This Section provides the functional and performance standards applicable to surveillance data processing equipment supporting air traffic control (ATC) services when enabling the separation of aircraft or the prevention of collision.

#### GM1 GE.CER.SDP.501 Scope

Surveillance data processing encompasses the surveillance processing from after the detection of aircraft by sensors up to the provision of surveillance data to the controller working position (CWP). It is independent of detection technologies (e.g. Mode S, WAM, ADS-B, etc.).

### FUNCTION

#### DS GE.CER.SDP.510 Data items

The surveillance data processing equipment has the capability to determine, for each aircraft within its operational coverage, the following data items:

- (a) Positional data
  - (1) Horizontal (2D) position;
  - (2) Time of applicability of horizontal position;
  - (3) Vertical position based upon pressure altitude received from the aircraft;
  - (4) Time of applicability of vertical position;
  - (5) Integrity and accuracy metrics for the horizontal position
- (b) Operational identification data
  - (1) Aircraft identity (ICAO aircraft identification or Mode 3/A code) reported by the aircraft;
  - (2) Supplementary indicators:
    - (i) emergency indicator (general emergency, radio failure and unlawful interference);
    - (ii) special position identification (or indicator) SPI.
- (c) Surveillance data status
  - (1) Cooperative/non-cooperative/combined;
  - (2) Coasted/not coasted (position).

## PERFORMANCE

### DS GE.CER.SDP.520 SDP equipment performance

(See AMC1 GE.CER.SDPE.520)

The performance of the surveillance data processing equipment supports the intended use.

### AMC1 GE.CER.SDP.520 SDP equipment performance

- (a) The assessment of the performance should be carried out as described in EUROCONTROL-SPEC-0147, Edition 1.2, EUROCONTROL Specification for ATM Surveillance System Performance, Section 3.
- (b) Additional performance conditions applicable to the intended use of surveillance data processing equipment may be defined as required. Such potential additional performance conditions may be derived from activities related to DS GE.GEN.002, DS GE.GEN.003, DS GE.GEN.004 and DS GE.GEN.007, for which the possible effects of the severity of the effect of failure on safety should be assessed.

## INTERFACE

### DS GE.CER.SDP.530 Surveillance data processing equipment interface

(See AMC1 GE.CER.SDP.530)

Surveillance data processing equipment interface supports the functions and levels of performance as required in DS GE.CER.SPDE.710 and DS GE.CER.SPDE.720.

### AMC1 GE.CER.SDP.530 Surveillance data processing equipment interface

The surveillance data processing equipment should comply with the following Asterix messages:

- (a) Cat 062 in accordance with EUROCONTROL-SPEC-0149-9, Edition 1.20, CAT062 - EUROCONTROL Specification for Surveillance Data Exchange ASTERIX - Part 9 Category 062 SDPS Track Reports; or
- (b) Cat 048 in accordance with EUROCONTROL-SPEC-0149-4, Edition 1.31, EUROCONTROL Specification for Surveillance Data Exchange ASTERIX - Part 4 Category 048 Monoradar Target Reports; or
- (c) Cat 021 in accordance with EUROCONTROL-SPEC-0149-12, Edition 2.6, EUROCONTROL Specification for Surveillance Data Exchange ASTERIX - Part 12 Category 021 ADS-B Target Reports; or

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- (d) Cat 020 in accordance with EUROCONTROL-SPEC-0149-14, Edition 1.10, EUROCONTROL Specification for Surveillance Data Exchange ASTERIX - Part 14 Category 020 Multilateration Target Reports; or
  - (e) Cat 065 'SDPS Service Status Messages' in accordance with EUROCONTROL-SPEC-0149-Part 15, Edition 1.6; or
  - (f) Cat 034 'Monoradar Service Messages' in accordance with EUROCONTROL-SPEC-0149-Part 2b, Edition 1.29; or
  - (g) Cat 023 'CNS/ATM Ground Station Service Messages' in accordance with EUROCONTROL-SPEC-0149-Part 16, Edition 1.3; or
  - (h) Cat 019 'MLT System Status Messages' in accordance with EUROCONTROL-SPEC-0149-Part 18, Edition 1.3.

**Subpart B — Air-to-ground communications (A/G COM)****Section 1 — Data communications****APPLICABILITY****DS GE.CER.AGDC.101 Scope**

(See GM1 GE.CER.AGDC.101)

This Section provides the functional and performance standards for air-to-ground data communications equipment.

**GM1 GE.CER.AGDC.101 Scope**

Considering ATN Data Link Architecture, the ATM/ANS equipment supporting air-to-ground data communications are inter alia:

- (a) VDL2 Ground Station (VGS) for air-to-ground data communications, operating in the band 117,975-137 MHz;
- (b) gateways for the ATN/AOC data link messages ground distribution;
- (c) ATN routers.

**FUNCTION****DS GE.CER.AGDC.110 Data communications equipment**

(See AMC1 GE.CER.AGDC.110)

Air-to-ground data communications equipment supports the intended use.

**AMC1 GE.CER.AGDC.110 Data communications equipment — VDL M2**

VGS radio equipment should comply with:

- (a) ETSI EN 301 841-1 (V1.4.1) (2015-04) VHF air-ground Digital Link (VDL) Mode 2; Technical characteristics and methods of measurement for ground-based equipment; Part 1: Physical layer and MAC sub-layer
- (b) ETSI EN 301 841-2 (V1.2.1) (2019-05) VHF air-ground Digital Link (VDL) Mode 2; Technical characteristics and methods of measurement for ground-based equipment; Part 2: Upper layers

## PERFORMANCE

### DS GE.CER.AGDC.120 Data communications equipment performance

(See AMC1 GE.CER.AGDC.120 and GM1 GE.CER.AGDC.120)

The performance of air-to-ground data communications equipment supports the intended use.

### AMC1 GE.CER.AGDC.120 Data communications equipment performance — VDL M2

- (a) Air-to-ground data communications equipment should comply with:
- (1) EUROCAE ED-228A — *Safety and Performance Requirements Standard for Baseline 2 ATS Data Communications (Baseline 2 SPR Standard)* with respect to the air-ground link;
  - (2) RTCA D0-224D *Signal-In-Space Minimum Aviation System Performance Standards (MASPS) for Advanced VHF Digital Data Communications including Compatibility with Digital Voice Techniques*;
  - (3) ARINC 631-7 VHF DIGITAL LINK (VDL) MODE 2 IMPLEMENTATION PROVISIONS;
  - (4) ICAO Doc 9776 *Manual on VHF Digital Link (VDL) Mode 2*;
  - (5) regarding the performance of ATN routers, in ICAO Doc 9880 - *Technical Specifications for ATN using ISO/OSI Standards and Protocols, Second Edition, 2016, Part III – Upper Layer Communications Service (ULCS) and Internet Communications Service (ICS)*;
  - (6) ETSI EN 301 841-3 V2.1.1 (2016-09) *VHF air-ground Digital Link (VDL) Mode 2; Technical characteristics and methods of measurement for ground-based equipment; Part 3: Harmonized EN covering the essential requirements of Article 3.2 of the R&TTE Directive*
- (b) Additional performance conditions applicable to the intended use of air-to-ground data communications equipment may be defined as required. Such potential additional performance conditions may be derived from activities related to DS GE.GEN.002, DS GE.GEN.003, DS GE.GEN.004 and DS GE.GEN.007, for which the possible effects of the severity of the effect of failure on safety should be assessed.

### GM1 GE.CER.AGDC.120 Data communications equipment performance — VDL M2

Additional information and guidance could be found in EUROCAE ED-276 — *Guidance on VDL Mode 2 Air/Ground Interoperability*.

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## INTERFACE

### DS GE.CER.B.AGDC.130 Air-to-ground data communications equipment interfaces

(See AMC1 GE.CER.AGDG.130)

Air-to-ground data communications equipment interfaces support the functions and levels of performance as required in DS GE.CER.AGDC.110 and DS GE.CER.AGDC.120.

### AMC1 GE.CER.AGDC.130 Air-to-ground data communications equipment interfaces

Air-to-ground data communications equipment interfaces should comply with:

- (a) ARINC 631-7 VHF DIGITAL LINK (VDL) MODE 2 IMPLEMENTATION PROVISIONS;
- (b) ICAO Doc 9776 Manual on VHF Digital Link (VDL) Mode 2,
- (c) regarding ATN routers: ICAO Doc 9880 - Technical Specifications for ATN using ISO/OSI Standards and Protocols, Ed.2, Part III – Upper Layer Communications Service (ULCS) and Internet Communications Service (ICS).

## Section 2 — Voice communications

### APPLICABILITY

#### DS GE.CER.AGVC.201 Scope

The Section provides the functional and performance standards for air-to-ground voice communication radios operating in the band 117,975-137 MHz.

### FUNCTION

#### DS GE.CER.AGVC.210 Air-to-ground voice communications

(See AMC1 GE.CER.AGVC.210)

Air-to-ground voice communication radios support the connections to the voice communication system.

#### AMC1 GE.CER.AGVC.210 Air-to-ground voice communications

The air-to-ground voice communication equipment should comply with:

- (a) ETSI EN 300 676-1 (V1.5.2) (2011-03) Ground-based VHF hand-held, mobile and fixed radio transmitters, receivers and transceivers for the VHF aeronautical mobile service using amplitude modulation; Part 1: Technical characteristics and methods of measurement;
- (b) EUROCAE ED-136 — *Voice over Internet Protocol (VoIP) Air Traffic Management (ATM) System Operational and Technical Requirements*, Section 2.4, requirement 25 [REQ RADIO FUNCTIONAL] Climax operation to be implemented for the off-set carrier or Climax system configuration to support the multi-carrier operation in the ground to air direction.

### PERFORMANCE

#### DS GE.CER.AGVC.220 Air-to-ground voice communications performance

(See AMC1 GE.CER.AGVC.220, AMC2 GE.CER.AGVC.220 and AMC3 GE.CER.AGVC.220)

The performance of the air-to-ground voice communication equipment supports the intended use.

#### AMC1 GE.CER.AGVC.220 Air-to-ground voice communications performance

- (a) The air-to-ground voice communication equipment should comply with:
  - (1) ICAO Annex 10, Volume III, Part 2 (Second Edition – July 2007 incorporating Amendment No 91), Chapter 2, 'Aeronautical Mobile Service', Section 2.2.1.2 'Power'.

- (2) ETSI EN 300 676-2 (V2.1.1) (2015-12) Ground-based VHF hand-held, mobile and fixed radio transmitters, receivers and transceivers for the VHF aeronautical mobile service using amplitude modulation; Part 2: Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU.
- (b) Additional performance conditions applicable to the intended use of air-to-ground voice communication radios may be defined as required. Such potential additional performance conditions may be derived from activities related to DS GE.GEN.002, DS GE.GEN.003, GE.GEN.004 and DS GE.GEN.007, for which the possible effects of the severity of the effect of failure on safety should be assessed.

### AMC2 GE.CER.AGVC.220 Voice delay

The voice delay for ground transmission components should comply with EUROCAE ED-136 — *Voice over Internet Protocol (VoIP) Air Traffic Management (ATM) System Operational and Technical Requirements*, Section 2.3, requirement 6 [REQ RADIO PERFORMANCE].

### AMC3 GE.CER.AGVC.220 Climax performance

In multi-carrier/climax operation the difference between the longest and the shortest voice latencies for ground transmission components should comply with:

- (a) EUROCAE ED-136 — *Voice over Internet Protocol (VoIP) Air Traffic Management (ATM) System Operational and Technical Requirements*, Section 2.3, requirement 7 [REQ RADIO PERFORMANCE];
- (b) EUROCAE ED 137/1C — *Interoperability Standards For VOIP ATM Components (Volume 1: Radio)*, Section 5.6.3 – Climax-Time-Delay.

### DS GE.CER.AGVC.225 Voice coding

(See AMC1 GE.CER.AGVC.225)

The air-to-ground voice communications equipment supports voice codec.

### AMC1 GE.CER.AGVC.225 Voice coding

The air-to-ground voice communications equipment should comply with EUROCAE ED-137/1C — *Interoperability Standards For VOIP ATM Components (Volume 1: Radio)*, Section 4.2.3, requirement 5 – [AUDIO] Voice coding requirement.

### DS GE.CER.AGVC.230 RTP Class of service (CoS)

(See AMC1 GEC.CER.AGVC.230)

The air-to-ground voice communications equipment supports differentiated services (DiffServ).



## AMC1 GE.CER.AGVC.230 Class of service (CoS)

Differentiated services should comply with ED 137/1C Interoperability Standards For VOIP ATM Components (Volume 1: Radio), Section 5.2.3, requirement 7 – [RTP] RTP Class of Service (CoS).

### INTERFACE

## DS GE.CER.AGVC.240 Air-to-ground voice communications interfaces

(See AMC1 GE.CER.AGVC.240)

The air-to-ground voice communications equipment provides interfaces to support the functions and levels of performance as required in DS GE.CER.AGVC.210, DS GE.CER.AGVC.220, DS GE.CER.AGVC.225, and DS GE.CER.AGVC.230.

## AMC1 GE.CER.AGVC.240 Air-to-ground voice communications interfaces

- (a) Air-to-ground voice communications equipment should support the following interfaces:
  - (1) analogue 4W and 4WE&M;
  - (2) voice over IP (VoIP);
- (b) Air-to-ground voice communications equipment should comply with:
  - (1) ICAO Annex 10, Volume III, Part 2 (Second Edition – July 2007 incorporating Amendment No 91), Chapter 2, 'Aeronautical Mobile Service', Section 2.1;
  - (2) ICAO Annex 10, Volume III, Part 2 (Second Edition – July 2007 incorporating Amendment No 91), Chapter 2, 'Aeronautical Mobile Service', Sections 2.2.1.1, 2.2.1.3 and 2.2.1.4;
  - (3) EUROCAE ED-136, Section 2.2.1;
  - (4) EUROCAE ED-137.1/C, Sections 2.3, 3.1, 3.3, 3.4, 3.8.4, and 5.5.4.

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**PART 3 — ATM/ANS equipment subject to declaration of design compliance****DS GE.DEC.GEN.001 Scope**

These Detailed Specifications (DSs) and the related acceptable means of compliance (AMC) and guidance material (GM) are applicable to the declaration of design compliance, or changes to the design, of ATM/ANS equipment which supports the following ATM/ANS services:

- (a) communications — ground-to-ground;
- (b) navigation;
- (c) surveillance.

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**Subpart A — Ground-to-ground communications (COM)****Section 1 — General****DS GE.DEC.GGCOM.101 Scope**

This Subpart provides the functional and performance standards applicable to the following ground-to-ground data communications:

- (a) ATS message handling system (AMHS);
- (b) system wide information management (SWIM) technical infrastructure;
- (c) flight message transfer protocol (FMTP).

## Section 2 — ATS message handling system (AMHS)

### APPLICABILITY

#### DS GE.DEC.AMHS.201 Scope

This Section provides the functional and performance standards for the:

- (a) basic; and
- (b) extended AMHS.

### FUNCTION

#### DS GE.DEC.AMHS.210 Basic AMHS

(See AMC1 GE.DEC.AMHS.210 and GM1.GE.DEC.AMHS.210)

The basic AMHS is to be suitable for the intended use.

#### AMC1 GE.DEC.AMHS.210 Basic AMHS

The basic AMHS should comply with EUROCONTROL-SPEC-0136, Edition 2.1, EUROCONTROL Specification for the Air Traffic Services Message Handling System (AMHS), Chapter 2.

#### GM1 GE.DEC.AMHS.210 Basic AMHS

- (a) The basic AMHS meets the basic requirements of the MHS Profiles published by ISO as International Standardized Profiles (ISPs), and it incorporates additional features to support the service offered by the aeronautical fixed telecommunications network (AFTN).
- (b) Additional information regarding the basic AMHS can be found in ICAO EUR Doc 020 EUR\_AMHS\_Manual\_v16\_0.

#### DS GE.DEC.AMHS.220 Extended AMHS

(See AMC1 GE.DEC.AMHS.220 and GM1.GE.DEC.AMHS.220)

The extended AMHS is to be suitable for the intended use.

#### AMC1 GE.DEC.AMHS.220 Extended AMHS

The extended AMHS should comply with EUROCONTROL-SPEC-0136, Edition 2.1, EUROCONTROL Specification for the Air Traffic Services Message Handling System (AMHS), Chapters 3, 4 and 5.

## GM1 GE.DEC.AMHS.220 Extended AMHS

- (a) The extended AMHS provides functionalities in addition to those of the basic AMHS such as the support of file transfer containing binary coded data, files, etc.
- (b) Additional information regarding the extended AMHS can be found in ICAO EUR Doc 020 EUR\_AMHS\_Manual\_v16\_0.

### PERFORMANCE

## DS GE.DEC.AMHS.230 AMHS performance

(See AMC1 GE.DEC.AMHS.230)

The performance of AMHS is to be suitable for the intended use.

## AMC1 GE.DEC.AMHS.230 AMHS performance

- (a) Basic and extended AMHSs should comply with EUROCONTROL-SPEC-0136, Edition 2.1, EUROCONTROL Specification for the Air Traffic Services Message Handling System (AMHS), Section A.2.1.4.
- (b) Additional performance conditions applicable to the intended use of AMHS may be defined as required. Such potential additional performance conditions may be derived from activities related to DS GE.GEN.002, DS GE.GEN.003, DS GE.GEN.004 and DS GE.GEN.007, for which the possible effects of the severity of the effect of failure on safety should be assessed.

### INTERFACE

## DS GE.DEC.AMHS.240 AMHS interfaces

(See AMC1 GE.DEC.AMHS.240)

AMHS interfaces support the functions and levels of performance as required in DS GE.DEC.AMHS.210, DS GE.DEC.AMHS.220 and DS GE.DEC.AMHS.230.

## AMC1 GE.DEC.AMHS.240 AMHS interfaces

AMHS interfaces should comply with:

- (a) EUROCONTROL-SPEC-0136, Edition 2.1, EUROCONTROL Specification for the Air Traffic Services Message Handling System (AMHS), Chapter 2;
- (b) EUROCONTROL-SPEC-0136, Edition 2.1, EUROCONTROL Specification for the Air Traffic Services Message Handling System (AMHS), Chapter 3.

## Section 3 — System wide information management (SWIM) technical infrastructure

### APPLICABILITY

#### DS GE.DEC.SWIM.301 Scope

This Section provides the standards for SWIM technical infrastructure.

### FUNCTION

#### DS GE.DEC.SWIM.310 SWIM

(See AMC1 GE.DEC.SWIM.310)

SWIM is to be suitable for the intended use.

#### AMC1 GE.DEC.SWIM.310 SWIM

SWIM technical infrastructure should comply with EUROCONTROL-SPEC-170, Edition 1.1, EUROCONTROL Specification for SWIM Technical Infrastructure (TI) Yellow Profile.

### PERFORMANCE

#### DS GE.DEC.SWIM.320 SWIM performance

(See AMC1 GE.DEC.SWIM.320)

The performance of SWIM is to be suitable for the intended use.

#### AMC1 GE.DEC.SWIM.320 SWIM performance

- (a) SWIM Technical infrastructure should comply with EUROCONTROL-SPEC-170, Edition 1.1, EUROCONTROL Specification for SWIM Technical Infrastructure (TI) Yellow Profile.
- (b) Additional performance conditions applicable to the intended use of SWIM technical infrastructure yellow profile may be defined as required. Such potential additional performance conditions may be derived from activities related to DS GE.GEN.002, DS GE.GEN.003, DS GE.GEN.004 and DS GE.GEN.007, for which the possible effects of the severity of the effect of failure on safety should be assessed.

### INTERFACE

#### DS GE.DEC.SWIM.330 SWIM interfaces

(See AMC1 GE.DEC.SWIM.330)

The SWIM technical infrastructure interfaces support the functions and levels of performance as required in DS GE.DEC.SWIM.310 and DS GE.DEC.SWIM.320.

## **AMC1 GE.DEC.330 SWIM Interfaces**

The SWIM technical infrastructure interfaces should comply with EUROCONTROL-SPEC-170, Edition 1.1, EUROCONTROL Specification for SWIM Technical Infrastructure (TI) Yellow Profile.

## Section 4 — Flight message transfer protocol (FMTP)

### APPLICABILITY

#### DS GE.DEC.FMTP.401 Scope

This Section provides the standards for the FMTP.

### FUNCTION

#### DS GE.DEC.FMTP.410 FMTP

(See AMC1 GE.DEC.FMTP.410)

The FMTP is to be suitable for the intended use.

#### AMC1 GE.DEC.FMTP.410 FMTP

The FMTP should comply with EUROCONTROL-SPEC-0100, Edition 2.0, EUROCONTROL Specification of Interoperability and Performance Requirements for the Flight Message Transfer Protocol.

### PERFORMANCE

#### DS GE.DEC.FMTP.420 FMTP performance

(See AMC1 GE.DEC.FMTP.420)

The performance of the FMTP is to be suitable for the intended use.

#### AMC1 GE.DEC.FMTP.420 FMTP performance

- (a) The FMTP should comply with EUROCONTROL-SPEC-0100, Edition 2.0, EUROCONTROL Specification of Interoperability and Performance Requirements for the Flight Message Transfer Protocol.
- (b) Additional performance conditions applicable to the intended use of the FMTP may be defined as required. Such potential additional performance conditions may be derived from activities related to DS GE.GEN.002, DS GE.GEN.003, DS GE.GEN.004 and DS GE.GEN.007, for which the possible effects of the severity of the effect of failure on safety should be assessed.

### INTERFACE

#### DS GE.DEC.FMTP.430 FMTP interfaces

(See AMC1 GE.DEC.FMTP.430)

FMTP interfaces support the functions and levels of performance as required in DS GE.DEC.FMTP.410 and DS GE.DEC.FMTP.420.



## **AMC1 GE.DEC.FMTP.430 FMTP interfaces**

FMTP interfaces should comply with EUROCONTROL-SPEC-0100, Edition 2.0, EUROCONTROL Specification of Interoperability and Performance Requirements for the Flight Message Transfer Protocol.

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**Subpart B — Navigation (NAV)****Section 1 — General**

Reserved

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**Subpart C — Surveillance (SUR)****Section 1 — General****DS GE.DEC.MSS.101 Scope**

This Subpart provides standards applicable to the following surveillance technologies:

- (a) Mode S;
- (b) ADS-B;
- (c) WAM.

## Section 2 — Mode S ground station (MSS)

### APPLICABILITY

#### DS GE.DEC.MSS.201 Scope

This Section provides the functional and performance standards applicable to the Mode S ground station equipment (MSS) composed of the following elements:

- (a) interrogation;
- (b) processing;
- (c) local display;
- (d) control and monitoring (CMS);
- (e) far field monitoring.

### FUNCTION

#### DS GE.DEC.MSS.210 Data items

(See AMC1 GE.DEC.MSS.210)

The MSS has the capability to detect aircraft equipped with a transponder and provide the following the data items:

- (a) measured horizontal position;
- (b) barometric pressure-altitude (Mode C code);
- (c) time of applicability;
- (d) identity (Mode A code);
- (e) special position indicator (SPI);
- (f) 24-bit ICAO aircraft address;
- (g) flight status (ground/airborne);
- (h) data link capability;
- (i) GICB capabilities;
- (j) aircraft identification;
- (k) ACAS resolution advisories;
- (l) MCP/FCU selected altitude;
- (m) roll angle;
- (n) true track angle;
- (o) ground speed;

- (p) magnetic heading;
- (q) indicated airspeed (IAS);
- (r) Mach number;
- (s) vertical rate;
- (t) barometric pressure setting;
- (u) track angle rate;
- (v) true airspeed.

### AMC1 GE.DEC.MSS.210 Data items

The MSS should comply with System Requirements identified as EMS-Cxx-SYS-SHA-xxxxx in EUROCONTROL-SPEC-189, Edition 4.0, EUROCONTROL Specification for European Mode S Station (EMS), Chapters 3, 5 and 6.

### DS GE.DEC.MSS.220 Operating conditions

(See AMC1 GE.DEC.MSS.220)

The MSS is to be suitable for the intended use.

### AMC1 GE.DEC.MSS.220 Operating conditions

The MSS should comply with System Requirements identified as EMS-Cxx-SYS-SHA-xxxxx in EUROCONTROL-SPEC-189, Edition 4.0, EUROCONTROL Specification for European Mode S Station (EMS), Chapters 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.11, 7.12, and Annex D.

## PERFORMANCE

### DS GE.DEC.MSS.230 MSS performance

(See AMC1 GE.DEC.MSS.230)

The MSS performance is to be suitable for the intended use in the intended operational environment.

### AMC1 GE.DEC.MSS.230 MSS performance

- (a) The MSS should comply with System Requirements identified as EMS-Cxx-SYS-SHA-xxxx in EUROCONTROL-SPEC-189, Edition 4.0, EUROCONTROL Specification for European Mode S Station (EMS), Chapter 2.6.
- (b) ETSI EN 303 363-1 (V1.1.1) (2022-02) Air Traffic Control Surveillance Radar Sensors; Secondary Surveillance Radar (SSR); Harmonised Standard for access to radio spectrum; Part 1: SSR Interrogator.

- (c) Additional performance conditions applicable to the intended use of the MSS may be defined as required. Such potential additional performance conditions may be derived from activities related to DS GE.GEN.002, DS GE.GEN.003, DS GE.GEN.004 and DS GE.GEN.007, for which the possible effects of the severity of the effect of failure on safety should be assessed.

## INTERFACE

### DS GE.DEC.MSS.240 MSS Interfaces

(See AMC1 GE.DEC.MSS.240)

MSS interfaces support the functions and levels of performance as required in DS GE.DEC.MSS.210 and DS GE.DEC.MSS.230.

### AMC1 GE.DEC.MSS.240 MSS interfaces

The MSS should comply with System Requirements identified as EMS-Cxx-SYS-SHA-xxxxx in EUROCONTROL-SPEC-189, Edition 4.0, EUROCONTROL Specification for European Mode S Station (EMS), Chapter 4.

## INTEGRITY

### DS GE.DEC.MSS.250 Integrity

(See AMC1 GE.DEC.MSS.250)

The MSS reliability, availability, and maintainability are suitable for the intended use.

### AMC1 GE.DEC.MSS 250 Integrity

The MSS should comply with System Requirements identified as EMS-Cxx-SYS-SHA-xxxxx in EUROCONTROL-SPEC-189, Edition 4.0, EUROCONTROL Specification for European Mode S Station (EMS), Chapter 9.7.2.

## HARDWARE

### DS GE.DEC.MSS.260 Hardware

(See AMC1 GE.DEC.MSS.260)

The MSS hardware is commensurate with its intended use.

### AMC1 GE.DEC.MSS 260 Hardware

The MSS hardware should comply with System Requirements identified as EMS-Cxx-SYS-SHA-xxxxx in EUROCONTROL-SPEC-189, Edition 4.0, EUROCONTROL Specification for European Mode S Station (EMS), Chapters 8.4 and 8.5.4.

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## SPECIFIC ENVIRONMENTAL CONDITIONS

### DS GE.DEC.MSS 270 Environmental conditions

(See AMC1 GE.DEC.MSS.270)

The MSS is capable of operating in the environmental conditions corresponding to its intended use.

### AMC1 GE.DEC.MSS 270 Environmental conditions

The MSS should comply with System Requirements identified as EMS-Cxx-SYS-SHA-xxxxx in EUROCONTROL-SPEC-189, Edition 4.0, EUROCONTROL Specification for European Mode S Station (EMS), Chapter 9.2.

## Section 3 — ADS-B

### APPLICABILITY

#### DS GE.DEC.ADSB.301 Scope

This Section provides the functional and performance standards applicable to 1090 MHz extended squitter ADS-B surveillance equipment.

### FUNCTION

#### DS GE.DEC.ADSB.310 Function

(See AMC1 GE.DEC.ADSB.310)

ADS-B surveillance equipment detects aircraft equipped with an ADS-B transmitter and has the capability to provide the following data items:

- (a) 24-bit ICAO aircraft address;
- (b) aircraft identification;
- (c) Mode A code;
- (d) special position indication (SPI);
- (e) emergency status;
- (f) ADS-B version number;
- (g) ADS-B emitter category;
- (h) geodetic horizontal position in accordance with the world geodetic system revision 1984 (WGS84) latitude and longitude;
- (i) geodetic horizontal position quality indicators;
- (j) pressure altitude;
- (k) geometric altitude;
- (l) geometric vertical accuracy (GVA);
- (m) velocity over ground, while airborne (east/west and north/south airborne velocity over ground) or on the ground (surface heading/ground track and movement);
- (n) velocity quality indicator (corresponding to the navigation accuracy category for velocity (NACv));
- (o) aircraft length and width;
- (p) global navigation satellite system (GNSS) antenna offset;
- (q) vertical rate;
- (r) selected altitude;



- (s) barometric pressure setting;
- (t) ACAS active resolution advisories.

### AMC1 GE.DEC.ADSB.310 Function

The ADS-B surveillance equipment should comply with EUROCAE ED-129B — *Technical Specification for 1090 MHz Extended Squitter ADS-B Ground System*, Sections 2 and 3.2.

### DS GE.DEC.ADSB.315 Control and monitoring

(See AMC1 GE.DEC.ADSB.315)

The ADS-B surveillance equipment provides control and monitoring functions that are commensurate with the intended use.

### AMC1 GE.DEC.ADSB.315 Control and monitoring

The ADS-B surveillance equipment should comply with EUROCAE ED-129B — *Technical Specification for 1090 MHz Extended Squitter ADS-B Ground System*, Section 3.5.

## PERFORMANCE

### DS GE.DEC.ADSB.320 ADS-B surveillance equipment performance

(See AMC1 GE.DEC.ADSB.320)

The ADS-B surveillance equipment performance is to be commensurate with the intended use.

### AMC1 GE.DEC.ADSB.320 ADS-B surveillance equipment performance

- (a) The ADS-B surveillance equipment should comply with EUROCAE ED-129B — *Technical Specification for 1090 MHz Extended Squitter ADS-B Ground System*, Section 3.3.
- (b) Additional performance conditions applicable to the intended use of ADS-B surveillance equipment may be defined as required. Such potential additional performance conditions may be derived from activities related to DS GE.GEN.002, DS GE.GEN.003, DS GE.GEN.004 and DS GE.GEN.007, for which the possible effects of the severity of the effect of failure on safety should be assessed.

## INTERFACE

### DS GE.DEC.ADSB.330 ADS-B surveillance equipment interfaces

(See AMC1 GE.DEC.ADSB.330)

The ADS-B surveillance equipment interfaces support the intended use.

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**AMC1 GE.DEC.ADSB.330 ADS-B surveillance equipment interfaces**

The ADS-B surveillance equipment should comply with EUROCAE ED-129B — *Technical Specification for 1090 MHz Extended Squitter ADS-B Ground System*, Section 3.4.

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**Section 4 — Wide area multilateration****General**

Reserved