GIBRALTAR
CIVIL AVIATION AUTHORITY

CAR CNS

COMMUNICATIONS, NAVIGATION AND SURVEILLANCE

FOREWORD

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FOREWORD

1. The Gibraltar Civil Aviation Authority, known in this regulation as the "Authority", has implemented CAR CNS, (Civil Aviation Regulations – Aeronautical Telecommunications (Communication, Navigation & Surveillance Services)).

2. Unless otherwise stated, applicable CAR DEF definitions, abbreviations and units of measurement are used throughout this document.

3. Any reference in this regulation to an Annex to the Chicago Convention includes any differences, present or future, notified to ICAO by the Authority in respect of the Standards specified in that Annex.

4. The editing practices used in this document are as follows:

   (a) 'Shall' is used to indicate a mandatory requirement whereby non-compliance may be considered an offence under Section 59 of the Civil Aviation Act – 2024 and may be enforced under the provisions of Section 58.

   (b) 'Should' is used to indicate a recommendation by the Authority and has no legal effect.

   (c) 'May' is used to indicate discretion by the Authority, the industry or the applicant, as appropriate.

   Note: The use of the male gender implies all genders.

5. Paragraphs and sub-paragraphs with new, amended and corrected text will be enclosed within square brackets until a subsequent "amendment" is issued.

The Director General, in exercise of the powers conferred by Section 34 of the Civil Aviation Act – 2024, hereby issues these operating regulations.

Christopher Charles Purkiss
Director General

Gibraltar Civil Aviation Authority

REVISION RECORD

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CHAPTER 1

GENERAL

1.1 Applicability

(a) This regulation prescribes requirements governing:

(1) The provision of aeronautical telecommunication services, including the provision of communication, navigation and surveillance services (CNS) that supports the provision of air traffic services (ATS) and air navigation within the sovereign airspace of Gibraltar; and

(2) The operation of organisations providing aeronautical telecommunication/CNS services:

(i) to support the provision of ATS and air navigation within the flight information region administered by another ICAO Contracting State in accordance with the terms of any Regional Air Navigation Agreements; or

(ii) the subject of a written agreement between an organisation responsible for the provision of aeronautical telecommunication services in adjacent airspace which delegates the provision of services to that organisation; and

(iii) the operating standards for Aeronautical Telecommunication/CNS services in relation to their performance, provision, maintenance and safety management.

Note: For the purposes of this regulation, the term CNS shall be used to cover the provision of all aeronautical telecommunications services

(b) The Authority shall be responsible for ensuring that any provider of CNS services (otherwise known as a "provider" for the purposes of this regulation) shall comply with the provisions of this regulation. Failure to comply with any of the requirements of this regulation may:

(1) Constitute a breach of the Civil Aviation Regulations or Acts of Gibraltar; and

(2) Result in proceedings for any such breaches; or

(3) Result in the refusal of an application for renewal of a Certificate; or

(4) Result in action to suspend, revoke or impose conditions in respect of the Aeronautical Telecommunication provider's Certificates.

(c) A provider shall comply with this regulation, and any other applicable national legislation in force at any time.

(d) Notwithstanding the requirements in this regulation, a provider shall be able to demonstrate that its working methods and operating procedures are compliant with the following standards:

(1) ICAO Annex 10;

(i) Volume 1 on radio navigation aids;

(ii) Volume 2 on communication procedures;

(iii) Volume 3 on communication systems;

(iv) Volume 4 on surveillance radar and collision avoidance systems;

(v) Volume 5 on aeronautical radio frequency spectrum utilisation.

(e) This regulation shall also be read in conjunction with the following documents;

(1) ICAO Doc 8071 Volumes I to III – Testing of Ground-based and Satellite-based Radio Navigation Systems and Surveillance Radar Systems;

(2) ICAO Doc 9576 Manual of surface movement guidance and control systems (ASMGCS)

(3) ICAO Doc 9868 - PANS-Training; and

(4) ICAO Doc 10057 – ATSEP Training Manual

(5) ICAO Doc 9924 – Aeronautical Surveillance Manual

(f) Under these regulations the Authority has adopted the Standards of Annex 10, Volumes I to V. Where there is a difference between these regulations and the Standards of Annex 10, Volumes I to V, these regulations shall prevail.

(g) Significant differences, where they exist, between these regulations and the Standards contained in the ICAO Annexes shall be published in the Gibraltar AIP.

(h) Units of measurement shall be as specified in CAR DEF.

(i) In addition, the following are to be issued as and when required to supplement this regulation:

(1) **Safety Directives** – mandatory requirements published for purposes of immediate promulgation of local standards and recommended practices in response to, but not limited to, amendments to ICAO Annexes.

(2) **Safety Publications** –published for the purposes of promulgating supplementary guidance materials to the standards and recommended practices. Publications may explain certain regulatory requirements by providing interpretive and explanatory materials.

(3) **Information Circulars** –published for the purposes of bringing to the attention of a provider educational materials related to aviation safety. Publications could be initiated as a result of ICAO State letters which do not require immediate changes to local regulations, new safety initiatives or international best practices as identified by Authority. Providers are encouraged to review and adopt the material if practicable.

(j) In accordance with the Civil Aviation Act – 2024, Section 4(2), these regulations are not applicable to the MOD nor to any equipment operated by the MOD.

(k) When a provider is not able to comply with any requirements specified or referenced in this regulation, an application shall be made to the Authority for an exemption or deviation from the regulation. Applications must be supported in writing with the reasons for such exemption or deviation including any safety assessment or other studies undertaken, and where appropriate, an indication of when compliance with the current regulation can be expected.

(l) Any exemption or deviation granted shall be recorded in the appropriate operations manual and shall include full details of the exemption or deviation, such as the reason that the exemption or deviation was requested and any resultant limitations or conditions imposed.

1.2 Definitions

The following definitions have been sourced from ICAO Annex 10 and separated by the Annex 10 Volume and Chapter. Other definitions can be found in CAR DEF.

Note: All references to "Radio Regulations" are to the Radio Regulations published by the International Telecommunication Union (ITU).

When the following terms are used, they have the following meaning:

1.2.1 Annex 10 Volume 1

Chapter 1

Altitude. The vertical distance of a level, a point or an object considered as a point, measured from mean sea level (MSL).

Area navigation (RNAV). A method of navigation which permits aircraft operation on any desired flight path within the coverage of ground- or space-based navigation aids or within the limits of the capability of self-contained aids, or a combination of these.

Note: Area navigation includes performance-based navigation as well as other operations that do not meet the definition of performance-based navigation.

Effective acceptance bandwidth. The range of frequencies with respect to the assigned frequency for which reception is assured when all receiver tolerances have been taken into account.

Effective adjacent channel rejection. The rejection that is obtained at the appropriate adjacent channel frequency when all relevant receiver tolerances have been taken into account.

Elevation. The vertical distance of a point or a level, on or affixed to the surface of the earth, measured from mean sea level.

Essential radio navigation service. A radio navigation service whose disruption has a significant impact on operations in the affected airspace or aerodrome.

Fan marker beacon. A type of radio beacon, the emissions of which radiate in a vertical fan-shaped pattern.

Height. The vertical distance of a level, a point or an object considered as a point, measured from a specified datum.

Human Factors principles. Principles which apply to design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

Mean power (of a radio transmitter). The average power supplied to the antenna transmission line by a

transmitter during an interval of time sufficiently long compared with the lowest frequency encountered in the modulation taken under normal operating conditions.
Note: A time of 1/10 second during which the mean power is greatest will be selected normally.

Navigation specification. A set of aircraft and flight crew requirements needed to support performance-based navigation operations within a defined airspace. There are two kinds of navigation specifications:

Required navigation performance (RNP) specification. A navigation specification based on area navigation that includes the requirement for performance monitoring and alerting, designated by the prefix RNP, e.g. RNP 4, RNP APCH.

Area navigation (RNAV) specification. A navigation specification based on area navigation that does not include the requirement for performance monitoring and alerting, designated by the prefix RNAV, e.g. RNAV 5, RNAV 1.

Performance-based navigation (PBN). Area navigation based on performance requirements for aircraft operating along an ATS route, on an instrument approach procedure or in a designated airspace.

Note: Performance requirements are expressed in navigation specifications (RNAV specification, RNP specification) in terms of accuracy, integrity, continuity, availability and functionality needed for the proposed operation in the context of a particular airspace concept.

Pressure-altitude. An atmospheric pressure expressed in terms of altitude which corresponds to that pressure in the Standard Atmosphere.

Protected service volume. A part of the facility coverage where the facility provides a particular service in accordance with relevant SARPs and within which the facility is afforded frequency protection.

Radio navigation service. A service providing guidance information or position data for the efficient and safe operation of aircraft supported by one or more radio navigation aids.

Touchdown. The point where the nominal glide path intercepts the runway.

Note: "Touchdown" as defined above is only a datum and is not necessarily the actual point at which the aircraft will touch the runway.

Z marker beacon. A type of radio beacon, the emissions of which radiate in a vertical cone-shaped pattern.

Chapter 3

Specifications for ILS

Angular displacement sensitivity. The ratio of measured DDM to the corresponding angular displacement from the appropriate reference line.

Back course sector. The course sector which is situated on the opposite side of the localizer from the runway.

Course line. The locus of points nearest to the runway centre line in any horizontal plane at which the DDM is zero.

Course sector. A sector in a horizontal plane containing the course line and limited by the loci of points nearest to the course line at which the DDM is 0.155.

DDM — Difference in depth of modulation. The percentage modulation depth of the larger signal minus the percentage modulation depth of the smaller signal, divided by 100.

Displacement sensitivity (localizer). The ratio of measured DDM to the corresponding lateral displacement from the appropriate reference line.

Facility Performance Category I — ILS. An ILS which provides guidance information from the coverage limit of the ILS to the point at which the localizer course line intersects the ILS glide path at a height of 60 m (200 ft) or less above the horizontal plane containing the threshold.

Note: This definition is not intended to preclude the use of Facility Performance Category I — ILS below the height of 60 m (200 ft), with visual reference where the quality of the guidance provided permits, and where satisfactory operational procedures have been established.

Facility Performance Category II — ILS. An ILS which provides guidance information from the coverage limit of the ILS to the point at which the localizer course line intersects the ILS glide path at a height of 15 m (50 ft) or less above the horizontal plane containing the threshold.

Facility Performance Category III — ILS. An ILS which, with the aid of ancillary equipment where necessary, provides guidance information from the coverage limit of the facility to, and along, the surface of the runway.

Front course sector. The course sector which is situated on the same side of the localizer as the runway.

Half course sector. The sector, in a horizontal plane containing the course line and limited by the loci of points nearest to the course line at which the DDM is 0.0775.

Half ILS glide path sector. The sector in the vertical plane containing the ILS glide path and limited by the loci of points nearest to the glide path at which the DDM is 0.0875.

ILS continuity of service. That quality which relates to the rarity of radiated signal interruptions. The level of continuity of service of the localizer or the glide path is expressed in terms of the probability of not losing the radiated guidance signals.

ILS glide path. That locus of points in the vertical plane containing the runway centre line at which the DDM is zero, which, of all such loci, is the closest to the horizontal plane.

ILS glide path angle. The angle between a straight line which represents the mean of the ILS glide path and the horizontal.

ILS glide path sector. The sector in the vertical plane containing the ILS glide path and limited by the loci of points nearest to the glide path at which the DDM is 0.175.

Note: The ILS glide path sector is located in the vertical plane containing the runway centre line, and is divided by the radiated glide path in two parts called upper sector and lower sector, referring respectively to the sectors above and below the glide path.

ILS integrity. That quality which relates to the trust which can be placed in the correctness of the information supplied by the facility. The level of integrity of the localizer or the glide path is expressed in terms of the probability of not radiating false guidance signals.

ILS Point "A". A point on the ILS glide path measured along the extended runway centre line in the approach direction a distance of 7.5 km (4 NM) from the threshold.
ILS Point "B". A point on the ILS glide path measured along the extended runway centre line in the approach direction a distance of 1 050 m (3 500 ft) from the threshold.

ILS Point "C". A point through which the downward extended straight portion of the nominal ILS glide path passes at a height of 30 m (100 ft) above the horizontal plane containing the threshold.

ILS Point "D". A point 4 m (12 ft) above the runway centre line and 900 m (3 000 ft) from the threshold in the direction of the localizer.

ILS Point "E". A point 4 m (12 ft) above the runway centre line and 600 m (2 000 ft) from the stop end of the runway in the direction of the threshold.

ILS reference datum (Point "T"). A point at a specified height located above the intersection of the runway centre line and the threshold and through which the downward extended straight portion of the ILS glide path passes.

Two-frequency glide path system. An ILS glide path in which coverage is achieved by the use of two independent radiation field patterns spaced on separate carrier frequencies within the particular glide path channel.

Two-frequency localizer system. A localizer system in which coverage is achieved by the use of two independent radiation field patterns spaced on separate carrier frequencies within the particular localizer VHF channel.

Specification for Non-Directional Radio Beacon (NDB)

Average radius of rated coverage. The radius of a circle having the same area as the rated coverage.

Effective coverage. The area surrounding an NDB within which bearings can be obtained with an accuracy sufficient for the nature of the operation concerned.

Locator. An LF/MF NDB used as an aid to final approach.

Note: A locator usually has an average radius of rated coverage of between 18.5 and 46.3 km (10 and 25 NM).

Rated coverage. The area surrounding an NDB within which the strength of the vertical field of the ground wave exceeds the minimum value specified for the geographical area in which the radio beacon is situated.

Note: The above definition is intended to establish a method of rating radio beacons on the normal coverage to be expected in the absence of sky wave transmission and/or anomalous propagation from the radio beacon concerned or interference from other LF/MF facilities, but taking into account the atmospheric noise in the geographical area concerned.

Specification for UHF Distance Measuring Equipment (DME)

Control motion noise (CMN). That portion of the guidance signal error which causes control surface, wheel and column motion and could affect aircraft attitude angle during coupled flight, but does not cause aircraft displacement from the desired course and/or glide path. (See 3.11.)

DME dead time. A period immediately following the decoding of a valid interrogation during which a received interrogation will not cause a reply to be generated.

Note: Dead time is intended to prevent the transponder from replying to echoes resulting from multipath effects.

DME/N. Distance measuring equipment, primarily serving operational needs of en-route or TMA navigation, where the "N" stands for narrow spectrum characteristics.

DME/P. The distance measuring element of the MLS, where the "P" stands for precise distance measurement. The spectrum characteristics are those of DME/N.

Equivalent isotropically radiated power (EIRP). The product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain).

Final approach (FA) mode. The condition of DME/P operation which supports flight operations in the final approach and runway regions.

Initial approach (IA) mode. The condition of DME/P operation which supports those flight operations outside the final approach region and which is interoperable with DME/N.

Key down time. The time during which a dot or dash of a Morse character is being transmitted.

MLS approach reference datum. A point on the minimum glide path at a specified height above the threshold.

MLS datum point. The point on the runway centre line closest to the phase centre of the approach elevation antenna.

Mode W, X, Y, Z. A method of coding the DME transmissions by time spacing pulses of a pulse pair, so that each frequency can be used more than once.

Partial rise time. The time as measured between the 5 and 30 per cent amplitude points on the leading edge of the pulse envelope, i.e. between points h and i on Figures 3-1 and 3-2.

Path following error (PFE). That portion of the guidance signal error which could cause aircraft displacement from the desired course and/or glide path.

Pulse amplitude. The maximum voltage of the pulse envelope, i.e. A in Figure 3-1.

Pulse decay time. The time as measured between the 90 and 10 per cent amplitude points on the trailing edge of the pulse envelope, i.e. between points e and g on Figure 3-1.

Pulse code. The method of differentiating between W, X, Y and Z modes and between FA and IA modes.

Pulse duration. The time interval between the 50 per cent amplitude point on leading and trailing edges of the pulse envelope, i.e. between points b and f on Figure 3-1.

Pulse rise time. The time as measured between the 10 and 90 per cent amplitude points on the leading edge of the pulse envelope, i.e. between points a and c on Figure 3-1.

Reply efficiency. The ratio of replies transmitted by the transponder to the total of received valid interrogations.

Search. The condition which exists when the DME interrogator is attempting to acquire and lock onto the response to its own interrogations from the selected transponder.
System efficiency. The ratio of valid replies processed by the interrogator to the total of its own interrogations.

Track. The condition which exists when the DME interrogator has locked onto replies in response to its own interrogations, and is continuously providing a distance measurement.

Transmission rate. The average number of pulse pairs transmitted from the transponder per second.

Virtual origin. The point at which the straight line through the 30 per cent and 5 per cent amplitude points on the pulse leading edge intersects the 0 per cent amplitude axis (see Figure 3-2).

Requirements for the Global Navigation Satellite System (GNSS)

Aircraft-based augmentation system (ABAS). An augmentation system that augments and/or integrates the information obtained from the other GNSS elements with information available on board the aircraft.

Alert. An indication provided to other aircraft systems or annunciation to the pilot to identify that an operating parameter of a navigation system is out of tolerance.

Alert limit. For a given parameter measurement, the error tolerance not to be exceeded without issuing an alert.

Antenna port. A point where the received signal power is specified. For an active antenna, the antenna port is a fictitious point between the antenna elements and the antenna pre-amplifier. For a passive antenna, the antenna port is the output of the antenna itself.

Axial ratio. The ratio, expressed in decibels, between the maximum output power and the minimum output power of an antenna to an incident linearly polarized wave as the polarization orientation is varied over all directions perpendicular to the direction of propagation.

Channel of standard accuracy (CSA). The specified level of positioning, velocity and timing accuracy that is available to any GLONASS user on a continuous, worldwide basis.

Core satellite constellation(s). The core satellite constellations are GPS and GLONASS.

GBAS/E. A ground-based augmentation system transmitting an elliptically-polarized VHF data broadcast.

GBAS/H. A ground-based augmentation system transmitting a horizontally-polarized VHF data broadcast.

Global navigation satellite system (GNSS). A worldwide position and time determination system that includes one or more satellite constellations, aircraft receivers and system integrity monitoring, augmented as necessary to support the required navigation performance for the intended operation.

Global navigation satellite system (GLONASS). The satellite navigation system operated by the Russian Federation.

Global positioning system (GPS). The satellite navigation system operated by the United States.

GNSS position error. The difference between the true position and the position determined by the GNSS receiver.

Ground-based augmentation system (GBAS). An augmentation system in which the user receives augmentation information directly from a ground-based transmitter.
Ground-based regional augmentation system (GRAS). An augmentation system in which the user receives augmentation information directly from one of a group of ground-based transmitters covering a region.

Integrity. A measure of the trust that can be placed in the correctness of the information supplied by the total system. Integrity includes the ability of a system to provide timely and valid warnings to the user (alerts).

Pseudo-range. The difference between the time of transmission by a satellite and reception by a GNSS receiver multiplied by the speed of light in a vacuum, including bias due to the difference between a GNSS receiver and satellite time reference.

Receiver. A subsystem that receives GNSS signals and includes one or more sensors.

Reserved (bits/words/fields). Bits/words/fields that are not allocated, but which are reserved for a particular GNSS application.

Satellite-based augmentation system (SBAS). A wide coverage augmentation system in which the user receives augmentation information from a satellite-based transmitter.

Spare (bits/words/fields). Bits/words/fields that are not allocated or reserved, and which are available for future allocation.

Note: All spare bits are set to zero.

Standard positioning service (SPS). The specified level of positioning, velocity and timing accuracy that is available to any global positioning system (GPS) user on a continuous, worldwide basis.

Time-to-alert. The maximum allowable time elapsed from the onset of the navigation system being out of tolerance until the equipment enunciates the alert.

Microwave Landing System (MLS) Characteristics

Auxiliary data. Data, transmitted in addition to basic data, that provide ground equipment siting information for use in refining airborne position calculations and other supplementary information.

Basic data. Data transmitted by the ground equipment that are associated directly with the operation of the landing guidance system.

Beam centre. The midpoint between the two minus 3-dB points on the leading and trailing edges of the scanning beam main lobe.

Beamwidth. The width of the scanning beam main lobe measured at the minus 3-dB points and defined in angular units on the boresight, in the horizontal plane for the azimuth function and in the vertical plane for the elevation function.

Clearance guidance sector. The volume of airspace, inside the coverage sector, within which the azimuth guidance information provided is not proportional to the angular displacement of the aircraft, but is a constant left or right indication of which side the aircraft is with respect to the proportional guidance sector.

Control motion noise (CMN). That portion of the guidance signal error which causes control surface,

wheel and column motion and could affect aircraft attitude angle during coupled flight, but does not cause aircraft displacement from the desired course and/or glide path.

Coordinate system — conical. A function is said to use conical coordinates when the decoded guidance angle varies as the minimum angle between the surface of a cone containing the receiver antenna, and a plane perpendicular to the axis of the cone and passing through its apex. The apex of the cone is at the antenna phase centre. For approach azimuth or back azimuth functions, the plane is the vertical plane containing the runway centre line. For elevation functions, the plane is horizontal.

Coordinate system — planar. A function is said to use planar coordinates when the decoded guidance angle varies as the angle between the plane containing the receiver antenna and a reference plane. For azimuth functions, the reference plane is the vertical plane containing the runway centre line and the plane containing the receiver antenna is a vertical plane passing through the antenna phase centre.

Coverage sector. A volume of airspace within which service is provided by a particular function and in which the signal power density is equal to or greater than the specified minimum.

DME/P. The distance measuring element of the MLS, where the "P" stands for precise distance measurement. The spectrum characteristics are those of DME/N.

Function. A particular service provided by the MLS, e.g. approach azimuth guidance, back azimuth guidance or basic data, etc.

Mean course error. The mean value of the azimuth error along the runway extended centre line.

Mean glide path error. The mean value of the elevation error along the glide path of an elevation function.

Minimum glide path. The lowest angle of descent along the zero degree azimuth that is consistent with published approach procedures and obstacle clearance criteria.

Note: This is the lowest elevation angle which has been approved and promulgated for the instrument runway.

MLS antenna boresight. The plane passing through the antenna phase centre perpendicular to the horizontal axis contained in the plane of the antenna array.

Note: In the azimuth case, the boresight of the antenna and the zero degree azimuth are normally aligned. However, the preferred designation in a technical context is "boresight" whereas the preferred designation in an operational context is "zero degree azimuth" (see definition below).

MLS azimuth. The locus of points in any horizontal plane where the decoded guidance angle is constant.

MLS approach reference datum. A point at a specified height above the intersection of the runway centre line and the threshold.

MLS back azimuth reference datum. A point at a specified height above the runway centre line at the runway midpoint.

MLS datum point. The point on the runway centre line closest to the phase centre of the approach elevation antenna.

MLS elevation. The locus of points in any vertical plane where the decoded guidance angle is constant.

MLS zero degree azimuth. The MLS azimuth where the decoded guidance angle is zero degrees.

Out-of-coverage indication signal. A signal radiated into areas outside the intended coverage sector where required to specifically prevent invalid removal of an airborne warning indication in the presence of misleading guidance information.

Path following error (PFE). That portion of the guidance signal error which could cause aircraft displacement from the desired course and/or glide path.

Path following noise (PFN). That portion of the guidance signal error which could cause aircraft displacement from the mean course line or mean glide path as appropriate.

Proportional guidance sector. The volume of airspace within which the angular guidance information provided by a function is directly proportional to the angular displacement of the airborne antenna with respect to the zero angle reference.

1.2.2 Annex 10 Volume II

Chapter 1 Services

Aeronautical broadcasting service. A broadcasting service intended for the transmission of information relating to air navigation.

Aeronautical fixed service (AFS). A telecommunication service between specified fixed points provided primarily for the safety of air navigation and for the regular, efficient and economical operation of air services.

Aeronautical fixed telecommunication network (AFTN). A worldwide system of aeronautical fixed circuits provided, as part of the aeronautical fixed service, for the exchange of messages and/or digital data between aeronautical fixed stations having the same or compatible communications characteristics.

Aeronautical mobile service (RR S1.32). A mobile service between aeronautical stations and aircraft stations, or between aircraft stations, in which survival craft stations may participate; emergency position-indicating radio beacon stations may also participate in this service on designated distress and emergency frequencies.

Aeronautical mobile (R)* service (RR S1.33). An aeronautical mobile service reserved for communications relating to safety and regularity of flight, primarily along national or international civil air routes.

Aeronautical mobile-satellite service (RR S1.35). A mobile-satellite service in which mobile earth stations are located on board aircraft; survival craft stations and emergency position-indicating radio beacon stations may also participate in this service.

Aeronautical mobile-satellite (R)* service (RR S1.36). An aeronautical mobile-satellite service reserved for communications relating to safety and regularity of flights, primarily along national or international civil air routes.

Aeronautical radio navigation service (RR S1.46). A radio navigation service intended for the benefit and for the safe operation of aircraft.

Note: The following Radio Regulations are quoted for purposes of reference and/or clarity in understanding of the above definition of the aeronautical radio navigation service:

RR S1.10 *Radio navigation: Radio determination used for the purpose of navigation, including obstruction warning.*

RR S1.9 *Radio determination: The determination of the position, velocity and/or other characteristics of an object, or the obtaining of information relating to these parameters, by means of the propagation* properties of radio waves.

Aeronautical telecommunication service. A telecommunication service provided for any aeronautical purpose.

International telecommunication service. A telecommunication service between offices or stations of different States, or between mobile stations which are not in the same State, or are subject to different States.

Chapter 1 Stations

Aerodrome control radio station. A station providing radio communication between an aerodrome control tower and aircraft or mobile aeronautical stations.

Aeronautical fixed station. A station in the aeronautical fixed service.

Aeronautical station (RR S1.81). A land station in the aeronautical mobile service. In certain instances, an aeronautical station may be located, for example, on board ship or on a platform at sea.

Aeronautical telecommunication station. A station in the aeronautical telecommunication service.

AFTN communication centre. An AFTN station whose primary function is the relay or retransmission of AFTN traffic from (or to) a number of other AFTN stations connected to it.

AFTN destination station. An AFTN station to which messages and/or digital data are addressed for processing for delivery to the addressee.

AFTN origin station. An AFTN station where messages and/or digital data are accepted for transmission over the AFTN.

AFTN station. A station forming part of the aeronautical fixed telecommunication network (AFTN) and operating as such under the authority or control of a State.

Air-ground control radio station. An aeronautical telecommunication station having primary responsibility for handling communications pertaining to the operation and control of aircraft in a given area.

Aircraft station (RR S1.83). A mobile station in the aeronautical mobile service, other than a survival craft station, located on board an aircraft.

Communication centre. An aeronautical fixed station which relays or retransmits telecommunication traffic from (or to) a number of other aeronautical fixed stations directly connected to it.

Mobile surface station. A station in the aeronautical telecommunication service, other than an aircraft station, intended to be used while in motion or during halts at unspecified points.

Network station. An aeronautical station forming part of a radiotelephony network.

Radio direction finding (RR S1.12). Radio determination using the reception of radio waves for the purpose of determining the direction of a station or object.

Radio direction-finding station (RR S1.91). A radiodetermination station using radio direction finding.

Note: The aeronautical application of radio direction finding is in the aeronautical radio navigation service.

Regular station. A station selected from those forming an en-route air-ground radiotelephony network to communicate with or to intercept communications from aircraft in normal conditions.

Tributary station. An aeronautical fixed station that may receive or transmit messages and/or digital data but which does not relay except for the purpose of serving similar stations connected through it to a communication centre.

Chapter 1 Communication Methods

Air-ground communication. Two-way communication between aircraft and stations or locations on the surface of the earth.

Air-to-ground communication. One-way communication from aircraft to stations or locations on the surface of the earth.

Blind transmission. A transmission from one station to another station in circumstances where two-way communication cannot be established but where it is believed that the called station is able to receive the transmission.

Broadcast. A transmission of information relating to air navigation that is not addressed to a specific station or stations.

Duplex. A method in which telecommunication between two stations can take place in both directions simultaneously.

Ground-to-air communication. One-way communication from stations or locations on the surface of the earth to aircraft.

Inter-pilot air-to-air communication. Two-way communication on the designated air-to-air channel to enable aircraft engaged in flights over remote and oceanic areas out of range of VHF ground stations to exchange necessary operational information and to facilitate the resolution of operational problems.

Non-network communications. Radiotelephony communications conducted by a station of the aeronautical mobile service, other than those conducted as part of a radiotelephony network.

Radiotelephony network. A group of radiotelephony aeronautical stations which operate on and guard frequencies from the same family and which support each other in a defined manner to ensure maximum dependability of air-ground communications and dissemination of air-ground traffic.

Readback. A procedure whereby the receiving station repeats a received message or an appropriate part thereof back to the transmitting station so as to obtain confirmation of correct reception.

Simplex. A method in which telecommunication between two stations takes place in one direction at a

time.

Note: In application to the aeronautical mobile service this method may be subdivided as follows:

(a) single channel simplex;

(b) double channel simplex;

(c) offset frequency simplex.

Telecommunication (RR S1.3). Any transmission, emission, or reception of signs, signals, writing, images and sounds or intelligence of any nature by wire, radio, optical or other electromagnetic systems.

Chapter 1 Direction Finding

Homing. The procedure of using the direction-finding equipment of one radio station with the emission of another radio station, where at least one of the stations is mobile, and whereby the mobile station proceeds continuously towards the other station.

Radio bearing. The angle between the apparent direction of a definite source of emission of electro-magnetic waves and a reference direction, as determined at a radio direction-finding station. A true radio bearing is one for which the reference direction is that of true North. A magnetic radio bearing is one for which the reference direction is that of magnetic North.

Chapter 1 Teletypewriter Systems

Automatic relay installation. A teletypewriter installation where automatic equipment is used to transfer messages from incoming to outgoing circuits.

Note: This term covers both fully automatic and semi-automatic installations.

Fully automatic relay installation. A teletypewriter installation where interpretation of the relaying responsibility in respect of an incoming message and the resultant setting-up of the connections required to effect the appropriate retransmissions is carried out automatically, as well as all other normal operations of relay, thus obviating the need for operator intervention, except for supervisory purposes.

Message field. An assigned area of a message containing specified elements of data.

Semi-automatic relay installation. A teletypewriter installation where interpretation of the relaying responsibility in respect of an incoming message and the resultant setting-up of the connections required to effect the appropriate retransmissions require the intervention of an operator but where all other normal operations of relay are carried out automatically.

Teletypewriter tape. A tape on which signals are recorded in the 5-unit Start-Stop code by completely severed perforations (Chad Type) or by partially severed perforations (Chadless Type) for transmission over teletypewriter circuits.

"Torn-tape" relay installation. A teletypewriter installation where messages are received and relayed in teletypewriter tape form and where all operations of relay are performed as the result of operator intervention.

Chapter 1 Agencies

Aeronautical telecommunication agency. An agency responsible for operating a station or stations in the aeronautical telecommunication service.
Aircraft operating agency. A person, organization or enterprise engaged in, or offering to engage in, an aircraft operation.

Chapter 1 Frequencies

Primary frequency. The radiotelephony frequency assigned to an aircraft as a first choice for air-ground communication in a radiotelephony network.

Secondary frequency. The radiotelephony frequency assigned to an aircraft as a second choice for air-ground communication in a radiotelephony network.

Chapter 1 Data Link Communications

Controller-pilot data link communications (CPDLC). A means of communication between controller and pilot, using data link for ATC communications.

CPDLC message. Information exchanged between an airborne system and its ground counterpart. A CPDLC message consists of a single message element or a combination of message elements conveyed in a single transmission by the initiator.

CPDLC message set. A list of standard message elements and free text message elements.

Current data authority. The designated ground system through which a CPDLC dialogue between a pilot and a controller currently responsible for the flight is permitted to take place.

Free text message element. Part of a message that does not conform to any standard message element in the PANS-ATM (Doc 4444).

Logon address. A specified code used for data link logon to an ATS unit.

Next data authority. The ground system so designated by the current data authority through which an onward transfer of communications and control can take place.

Standard message element. Part of a message defined in the PANS-ATM (Doc 4444) in terms of display format, intended use and attributes.

Chapter 1 Miscellaneous

Aeronautical fixed circuit. A circuit forming part of the aeronautical fixed service (AFS).

Aeronautical fixed telecommunication network circuit. A circuit forming part of the aeronautical fixed telecommunication network (AFTN).

Aeronautical Information Publication (AIP) means a publication issued by and with the authority of the State and containing aeronautical information of a lasting character essential to air navigation

Aeronautical Information Services (AIS) means a service established within the defined area of coverage responsible for the provision of aeronautical data and aeronautical information necessary for the safety, regularity and efficiency of air navigation.

Aeronautical telecommunication service means a provision of any communication, navigation and

surveillance (CNS) services for any aeronautical purpose, including any system that processes or displays air traffic control data

Air Traffic Safety Electronic Personnel means personnel engaged in the installation, operation or maintenance of a Communication, Navigation, Surveillance or Air Traffic Management (CNS/ATM) system and includes the personnel of a contractor

Aeronautical telecommunication log. A record of the activities of an aeronautical telecommunication station.

Air-report. A report from an aircraft in flight prepared in conformity with requirements for position, and operational and/or meteorological reporting.

Note: Details of the AIREP form are given in the PANS-ATM (Doc 4444).

Altitude. The vertical distance of a level, a point or an object considered as a point, measured from mean sea level (MSL).

ATS direct speech circuit. An aeronautical fixed service (AFS) telephone circuit, for direct exchange of information between air traffic services (ATS) units.

Automatic telecommunication log. A record of the activities of an aeronautical telecommunication station recorded by electrical or mechanical means.

Facility means equipment, building or services that support an aeronautical telecommunication service

Flight level. A surface of constant atmospheric pressure which is related to a specific pressure datum, 1013.2 hectopascals (hPa), and is separated from other such surfaces by specific pressure intervals.

Note 1: A pressure type altimeter calibrated in accordance with the standard atmosphere:

(a) when set to a QNH altimeter setting, will indicate altitude;

(b) when set to a QFE altimeter setting, will indicate height above the QFE reference datum;

(c) when set to a pressure 1 013.2 hPa, may be used to indicate flight levels.

Note 2: The terms "height" and "altitude", used in Note 1 above, indicate altimetric rather than geometric heights and altitudes.

Frequency channel. A continuous portion of the frequency spectrum appropriate for a transmission utilizing a specified class of emission.

Note: The classification of emissions and information relevant to the portion of the frequency spectrum appropriate for a given type of transmission (bandwidths) are specified in the ITU Radio Regulations, Article S2 and Appendix S1.

Height. The vertical distance of a level, a point or an object considered as a point, measured from a specified datum.

Human performance. Human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations.

Location indicator. A four-letter code group formulated in accordance with rules prescribed by ICAO and

assigned to the location of an aeronautical fixed station.

Malfunction incident means an incident related to the malfunction or failure of a facility

Maintenance contractor means an organisation contracted by the air navigation service provider to operate and maintain its facility on its behalf

Meteorological operational channel. A channel of the aeronautical fixed service (AFS), for the exchange of aeronautical meteorological information.

Meteorological operational telecommunication network. An integrated system of meteorological operational channels, as part of the aeronautical fixed service (AFS), for the exchange of aeronautical meteorological information between the aeronautical fixed stations within the network.

Note: "Integrated" is to be interpreted as a mode of operation necessary to ensure that the information can be transmitted and received by the stations within the network in accordance with pre-established schedules.

NOTAM. A notice distributed by means of telecommunication containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations.

Operational control communications. Communications required for the exercise of authority over the initiation, continuation, diversion or termination of a flight in the interest of the safety of the aircraft and the regularity and efficiency of a flight.

Note: Such communications are normally required for the exchange of messages between aircraft and aircraft operating agencies.

Provider means an organisation, person, persons or entity responsible for the provision of Aeronautical Telecommunications/CNS as approved by the Authority

Route segment. A route or portion of route usually flown without an intermediate stop.

Routing Directory. A list in a communication centre indicating for each addressee the outgoing circuit to be used.

Safety case means a process that documents the evidence and argument that a facility or change to a facility meets the safety objectives or levels for the facility

Safety incident means any incident involving a hazard to the provision of ATE facility which may or may not result in a service malfunction. Examples of safety incidents include:

- a fire or explosion at a facility
- hazards in the facility maintenance process such as human error which may have safety implications
- security breaches at a facility which may have safety implications

Serious service failure means a loss of aeronautical telecommunication service which breaches the established safety performance targets

SNOWTAM. A special series NOTAM notifying the presence or removal of hazardous conditions due to

snow, ice, slush or standing water associated with snow, slush and ice on the movement area, by means of a specific format.
System performance target means a set of performance targets for each facility which an air navigation service provider sets out to achieve as spelt out in its operations manual.

1.2.3 Annex 10 Volume III

Chapter 1

Aeronautical administrative communications (AAC). Communications necessary for the exchange of aeronautical administrative messages.

Aeronautical operational control (AOC). Communication required for the exercise of authority over the initiation, continuation, diversion or termination of flight for safety, regularity and efficiency reasons.

Aeronautical telecommunication network (ATN). A global internetwork architecture that allows ground, air-ground and avionic data subnetworks to exchange digital data for the safety of air navigation and for the regular, efficient and economic operation of air traffic services.

Aircraft address. A unique combination of twenty-four bits available for assignment to an aircraft for the purpose of air- ground communications, navigation and surveillance.

Aircraft earth station (AES). A mobile earth station in the aeronautical mobile-satellite service located on board an aircraft (see also “GES”).

Air traffic service. A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service).

Automatic dependent surveillance — contract (ADS-C). A means by which the terms of an ADS-C agreement will be exchanged between the ground system and the aircraft, via a data link, specifying under what conditions ADS-C reports would be initiated, and what data would be contained in the reports.

Automatic terminal information service (ATIS). The automatic provision of current, routine information to arriving and departing aircraft throughout 24 hours or a specified portion thereof.

> **Data link-automatic terminal information service (D-ATIS).** The provision of ATIS via data link.
>
> **Voice-automatic terminal information service (Voice-ATIS)**. The provision of ATIS by means of continuous and repetitive voice broadcasts.

Bit error rate (BER). The number of bit errors in a sample divided by the total number of bits in the sample, generally averaged over many such samples.

Carrier-to-multipath ratio (C/M). The ratio of the carrier power received directly, i.e. without reflection, to the multipath power, i.e. carrier power received via reflection.

Carrier-to-noise density ratio (C/N_o). The ratio of the total carrier power to the average noise power in a 1 Hz bandwidth, usually expressed in dBHz.

Channel rate. The rate at which bits are transmitted over the RF channel. These bits include those bits used for framing and error correction, as well as the information bits. For burst transmission, the channel rate

refers to the instantaneous burst rate over the period of the burst.

Channel rate accuracy. This is relative accuracy of the clock to which the transmitted channel bits are synchronized. For example, at a channel rate of 1.2 kbits/s, maximum error of one part in 10^6 implies the maximum allowed error in the clock is $\pm 1.2 \times 10^{-3}$ Hz.

Circuit mode. A configuration of the communications network which gives the appearance to the application of a dedicated transmission path.

Controller pilot data link communications (CPDLC). A means of communication between controller and pilot, using data link for ATC communications.

Data link flight information services (D-FIS). The provision of FIS via data link.

Doppler shift. The frequency shift observed at a receiver due to any relative motion between transmitter and receiver.

End-to-end. Pertaining or relating to an entire communication path, typically from (1) the interface between the information source and the communication system at the transmitting end to (2) the interface between the communication system and the information user or processor or application at the receiving end.

End-user. An ultimate source and/or consumer of information.

Energy per symbol to noise density ratio (E_s/N_o). The ratio of the average energy transmitted per channel symbol to the average noise power in a 1 Hz bandwidth, usually expressed in dB. For A-BPSK and A-QPSK, one channel symbol refers to one channel bit.

Equivalent isotropically radiated power (e.i.r.p.). The product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain).

Flight information service (FIS). A service provided for the purpose of giving advice and information useful for the safe and efficient conduct of flights.

Forward error correction (FEC). The process of adding redundant information to the transmitted signal in a manner which allows correction, at the receiver, of errors incurred in the transmission.

Gain-to-noise temperature ratio. The ratio, usually expressed in dB/K, of the antenna gain to the noise at the receiver output of the antenna subsystem. The noise is expressed as the temperature that a 1 ohm resistor must be raised to produce the same noise power density.

Ground earth station (GES). An earth station in the fixed satellite service, or, in some cases, in the aeronautical mobile-satellite service, located at a specified fixed point on land to provide a feeder link for the aeronautical mobile- satellite service.

Note: This definition is used in the ITU's Radio Regulations under the term "aeronautical earth station". The definition herein as "GES" for use in the SARPs is to clearly distinguish it from an aircraft earth station (AES), which is a mobile station on an aircraft.

Intermediate system (IS). A system which performs relaying and routing functions and comprises the lowest three layers of the OSI reference model.

Mode S subnetwork. A means of performing an interchange of digital data through the use of secondary

surveillance radar (SSR) Mode S interrogators and transponders in accordance with defined protocols.

Multilink. The ability to use more than one available air-ground subnetworks in order to provide the required performance.

Point-to-point. Pertaining or relating to the interconnection of two devices, particularly end-user instruments. A communication path of service intended to connect two discrete end-users; as distinguished from broadcast or multipoint service.

Router. A router is a node that forwards Internet protocol (IP) packets not explicitly addressed to itself. A router manages the relaying and routing of data while in transit from an originating end system to a destination end system.

Slotted aloha. A random access strategy whereby multiple users access the same communications channel independently, but each communication must be confined to a fixed time slot. The same timing slot structure is known to all users, but there is no other coordination between the users.

Time division multiple access (TDMA). A multiple access scheme based on time-shared use of an RF channel employing:

(1) discrete contiguous time slots as the fundamental shared resource; and

(2) a set of operating protocols that allows users to interact with a master control station to mediate access to the channel.

Time division multiplex (TDM). A channel sharing strategy in which packets of information from the same source but with different destinations are sequenced in time on the same channel.

Transit delay. In packet data systems, the elapsed time between a request to transmit an assembled data packet and an indication at the receiving end that the corresponding packet has been received and is ready to be used or forwarded.

VHF digital link (VDL). A constituent mobile subnetwork of the aeronautical telecommunication network (ATN), operating in the aeronautical mobile VHF frequency band. In addition, the VDL may provide non-ATN functions such as, for instance, digitized voice.

Chapter 3

Application entity (AE). An AE represents a set of ISO/OSI communication capabilities of a particular application process (see ISO/IEC 9545 for further details).

ATN security services. A set of information security provisions allowing the receiving end system or intermediate system to unambiguously identify (i.e. authenticate) the source of the received information and to verify the integrity of that information.

ATS interfacility data communication (AIDC). Automated data exchange between air traffic services units in support of flight notification, flight coordination, transfer of control and transfer of communication.

ATS message handling service (ATSMHS). An ATN application consisting of procedures used to exchange ATS messages in store-and-forward mode over the ATN such that the conveyance of an ATS message is in general not correlated with the conveyance of another ATS message by the service provider.

ATS message handling system (AMHS). The set of computing and communication resources

implemented by ATS organizations to provide the ATS message handling service.

Authorized path. A communication path suitable for a given message category.

Data link initiation capability (DLIC). A data link application that provides the ability to exchange addresses, names and version numbers necessary to initiate data link applications (see Doc 4444).

Directory service (DIR). A service, based on the ITU-T X.500 series of recommendations, providing access to and management of structured information relevant to the operation of the ATN and its users.

Required communication performance (RCP). A statement of the performance requirements for operational communication in support of specific ATM functions (see Manual on Required Communication Performance (RCP) (Doc 9869)).
Chapter 4

Connection establishment delay. Connection establishment delay, as defined in ISO 8348, includes a component, attributable to the called subnetwork (SN) service user, which is the time between the SN-CONNECT indication and the SN-CONNECT response. This user component is due to actions outside the boundaries of the satellite subnetwork and is therefore excluded from the AMS(R)S specifications.

Data transfer delay (95th percentile). The 95th percentile of the statistical distribution of delays for which transit delay is the average.

Data transit delay. In accordance with ISO 8348, the average value of the statistical distribution of data delays. This delay represents the subnetwork delay and does not include the connection establishment delay.

Network (N). The word "network" and its abbreviation "N" in ISO 8348 are replaced by the word "subnetwork" and its abbreviation "SN", respectively, wherever they appear in relation to the subnetwork layer packet data performance.

Residual error rate. The ratio of incorrect, lost and duplicate subnetwork service data units (SNSDUs) to the total number of SNSDUs that were sent.

Spot beam. Satellite antenna directivity whose main lobe encompasses significantly less than the earth's surface that is within line-of-sight view of the satellite. May be designed so as to improve system resource efficiency with respect to geographical distribution of user earth stations.

Subnetwork (SN). See Network (N).

Subnetwork service data unit (SNSDU). An amount of subnetwork user data, the identity of which is preserved from one end of a subnetwork connection to the other.

Total voice transfer delay. The elapsed time commencing at the instant that speech is presented to the AES or GES and concluding at the instant that the speech enters the interconnecting network of the counterpart GES or AES. This delay includes vocoder processing time, physical layer delay, RF propagation delay and any other delays within an AMS(R)S subnetwork.

Note: The following terms used in Annex 10 Volume III are as follows:

- *Aeronautical telecommunication network (ATN): Volume III, Chapter 1.*
- *Aeronautical mobile-satellite (route) service (AMS(R)S): Volume II, Chapter 1.1.*

- *Aircraft earth station (AES): Volume III, Chapter 1.*
- *Ground earth station (GES): Volume III, Chapter 1.*
- *Subnetwork layer: Volume III, Chapter 6.1.*

Chapter 5

Aircraft. The term aircraft may be used to refer to Mode S emitters (e.g. aircraft/vehicles), where appropriate.

Aircraft address. A unique combination of 24 bits available for assignment to an aircraft for the purpose of air-ground communications, navigation and surveillance.

Aircraft data circuit-terminating equipment (ADCE). An aircraft specific data circuit-terminating equipment that is associated with an airborne data link processor (ADLP). It operates a protocol unique to Mode S data link for data transfer between air and ground.

Aircraft data link processor (ADLP). An aircraft-resident processor that is specific to a particular air-ground data link (e.g. Mode S) and which provides channel management, and segments and/or reassembles messages for transfer. It is connected to one side of aircraft elements common to all data link systems and on the other side to the air-ground link itself.

Aircraft/vehicle. May be used to describe either a machine or device capable of atmospheric flight, or a vehicle on the airport surface movement area (i.e. runways and taxiways).

Air-initiated protocol. A procedure initiated by a Mode S aircraft installation for delivering a standard length or extended length downlink message to the ground.

BDS Comm-B Data Selector. The 8-bit BDS code determines the register whose contents are to be transferred in the MB field of a Comm-B reply. It is expressed in two groups of 4 bits each, BDS1 (most significant 4 bits) and BDS2 (least significant 4 bits).

Broadcast. The protocol within the Mode S system that permits uplink messages to be sent to all aircraft in coverage area, and downlink messages to be made available to all interrogators that have the aircraft wishing to send the message under surveillance.

Capability report. Information identifying whether the transponder has a data link capability as reported in the capability (CA) field of an all-call reply or squitter transmission (see “data link capability report”).

Close-out. A command from a Mode S interrogator that terminates a Mode S link layer communication transaction.

Cluster of interrogators. Two or more interrogators with the same interrogator identifier (II) code, operating cooperatively to ensure that there is no interference to the required surveillance and data link performance of each of the interrogators, in areas of common coverage.

Comm-A. A 112-bit interrogation containing the 56-bit MA message field. This field is used by the uplink standard length message (SLM) and broadcast protocols.

Comm-B. A 112-bit reply containing the 56-bit MB message field. This field is used by the downlink SLM, ground-initiated and broadcast protocols.

Comm-C. A 112-bit interrogation containing the 80-bit MC message field. This field is used by the uplink extended length message (ELM) protocol.

Comm-D. A 112-bit reply containing the 80-bit MD message field. This field is used by the downlink ELM protocol.

Connection. A logical association between peer-level entities in a communication system.

Data link capability report. Information in a Comm-B reply identifying the complete Mode S communications capabilities of the aircraft installation.
Downlink. A term referring to the transmission of data from an aircraft to the ground. Mode S air-to-ground signals are transmitted on the 1 090 MHz reply frequency channel.

Extended length message (ELM). A series of Comm-C interrogations (uplink ELM) transmitted without the requirement for intervening replies, or a series of Comm-D replies (downlink ELM) transmitted without intervening interrogations.

Uplink ELM (UELM). A term referring to extended length uplink communication by means of 112-bit Mode S Comm-C interrogations, each containing the 80-bit Comm-C message field (MC).

Downlink ELM (DELM). A term referring to extended length downlink communication by means of 112-bit Mode S Comm-D replies, each containing the 80-bit Comm-D message field (MD).

Frame. The basic unit of transfer at the link level. In the context of Mode S subnetwork, a frame can include from one to four Comm-A or Comm-B segments, from two to sixteen Comm-C segments, or from one to sixteen Comm-D segments.

General formatter/manager (GFM). The aircraft function responsible for formatting messages to be inserted in the transponder registers. It is also responsible for detecting and handling error conditions such as the loss of input data.

Ground data circuit-terminating equipment (GDCE). A ground specific data circuit-terminating equipment associated with a ground data link processor (GDLP). It operates a protocol unique to Mode S data link for data transfer between air and ground.

Ground data link processor (GDLP). A ground-resident processor that is specific to a particular air-ground data link (e.g. Mode S), and which provides channel management, and segments and/or reassembles messages for transfer. It is connected on one side (by means of its DCE) to ground elements common to all data link systems, and on the other side to the air-ground link itself.

Ground-initiated Comm-B (GICB). The ground-initiated Comm-B protocol allows the interrogator to extract Comm-B replies containing data from a defined source in the MB field.

Ground-initiated protocol. A procedure initiated by a Mode S interrogator for delivering standard length or extended length messages to a Mode S aircraft installation.

Mode S air-initiated Comm-B (AICB) protocol. A procedure initiated by a Mode S transponder for transmitting a single Comm-B segment from the aircraft installation.

Mode S broadcast protocols. Procedures allowing standard length uplink or downlink messages to be received by more than one transponder or ground interrogator respectively.

Mode S ground-initiated Comm-B (GICB) protocol. A procedure initiated by a Mode S interrogator for eliciting a single Comm-B segment from a Mode S aircraft installation, incorporating the contents of one of 255 Comm-B registers within the Mode S transponder.

Mode S multisite-directed protocol. A procedure to ensure that extraction and close-out of a downlink standard length or extended length message is affected only by the particular Mode S interrogator selected by the aircraft.

Mode S packet. A packet conforming to the Mode S subnetwork standard, designed to minimize the bandwidth required from the air-ground link. ISO 8208 packets may be transformed into Mode S packets and vice-versa.

Mode S specific protocol (MSP). A protocol that provides restricted datagram service within the Mode S subnetwork.

Mode S specific services. A set of communication services provided by the Mode S system which are not available from other air-ground subnetworks, and therefore not interoperable.

Mode S specific services entity (SSE). An entity resident within an XDLP to provide access to the Mode S specific services.

Packet. The basic unit of data transfer among communication devices within the network layer (e.g. an ISO 8208 packet or a Mode S packet).

Segment. A portion of a message that can be accommodated within a single MA/MB field in the case of a standard length message, or MC/MD field in the case of an extended length message. This term is also applied to the Mode S transmissions containing these fields.

Standard length message (SLM). An exchange of digital data using selectively addressed Comm-A interrogations and/or Comm-B replies (see “Comm-A” and “Comm-B”).

Subnetwork. An actual implementation of a data network that employs a homogeneous protocol and addressing plan, and is under the control of a single authority.

Subnetwork management entity (SNME). An entity resident within a GDLP that performs subnetwork management and communicates with peer entities in intermediate or end-systems.

Timeout. The cancellation of a transaction after one of the participating entities has failed to provide a required response within a pre-defined period of time.

Uplink. A term referring to the transmission of data from the ground to an aircraft. Mode S ground-to-air signals are transmitted on the 1 030 MHz interrogation frequency channel.

XDCE. A general term referring to both the ADCE and the GDCE.

XDLP. A general term referring to both the ADLP and the GDLP.

Chapter 6

Automatic dependent surveillance-broadcast (ADS-B). A means by which aircraft, aerodrome vehicles and other objects can automatically transmit and/or receive data such as identification, position and additional data, as appropriate, in a broadcast mode via a data link.

Broadcast. A transmission of information relating to air navigation that is not addressed to a specific station or stations.

Burst. A time-defined, contiguous set of one or more related signal units which may convey user information and protocols, signalling, and any necessary preamble.

Current slot. The slot in which a received transmission begins.
Data circuit-terminating equipment (DCE). A DCE is a network provider equipment used to facilitate communications between DTEs.

Data link entity (DLE). A protocol state machine capable of setting up and managing a single data link connection.

Data link service (DLS) sublayer. The sublayer that resides above the MAC sublayer. For VDL Mode 4, the DLS sublayer resides above the VSS sublayer. The DLS manages the transmit queue, creates and destroys DLEs for connection- oriented communications, provides facilities for the LME to manage the DLS, and provides facilities for connectionless communications.

Data terminal equipment (DTE). A DTE is an endpoint of a subnetwork connection.

Extended Golay Code. An error correction code capable of correcting multiple bit errors.

Frame. The link layer frame is composed of a sequence of address, control, FCS and information fields. For VDL Mode 2, these fields are bracketed by opening and closing flag sequences, and a frame may or may not include a variable-length information field.

Gaussian filtered frequency shift keying (GFSK). A continuous-phase, frequency shift keying technique using two tones and a Gaussian pulse shape filter.

Global signalling channel (GSC). A channel available on a worldwide basis which provides for communication control.

Link. A link connects an aircraft DLE and a ground DLE and is uniquely specified by the combination of aircraft DLS address and the ground DLS address. A different subnetwork entity resides above every link endpoint.

Link layer. The layer that lies immediately above the physical layer in the Open Systems Interconnection protocol model. The link layer provides for the reliable transfer of information across the physical media. It is subdivided into the data link sublayer and the media access control sublayer.

Link management entity (LME). A protocol state machine capable of acquiring, establishing and maintaining a connection to a single peer system. An LME establishes data link and subnetwork connections, “hands-off” those connections, and manages the media access control sublayer and physical layer. An aircraft LME tracks how well it can communicate with the ground stations of a single ground system. An aircraft VME instantiates an LME for each ground station that it monitors. Similarly, the ground VME instantiates an LME for each aircraft that it monitors. An LME is deleted when communication with the peer system is no longer viable.

M burst. A management channel data block of bits used in VDL Mode 3. This burst contains signalling information needed for media access and link status monitoring.

Media access control (MAC). The sublayer that acquires the data path and controls the movement of bits over the data path.

Mode 2. A data-only VDL mode that uses D8PSK modulation and a carrier sense multiple access (CSMA) control scheme.

Mode 3. A voice and data VDL mode that uses D8PSK modulation and a TDMA media access control scheme.

Mode 4. A data-only VDL mode using a GFSK modulation scheme and self-organizing time division multiple access (STDMA).

Physical layer. The lowest level layer in the Open Systems Interconnection protocol model. The physical layer is concerned with the transmission of binary information over the physical medium (e.g. VHF radio).

Quality of service. The information relating to data transfer characteristics used by various communication protocols to achieve various levels of performance for network users.

Reed-Solomon code. An error correction code capable of correcting symbol errors. Since symbol errors are collections of bits, these codes provide good burst error correction capabilities.

Self-organizing time division multiple access (STDMA). A multiple access scheme based on time-shared use of a radio frequency (RF) channel employing: (1) discrete contiguous time slots as the fundamental shared resource; and (2) a set of operating protocols that allows users to mediate access to these time slots without reliance on a master control station.

Slot. One of a series of consecutive time intervals of equal duration. Each burst transmission starts at the beginning of a slot.

Subnetwork connection. A long-term association between an aircraft DTE and a ground DTE using successive virtual calls to maintain context across link handoff.

Subnetwork dependent convergence function (SNDCF). A function that matches the characteristics and services of a particular subnetwork to those characteristics and services required by the internetwork facility.

Subnetwork entity. In this document, the phrase “ground DCE” will be used for the subnetwork entity in a ground station communicating with an aircraft; the phrase “ground DTE” will be used for the subnetwork entity in a ground router communicating with an aircraft station; and, the phrase “aircraft DTE” will be used for the subnetwork entity in an aircraft communicating with the station. A subnetwork entity is a packet layer entity as defined in ISO 8208.

Subnetwork layer. The layer that establishes, manages and terminates connections across a subnetwork.

System. A VDL-capable entity. A system comprises one or more stations and the associated VDL management entity. A system may either be an aircraft system or a ground system.

Time division multiple access (TDMA). A multiple access scheme based on time-shared use of an RF channel employing:

(1) discrete contiguous time slots as the fundamental shared resource; and

(2) a set of operating protocols that allows users to interact with a master control station to mediate access to the channel.

User group. A group of ground and/or aircraft stations which share voice and/or data connectivity. For voice communications, all members of a user group can access all communications. For data, communications include point-to-point connectivity for air-to-ground messages, and point-to-point and broadcast connectivity for ground-to-air messages.

VDL management entity (VME). A VDL-specific entity that provides the quality of service requested by the ATN-defined SN_SME. A VME uses the LMEs (that it creates and destroys) to enquire the quality of service available from peer systems.

VDL Mode 4 burst. A VHF digital link (VDL) Mode 4 burst is composed of a sequence of source address, burst ID, information, slot reservation and frame check sequence (FCS) fields, bracketed by opening and closing flag sequences.

Note: The start of a burst may occur only at quantized time intervals and this constraint allows the propagation delay between the transmission and reception to be derived.

VDL Mode 4 DLS system. A VDL system that implements the VDL Mode 4 DLS and subnetwork protocols to carry ATN packets or other packets.

VDL Mode 4 specific services (VSS) sublayer. The sublayer that resides above the MAC sublayer and provides VDL Mode 4 specific access protocols including reserved, random and fixed protocols.

VDL station. An aircraft-based or ground-based physical entity, capable of VDL Mode 2, 3 or 4.

Note: A VDL station may also be referred to as a "station".

Vocoder. A low bit rate voice encoder/decoder.

Voice unit. A device that provides a simplex audio and signalling interface between the user and VDL.

VSS user. A user of the VDL Mode 4 specific services. The VSS user could be higher layers in the VDL Mode 4 SARPs or an external application using VDL Mode 4.

Chapter 7

Adaptive modulation. A system's ability to communicate with another system using multiple burst profiles and a system's ability to subsequently communicate with multiple systems using different burst profiles.

Aerodrome. A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

Aeronautical Mobile Airport Communications System (AeroMACS). A high-capacity data link supporting mobile and fixed communications on the aerodrome surface.

AeroMACS downlink (DL). The transmission direction from the base station (BS) to the mobile station (MS).

AeroMACS uplink (UL). The transmission direction from the mobile station (MS) to the base station (BS).

AeroMACS handover. The process in which a mobile station (MS) migrates from the air-interface provided by one base station (BS) to the air-interface provided by another BS. A break-before-make AeroMACS handover is where service with the target BS starts after a disconnection of service with the previous serving BS.

Base station (BS). A generalized equipment set providing connectivity, management and control of the mobile station (MS).

Bit error rate (BER). The number of bit errors in a sample divided by the total number of bits in the sample, generally averaged over many such samples.

Burst profile. Set of parameters that describe the uplink or downlink transmission properties associated with an interval usage code. Each profile contains parameters such as modulation type, forward error correction (FEC) type, preamble length, guard times, etc.

Convolutional turbo codes (CTC). Type of forward error correction (FEC) code.

Data transit delay. In accordance with ISO 8348, the average value of the statistical distribution of data delays. This delay represents the subnetwork delay and does not include the connection establishment delay.

Domain. A set of end systems and intermediate systems that operate according to the same routing procedures and that is wholly contained within a single administrative domain.

Forward error correction. The process of adding redundant information to the transmitted signal in a manner which allows correction, at the receiver, of errors incurred in the transmission.

Frequency assignment. A logical assignment of centre frequency and channel bandwidth programmed to the base station (BS).

Mobile station (MS). A station in the mobile service intended to be used while in motion or during halts at unspecified points. An MS is always a subscriber station (SS).

Partial usage sub-channelization (PUSC). A technique in which the orthogonal frequency division multiplexing (OFDM) symbol subcarriers are divided and permuted among a subset of sub-channels for transmission, providing partial frequency diversity.

Residual error rate. The ratio of incorrect, lost and duplicate subnetwork service data units (SNSDUs) to the total number of SNSDUs that were sent.

Service data unit (SDU). A unit of data transferred between adjacent layer entities, which is encapsulated within a protocol data unit (PDU) for transfer to a peer layer.

Service flow. A unidirectional flow of media access control layer (MAC) service data units (SDUs) on a connection that is providing a particular quality of service (QoS).

Subscriber station (SS). A generalized equipment set providing connectivity between subscriber equipment and a base station (BS).

Subnetwork entry time. The time from when the mobile station starts the scanning for BS transmission,

until the network link establishes the connection, and the first network user "protocol data unit" can be sent.

Subnetwork service data unit (SNSDU). An amount of subnetwork user data, the identity of which is preserved from one end of a subnetwork connection to the other.

Time division duplex (TDD). A duplex scheme where uplink and downlink transmissions occur at different times but may share the same frequency.

Chapter 8

Data signalling rate. Data signalling rate refers to the passage of information per unit of time, and is expressed in bits/second. Data signalling rate is given by the formula:

$$\sum_{i=1}^{i=m} \frac{1}{T_i} \log_2 n_i$$

where m is the number of parallel channels, T_i is the minimum interval for the ith channel expressed in seconds, n_i is the number of significant conditions of the modulation in the ith channel.

Note 1:

(a) For a single channel (serial transmission) it reduces to $(1/T)\log_2 n$; with a two-condition modulation (n = 2), it is 1/T.

(b) For a parallel transmission with equal minimum intervals and equal number of significant conditions on each channel, it is $m(1/T)\log_2 n$ (m(1/T) in case of a two-condition modulation).

Note 2: In the above definition, the term "parallel channels" is interpreted to mean: channels, each of which carries an integral part of an information unit, e.g. the parallel transmission of bits forming a character. In the case of a circuit comprising a number of channels, each of which carries information "independently", with the sole purpose of increasing the traffic handling capacity, these channels are not to be regarded as parallel channels in the context of this definition.

Degree of standardized test distortion. The degree of distortion of the restitution measured during a specific period of time when the modulation is perfect and corresponds to a specific text.

Effective margin. That margin of an individual apparatus which could be measured under actual operating conditions.

Low modulation rates. Modulation rates up to and including 300 bauds.

Margin. The maximum degree of distortion of the circuit at the end of which the apparatus is situated which is compatible with the correct translation of all the signals which it may possibly receive.

Medium modulation rates. Modulation rates above 300 and up to and including 3 000 bauds.

Modulation rate. The reciprocal of the unit interval measured in seconds. This rate is expressed in bauds.

Note: Telegraph signals are characterized by intervals of time of duration equal to or longer than the shortest or unit interval. The modulation rate (formerly telegraph speed) is therefore expressed as the inverse of the value of this unit interval. If, for example, the unit interval is 20 milliseconds, the modulation rate is 50 bauds.

Synchronous operation. Operation in which the time interval between code units is a constant.

Chapter 11

Coded chip. A "1" or "0" output of the rate ½ or ¼ convolutional code encoder.

Designated operational coverage (DOC) area. The area in which a particular service is provided and in which the service is afforded frequency protection.

Note: This area may, after proper coordination to ensure frequency protection, extend to areas outside the allotment areas contained in Appendix S27 to the Radio Regulations.

Direct link service (DLS). A data communications service which makes no attempt to automatically correct errors, detected or undetected, at the link layer of the air-ground communications path. (Error control may be effected by end-user systems.)

High frequency network protocol data unit (HFNPDU). User data packet.

Link protocol data unit (LPDU). Data unit which encapsulates a segment of an HFNPDU.

M-ary phase shift keying (M-PSK) modulation. A digital phase modulation that causes the phase of the carrier waveform to take on one of a set of M values.

Media access protocol data unit (MPDU). Data unit which encapsulates one or more LPDUs.

M-PSK symbol. One of the M possible phase shifts of the M-PSK modulated carrier representing a group of $\log_2 M$ coded chips.

Peak envelope power (PEP). The peak power of the modulated signal supplied by the transmitter to the antenna transmission line.

Physical layer protocol data unit (PPDU). Data unit passed to the physical layer for transmission, or decoded by the physical layer after reception.

Quality of service (QOS). The information relating to data transfer characteristics used by various communications protocols to achieve various levels of performance for network users.

Reliable link service (RLS). A data communications service provided by the subnetwork which automatically provides for error control over its link through error detection and requested retransmission of signal units found to be in error.

Squitter protocol data unit (SPDU). Data packet which is broadcast every 32 seconds by an HFDL ground station on each of its operating frequencies, and which contains link management information.

Chapter 12

High performance receiver. A UAT receiver with enhanced selectivity to further improve the rejection of adjacent frequency DME interference (see 12.3.2.2 for further details).

Optimum sampling point. The optimum sampling point of a received UAT bit stream is at the nominal centre of each bit period, when the frequency offset is either plus or minus 312.5 kHz.

Power measurement point (PMP). A cable connects the antenna to the UAT equipment. The PMP is the

end of that cable that attaches to the antenna. All power measurements are considered as being made at the PMP unless otherwise specified. The cable connecting the UAT equipment to the antenna is assumed to have 3 dB of loss.

Pseudorandom message data block. Several UAT requirements state that performance will be tested using pseudorandom message data blocks. Pseudorandom message data blocks should have statistical properties that are nearly indistinguishable from those of a true random selection of bits. For instance, each bit should have (nearly) equal probability of being a ONE or a ZERO, independent of its neighbouring bits. There should be a large number of such pseudorandom message data blocks for each message type (Basic ADS-B, Long ADS-B or Ground Uplink) to provide sufficient independent data for statistical performance measurements. See Section 2.3 of Part I of the Manual on the Universal Access Transceiver (UAT) (Doc 9861) for an example of how to provide suitable pseudorandom message data blocks.
Service volume. A part of the facility coverage where the facility provides a particular service in accordance with relevant SARPs and within which the facility is afforded frequency protection.

Standard UAT receiver. A general purpose UAT receiver satisfying the minimum rejection requirements of interference from adjacent frequency distance measuring equipment (DME) (see 12.3.2.2 for further details).

Successful message reception (SMR). The function within the UAT receiver for declaring a received message as valid for passing to an application that uses received UAT messages. See Section 4 of Part I of the Manual on the Universal Access Transceiver (UAT) (Doc 9861) for a detailed description of the procedure to be used by the UAT receiver for declaring successful message reception.

UAT ADS-B message. A message broadcasted once per second by each aircraft to convey state vector and other information. UAT ADS-B messages can be in one of two forms depending on the amount of information to be transmitted in a given second: the Basic UAT ADS-B Message or the Long UAT ADS-B Message (see 12.4.4.1 for definition of each). UAT ground stations can support traffic information service-broadcast (TIS-B) through transmission of individual ADS-B messages in the ADS-B segment of the UAT frame.

UAT ground uplink message. A message broadcasted by ground stations, within the ground segment of the UAT frame, to convey flight information such as text and graphical weather data, advisories, and other aeronautical information, to aircraft that are in the service volume of the ground station (see 12.4.4.2 for further details).

Universal access transceiver (UAT). A broadcast data link operating on 978 MHz, with a modulation rate of 1.041667 Mbps.

1.2.4 Annex 10 Volume IV

Chapter 1

Airborne collision avoidance system (ACAS). An aircraft system based on secondary surveillance radar (SSR) transponder signals which operates independently of ground-based equipment to provide advice to the pilot on potential conflicting aircraft that are equipped with SSR transponders.

Note: SSR transponders referred to above are those operating in Mode C or Mode S. ACAS may also use automatic dependent surveillance — broadcast (ADS-B) signals received from other aircraft to improve its performance.

Aircraft address. A unique combination of twenty-four bits available for assignment to an aircraft for the purpose of air- ground communications, navigation and surveillance.

Note: SSR Mode S transponders transmit extended squitters to support the broadcast of aircraft-derived position for surveillance purposes. The broadcast of this type of information is a form of automatic dependent surveillance (ADS) known as ADS-broadcast (ADS-B).

Automatic dependent surveillance-broadcast (ADS-B) OUT. A function on an aircraft or vehicle that periodically broadcasts its state vector (position and velocity) and other information derived from on-board systems in a format suitable for ADS-B IN capable receivers.

Automatic dependent surveillance-broadcast (ADS-B) IN. A function that receives surveillance data from ADS-B OUT data sources.

Collision avoidance logic. The sub-system or part of ACAS that analyses data relating to an intruder and own aircraft, decides whether or not advisories are appropriate and, if so, generates the advisories. It includes the following functions: range and altitude tracking, threat detection and RA generation. It excludes surveillance.

Human Factors principles. Principles which apply to design, certification, training, operations and maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.

Secondary surveillance radar (SSR). A surveillance radar system which uses transmitters/receivers (interrogators) and transponders.

Surveillance radar. Radar equipment used to determine the position of an aircraft in range and azimuth.

Traffic information service – broadcast (TIS-B) IN. A surveillance function that receives and processes surveillance data from TIS-B OUT data sources.

Traffic information service – broadcast (TIS-B) OUT. A function on the ground that periodically broadcasts the surveillance information made available by ground sensors in a format suitable for TIS-B IN capable receivers.

Note: This technique can be achieved through different data links. The requirements for Mode S extended squitters are specified in Annex 10, Volume IV, Chapter 5. The requirements for VHF digital link (VDL) Mode 4 and universal access transceiver (UAT) are specified in Annex 10, Volume III, Part I.

Transponder occupancy. A state of unavailability of the transponder from the time it detects an incoming signal that appears to cause some action or from the time of a self-initiated transmission, to the time that it is capable of replying to another interrogation.

Note: Signals from various systems that contribute to transponder occupancy are described in the Aeronautical Surveillance Manual (Doc 9924), Appendix M.

Chapter 4

Definitions Relating to Airborne Collision Avoidance System

ACAS I. An ACAS which provides information as an aid to “see and avoid” action but does not include the capability for generating resolution advisories (RAs).

Note: ACAS I is not intended for international implementation and standardization by ICAO. Therefore,

only ACAS I characteristics required to ensure compatible operation with other ACAS configurations and interference limiting are defined in 4.2.

ACAS II. An ACAS which provides vertical resolution advisories (RAs) in addition to traffic advisories (TAs).

ACAS III. An ACAS which provides vertical and horizontal resolution advisories (RAs) in addition to traffic advisories (TAs).

ACAS broadcast. A long Mode S air-air surveillance interrogation (UF = 16) with the broadcast address.

Active RAC. An RAC is active if it currently constrains the selection of the RA. RACs that have been received within the last six seconds and have not been explicitly cancelled are active.

Altitude crossing RA. A resolution advisory is altitude crossing if own ACAS aircraft is currently at least 30 m (100 ft) below or above the threat aircraft for upward or downward sense advisories, respectively.
Climb RA. A positive RA recommending a climb but not an increased climb.

Closest approach. The occurrence of minimum range between own ACAS aircraft and the intruder. Thus range at closest approach is the smallest range between the two aircraft and time of closest approach is the time at which this occurs.

Coordination. The process by which two ACAS-equipped aircraft select compatible resolution advisories (RAs) by the exchange of resolution advisory complements (RACs).

Coordination interrogation. A Mode S interrogation (uplink transmission) radiated by ACAS II or III and containing a resolution message.

Coordination reply. A Mode S reply (downlink transmission) acknowledging the receipt of a coordination interrogation by the Mode S transponder that is part of an ACAS II or III installation.

Corrective RA. A resolution advisory that advises the pilot to deviate from the current flight path.

Cycle. The term “cycle” used in this chapter refers to one complete pass through the sequence of functions executed by ACAS II or ACAS III, nominally once a second.

Descend RA. A positive RA recommending a descent but not an increased descent.

Established track. A track generated by ACAS air-air surveillance that is treated as the track of an actual aircraft.

Increased rate RA. A resolution advisory with a strength that recommends increasing the altitude rate to a value exceeding that recommended by a previous climb or descend RA.

Intruder. An aircraft for which ACAS has an established track.

Own aircraft. The aircraft fitted with the ACAS that is the subject of the discourse, which ACAS is to protect against possible collisions, and which may enter a manoeuvre in response to an ACAS indication.

Positive RA. A resolution advisory that advises the pilot either to climb or to descend (applies to ACAS II).

Potential threat. An intruder deserving special attention either because of its close proximity to own aircraft or because successive range and altitude measurements indicate that it could be on a collision or near-collision course with own aircraft. The warning time provided against a potential threat is sufficiently small that a traffic advisory (TA) is justified but not so small that a resolution advisory (RA) would be justified.

Preventive RA. A resolution advisory that advises the pilot to avoid certain deviations from the current flight path but does not require any change in the current flight path.

RA sense. The sense of an ACAS II RA is "upward" if it requires climb or limitation of descent rate and "downward" if it requires descent or limitation of climb rate. It can be both upward and downward simultaneously if it requires limitation of the vertical rate to a specified range.

Note: The RA sense may be both upward and downward when, having several simultaneous threats, ACAS generates an RA aimed at ensuring adequate separation below some threat(s) and above some other threat(s).

Resolution advisory (RA). An indication given to the flight crew recommending:

(a) a manoeuvre intended to provide separation from all threats; or

(b) a manoeuvre restriction intended to maintain existing separation.

Resolution advisory complement (RAC). Information provided by one ACAS to another via a Mode S interrogation in order to ensure complementary manoeuvres by restricting the choice of manoeuvres available to the ACAS receiving the RAC.

Resolution advisory complements record (RAC record). A composite of all currently active vertical RACs (VRCs) and horizontal RACs (HRCs) that have been received by ACAS. This information is provided by one ACAS to another ACAS or to a Mode S ground station via a Mode S reply.

Resolution advisory strength. The magnitude of the manoeuvre indicated by the RA. An RA may take on several successive strengths before being cancelled. Once a new RA strength is issued, the previous one automatically becomes void.

Resolution message. The message containing the resolution advisory complement (RAC).

Reversed sense RA. A resolution advisory that has had its sense reversed.

Sensitivity level (S). An integer defining a set of parameters used by the traffic advisory (TA) and collision avoidance algorithms to control the warning time provided by the potential threat and threat detection logic, as well as the values of parameters relevant to the RA selection logic.

Note: For TA and RA selection, sensitivity level is not used in ACAS X compliant systems.

Threat. An intruder deserving special attention either because of its close proximity to own aircraft or because successive range and altitude measurements indicate that it could be on a collision or near-collision course with own aircraft. The warning time provided against a threat is sufficiently small that an RA is justified.

Track. A sequence of measurements representing positions that could reasonably have been occupied by an aircraft.

Traffic advisory (TA). An indication given to the flight crew that a certain intruder is a potential threat.

Vertical speed limit (VSL) RA. A resolution advisory advising the pilot to avoid a given range of altitude rates. A VSL RA can be either corrective or preventive.

Warning time. The time interval between potential threat or threat detection and closest approach when neither aircraft accelerates.

Definitions relating to the performance of the collision avoidance logic

Note: The notation (t_1, t_2) is used to indicate the interval between t_1 and t_2.

Altitude layer. Each encounter is attributed to one of six altitude layers as follows:

Layer	1	2	3	4	5	6
from		2 300 ft	5 000 ft	10 000 ft	20 000 ft	41 000 ft
to	2 300 ft	5 000 ft	10 000 ft	20 000 ft	41 000 ft	

The altitude layer of an encounter is determined by the average altitude of the two aircraft at closest approach.

Note: For the purposes of defining the performance of the collision avoidance logic, there is no need to specify the physical basis of the altitude measurement or the relationship between altitude and ground level.

Approach angle. The difference in the ground headings of the two aircraft at closest approach, with 180 degrees defined as head on and 0 degrees defined as parallel.

Crossing encounter. An encounter in which the altitude separation of the two aircraft exceeds 100 ft at the beginning and at the end of the encounter window, and the relative vertical position of two aircraft at the end of the encounter window is reversed from that at the beginning of the encounter window.

Encounter. For the purposes of defining the performance of the collision avoidance logic, an encounter consists of two simulated aircraft trajectories. The horizontal coordinates of the aircraft represent the actual position of the aircraft but the vertical coordinate represents an altimeter measurement of altitude.

Encounter class. Encounters are classified according to whether or not the aircraft are transitioning at the beginning and end of the encounter window, and whether or not the encounter is crossing.

Encounter window. The time interval (tca – 40 s, tca + 10 s).

Horizontal miss distance (hmd). The minimum horizontal separation observed in an encounter.

Level aircraft. An aircraft that is not transitioning.

Original trajectory. The original trajectory of an ACAS-equipped aircraft is that followed by the aircraft in the same encounter when it was not ACAS equipped.

Original rate. The original rate of an ACAS-equipped aircraft at any time is its altitude rate at the same time when it followed the original trajectory.

Required rate. For the standard pilot model, the required rate is that closest to the original rate consistent with the RA.

tca. Nominally, the time of closest approach. For encounters in the standard encounter model, a reference time for the construction of the encounter at which various parameters, including the vertical and horizontal separation (vmd and hmd), are specified.

Note: Encounters in the standard encounter model are constructed by building the trajectories of the two aircraft outwards starting at tca. When the process is complete, tca may not be the precise time of closest approach and differences of a few seconds are acceptable.

Transitioning aircraft. An aircraft having an average vertical rate with a magnitude exceeding 400 feet per minute (ft/min), measured over some period of interest.

Turn extent. A heading difference defined as an aircraft's ground heading at the end of a turn minus its ground heading at the beginning of the turn.

Vertical miss distance (vmd). Notionally, the vertical separation at closest approach. For encounters in the standard encounter model, by construction the vertical separation at the time tca.

Chapter 6

Multi-lateration (MLAT) System. A group of equipment configured to provide position derived from the secondary surveillance radar (SSR) transponder signals (replies or squitters) primarily using time difference of arrival (TDOA) techniques. Additional information, including identification, can be extracted from the received signals.

Time Difference of Arrival (TDOA). The difference in relative time that a transponder signal from the same aircraft (or ground vehicle) is received at different receivers.

Wide area multi-lateration (WAM) system. A multi-lateration system deployed to support en-route surveillance, terminal area surveillance and other applications such as height monitoring and precision runway monitoring (PRM).

1.2.5 Annex 10 Volume V

Alternative means of communication. A means of communication provided with equal status, and in addition to the primary means.

Double channel simplex. Simplex using two frequency channels, one in each direction.

Note: This method was sometimes referred to as cross-band.

Duplex. A method in which telecommunication between two stations can take place in both directions simultaneously.

Frequency channel. A continuous portion of the frequency spectrum appropriate for a transmission utilizing a specified class of emission.

Note: The classification of emissions and information relevant to the portion of the frequency spectrum appropriate for a given type of transmission (bandwidths) are specified in the Radio Regulations, Article 2 and Appendix 1.

Offset frequency simplex. A variation of single channel simplex wherein telecommunication between two stations is effected by using in each direction frequencies that are intentionally slightly different but

contained within a portion of the spectrum allotted for the operation.

Operational control communications. Communications required for the exercise of authority over the initiation, continuation, diversion or termination of a flight in the interest of the safety of the aircraft and the regularity and efficiency of a flight.

Note: Such communications are normally required for the exchange of messages between aircraft and aircraft operating agencies.

Primary means of communication. The means of communication to be adopted normally by aircraft and ground stations as a first choice where alternative means of communication exist.

Simplex. A method in which telecommunication between two stations takes place in one direction at a time.

Note: In application to the aeronautical mobile service, this method may be subdivided as follows:

(a) single channel simplex;

(b) double channel simplex;

(c) offset frequency simplex.

Single channel simplex. Simplex using the same frequency channel in each direction.

VHF digital link (VDL). A constituent mobile subnetwork of the aeronautical telecommunication network (ATN), operating in the aeronautical mobile VHF frequency band. In addition, the VDL may provide non-ATN functions such as, for instance, digitized voice.

WAIC component. Any tangible entity of a WAIC network on board an aircraft.

WAIC network. A network comprised of interrelated WAIC components, such as components used for wireless communications, security or network management.

WAIC system. A system which provides wireless communications between points on board a single aircraft. A WAIC system may be comprised of one or more WAIC networks necessary for establishing, maintaining and securing wireless communications. A WAIC system consists of interrelated sets of WAIC components on board the same aircraft, so that a single aircraft contains only a single WAIC system.

Wireless avionic intra-communications (WAIC). Radiocommunication between two or more aircraft stations located on board a single aircraft for aircraft applications supporting the safe operation of the aircraft.

1.3 Abbreviations

Other abbreviations can be found in CAR DEF. When the following abbreviations are used, they have the following meaning:

ADS-B	Automatic Dependent Surveillance-Broadcast
AIP	Aeronautical Information Publication
ANSP	Air Navigation Service Provider
ATC	Air Traffic Control
ATSEP	Air Traffic Safety Electronic Personnel

ATSIC	Air Traffic Service Information Circular
ATSSP	Air Traffic Service Safety Publication
ATS	Air Traffic Service
ATM	Air Traffic Management
ICAO	International Civil Aviation Organisation
IT	Information Technology
IVCS	Integrated Voice Communication System
ILS	Instrument Landing System
MANOPS	Manual of Operations
SARPS	Standards and Recommended Practices
SMS	Safety Management System

1.4 State Safety Requirements

(a) The Authority shall certify all the Communication, Navigation, Surveillance, Landing aids, products, facilities and procedures used in the provision of Air Navigation Services before their commissioning for use in the provision of Air Traffic Services within the sovereign airspace of Gibraltar.

(b) Safety oversight of CNS shall be conducted on a regular and systematic basis by the Authority. These oversight functions will be based upon the standards given in this regulation, and any additional technical guidance given by the Authority as may be applicable from time-to-time, to aid in safe operating practices.

(c) A provider shall have established and implemented:

(1) Job descriptions for all technical staff;

(2) Training programmes which includes initial, recurrent and specialized training, and OJT;

(3) CNS operations manuals and reference material and

(4) Equipment operations manuals and reference material.

(d) A provider shall also have policies and procedures for the;

(1) recruitment and retention of technical staff;

(2) maintenance and storage of training records; and

(3) recording and archiving of data.

1.5 Compliance with laws, requirements and procedures

(a) A provider shall only operate an aeronautical radio navigation aid or radio communication transmitter if a current licence is held for the radio frequency and that an identification code has been allocated and that this has been declared in the Aeronautical Telecommunications Service Organization plan.

(b) A provider shall ensure the performance of an aeronautical radio navigation aid or radio communication transmitter is protected against any interference caused by obstructions and other radio emissions.

(c) A provider shall take all necessary steps to ensure that all persons employed, engaged, or contracted

to perform safety sensitive functions, are familiar with the appropriate sections of this regulation, any applicable conditions of a provider's certificate and the procedures specified in a provider's safety assurance documentation/organisation plan.

(d) A provider shall provide Aeronautical Telecommunication Services/CNS in accordance with the requirements of these regulations, the requirements of this and referenced compliance and guidance material including any other manual approved, authorized, published and amended by the Authority.

(e) A provider may not deviate from this regulation or associated ICAO standards unless in an emergency scenario, or other circumstances, arises that makes the deviation necessary in the interest of safety.

(f) A provider shall ensure that any deviation from this regulation or associated ICAO standards shall be reported to the Authority within 24 hours.

(g) A provider shall ensure that services it provides are in accordance with the radiotelephony procedures and the procedures for Aeronautical Telecommunications set out in ICAO Annex 10, and this regulation.

1.6 Procedure compliance

Any person performing duties in relation to a certificate issued under this regulation shall conform to the requirements of this regulation and any conditions of a certificate issued by the Authority.

1.7 Power to inspect

(a) A provider shall ensure that any Authority Inspector shall have uninterrupted access to any documentation relating to the organisation as appropriate to the operation.

(b) A provider shall be responsible for ensuring that, if requested to do so by an Authority Inspector, documentation is produced within a reasonable period of time or any other time specified by the Inspector.

1.8 Aircraft Addressing System

1.8.1 General

(a) The aircraft address shall be one of 16 777 214 twenty-four-bit aircraft addresses allocated by ICAO to the Authority, as the State of Registry and assigned as prescribed in the Appendix to Chapter 9 of ICAO Annex 10, Volume III.

(b) At any one time, no address shall be assigned to more than one aircraft.

(c) Non-aircraft transponders that are installed on aerodrome surface vehicles, obstacles or fixed Mode S target detection devices for surveillance and/or radar monitoring purposes shall be assigned 24-bit aircraft addresses.

(d) Mode S transponders used under specific conditions stated in (c) should not have any negative impact on the performance of existing ATS surveillance systems and ACAS.

1.8.2 Assignment of Aircraft Addresses

(a) During the registration process, using its allocated block of addresses, the Authority shall assign an individual aircraft address to each suitably equipped aircraft entered on the register.

Note: For an aircraft delivery, the aircraft operator is expected to inform the airframe manufacturer of an address assignment. The airframe manufacturer or other organization responsible for a delivery flight is expected to ensure installation of a correctly assigned address supplied by the State of Registry or common mark registering authority.

(b) Aircraft addresses shall be assigned to aircraft in accordance with the following principles:

(1) at any one time, no address shall be assigned to more than one aircraft with the exception of aerodrome surface vehicles on surface movement areas. If such exceptions are applied by the Authority, the vehicles which have been allocated the same address shall not operate on aerodromes separated by less than 1000 km;

(2) only one address shall be assigned to an aircraft, irrespective of the composition of equipment on board. In the case when a removable transponder is shared by several light aviation aircraft such as balloons or gliders, it shall be possible to assign a unique address to the removable transponder. Registers 08_{16} and 20_{16} of the removable transponder shall be correctly updated each time the removable transponder is installed in any aircraft;

(3) the address shall not be changed except under exceptional circumstances and shall not be changed during flight;

(4) when an aircraft changes its State of Registry, the new registering State shall assign the aircraft a new address from its own allocation address block, and the old aircraft address shall be returned to the allocation address block of the State that previously registered the aircraft;

(5) the address shall serve only a technical role for addressing and identification of aircraft and shall not be used to convey any specific information; and

(6) the addresses composed of 24 ZEROS or 24 ONES shall not be assigned to aircraft.

(c) Any method used to assign aircraft addresses should ensure efficient use of the entire address block that is allocated to that State.

(d) Assignment of aircraft addresses to unmanned aircraft (UA)

Note 1: States may need to consider withholding aircraft addresses to unmanned aircraft (UA) unless certain criteria have been met. Proper and efficient utilization of available bandwidth and capacity at 1090 MHz is a key element to ensure the safe operation of aeronautical surveillance systems, including secondary surveillance radar (SSR), automatic dependent surveillance — broadcast (ADS-B) and airborne collision avoidance systems (ACAS).

Note 2: A large number of UA equipped with ADS-B OUT transmitters operating at 1090 MHz may adversely affect the operation of surveillance systems in the area.

1.8.3 Administration of the Aircraft Address Assignments

(a) The Authority shall administer the allocated block of aircraft addresses so that appropriate assignment of aircraft addresses within its allocated block can be maintained.

(b) The Authority shall establish and publish an administrative procedure for requesting and assigning aircraft addresses.

(c) The Authority shall put in place measures to ensure that aircraft registered under their responsibility are flying with a correct aircraft address.

1.8.4 Application of Aircraft Addresses

(a) The aircraft addresses shall be used in applications which require the routing of information to or from individual suitably equipped aircraft.

Note: Examples of such applications are the aeronautical telecommunication network (ATN), SSR Mode S, ADS-B, emergency locator transmitter (ELT) and airborne collision avoidance system (ACAS).

(b) An address consisting of 24 ZEROs shall not be used for any application.

1.9 Emergency Locator Transmitter (ELT) Register

(a) The Authority shall make arrangements for a 406 MHz ELT register.

(b) Register information regarding the ELT shall be immediately available to search and rescue authorities. States shall ensure that the register is updated whenever necessary.

(c) ELT register information shall include the following;

(1) transmitter identification (expressed in the form of an alphanumerical code of 15 hexadecimal characters);

(2) transmitter manufacturer, model and, when available, manufacturer's serial number;

(3) COSPAS-SARSAT* type approval number;

(4) name, address (postal and e-mail) and emergency telephone number of the owner and operator;

(5) name, address (postal and e-mail) and telephone number of other emergency contacts (two, if possible) to whom the owner or the operator is known;

(6) aircraft manufacturer and type; and

(7) colour of the aircraft.

* *COSPAS = Space system for search of vessels in distress;*

* *SARSAT = Search and rescue satellite-aided tracking.*

Note 1: Various coding protocols are available. Depending on the protocol adopted, the Authority may, at its discretion, include one of the following as supplementary identification information to be registered:

a) aircraft operating agency designator and operator's serial number; or

b) 24-bit aircraft address; or

c) aircraft nationality and registration marks.

The aircraft operating agency designator is allocated to the operator by ICAO through the Authority, and the operator's serial number is allocated by the operator from the block 0001 to 4096.

Note 2: At its discretion, depending on arrangements in place, the Authority may include other relevant information to be registered such as the last date of register, battery expiry date and place of ELT in the aircraft (e.g. "primary ELT" or "life- raft No. 1").

CHAPTER 2

MANUALS, DOCUMENTATION AND RECORDS

2.1 Organisation Plan

(a) A provider is required to submit to the Authority an organisation plan that shall be acceptable to the Authority.

(1) An organisation plan shall contain, as a minimum;

(i) a set of overall aims and goals of a provider and its strategy towards achieving them in consistency with any overall longer-term organisation plan of the provider and any other requirements prescribed by the Authority;

(ii) appropriate performance objectives in terms of quality and level of service, safety and cost effectiveness; and

(iii) a statement signed by the Accountable Manager confirming that the organisation plan and the appropriate manual of operations;

(A) defines the organisation and demonstrates its means and methods for ensuring safety of all services provided to support air navigation, and to ensure that such services are provided safely, securely and in continuing compliance with this and any other applicable regulations; and

(B) are required to be complied with by its personnel at all times.

(iv) The titles and names of key persons;

(A) The duties and responsibilities of key persons shall include matters for which they have responsibility to deal directly with the Authority on behalf of the organisation.

(v) an organisation chart showing lines of responsibility of the key personnel and extending to each location approved by the Authority;

(vi) a summary of the organisation's staffing structure including job descriptions and safety responsibilities;

(vii) procedures, evidence or a reference that identifies documentation containing;

(A) a summary of the operational details of each type of equipment to be operated under the authority of a CNS approval;

(B) a summary of services provided at each location where a CNS service is provided and/or is proposed to be provided;

(C) details of procedures regarding the design, installation, and commissioning of facilities;

(D) details of procedures regarding the operation of temporary, pre-operational or replacement equipment for site tests;

(E) details of the systems and procedures regarding the equipment maintenance programme;

(F) details of the procedures regarding equipment performance;

(G) details of the systems and procedures regarding the control, calibration, and maintenance of inspection, measuring, and test equipment;

(H) details of the procedures regarding the notification of facility information;

(I) details of the procedures regarding equipment checks after notification of an accident or incident;

(J) details of the procedures regarding any equipment malfunction incidents;

(K) details of the procedures regarding radio interference incidents;

(L) details of the systems and procedures regarding the maintenance of records;

(M) details of the systems and procedures regarding operating and maintenance instructions;

(N) details of procedures regarding the competency, qualifications, maintenance of current operating practice and fitness of personnel;

(O) details of procedures regarding the training and assessment of personnel and the qualifications of training personnel within or utilized by the organisation;

(P) details of procedures regarding the observation of human factors principles in all systems, procedures, documentation and programmes;

(Q) details of the systems, procedures, and programmes regarding the safety and quality management system;

(R) details of the systems, procedures and programmes regarding the organisation's security programme as required by the Authority;

(S) procedures to mitigate against the effects of fatigue; and

(T) procedures to control, amend and distribute the organisation plan.

(2) A provider shall:

(i) hold at least one complete, current copy of its organisation plan at each unit listed in its organisation plan, except those parts relating solely to a particular place need only be held at principal locations and the place concerned;

(ii) amend or revise the organisation plan, as necessary, to ensure that it is kept up to date;

(iii) include in the organisation plan, any material as the Authority may require;

(iv) comply with all procedures and standards detailed in its organisation plan;

(v) make each applicable part of its organisation plan available to personnel who require those parts to carry out their duties;

(vi) continue to meet the standards and comply with this regulation; and

(vii) notify the Authority promptly of any change of address for service, telephone number, email address or facsimile number prior to and within 30 days of the intended date of the change; and

(3) Where a provider is proposing to operate or maintain facilities owned by an aerodrome operator or air traffic service provider, such as on-aerodrome navigation aids or facilities in a control tower, then the provider shall demonstrate that there is an agreement with the owner such as a memorandum of understanding.

2.2 Manuals of Operations and Facility Manuals

(a) A provider shall prepare and keep current for compliance by its personnel, a manual of operations (MANOPs) that contains the procedures and policies for the use and guidance of its personnel in the provision of the services listed in its organisation plan.

(b) A provider shall provide separate facility manuals to be used in conjunction with the MANOPs at each facility location listed in its organisation plan. Facility manuals shall contain procedures and instructions of a local nature which are either subject to frequent change or limited in application, but are, in all cases, supplementary to the provisions of the MANOPs.

(c) Accountable Managers shall sign any MANOPs or facility manual submitted to the Authority for approval.

(d) MANOPs and facility manuals shall be acceptable to the Authority and amended or revised as directed by the Authority; and as otherwise necessary to ensure that they are appropriate and kept up-to-date.

(e) A provider shall control the distribution, and hold copies of, all relevant manuals and documentation ensuring amendments are made whenever necessary to ensure that all information contained is accurate and current.

(f) Providers shall ensure that MANOPs, facility manuals or any portion of a manual which has not been reviewed and found acceptable or approved by the Authority, shall not be made available for use

(g) A MANOPs shall describe the overall (general) company policies and procedures regarding the provision of services listed in the organisation plan. The contents of a MANOPs shall, inter alia, also include;

(1) a description of personnel requirements and the responsibilities of personnel;

(2) identification of training instructors and proficiency assessment officers within the organisation, where applicable;

(3) minimum required staffing and qualifications at unit level;

(4) quality assurance and safety management system operational procedures;

(5) contingency plans for either a partial or total system failure for which the organisation provides the services;

(6) a security organisation plan;

(7) a minimum air navigation facility equipment list specifying the minimum level of equipment required as applicable to a particular class of operation;

(8) procedures to be followed to satisfy the maintenance responsibility for facility equipment with respect to this regulation and manufacturer specifications;

(9) fault and defect reporting;

(10) maintenance of documents and records; and

(11) any other information required by the Authority.

(h) MANOPs shall also contain:

(1) a chart depicting a provider's organisational structure and shows the accountable manager and the position of each key person along with the name, qualification, experience, duties and responsibilities of each key person and all other personnel involved in service provision; and

(2) information on the status of a provider's compliance with the applicable requirements of this regulation, applicable technical manuals and documents issued by the Authority and any deviations approved by the Authority

(i) Facility Manuals shall contain but are not limited to the following;

(1) detailed unit operational procedures and requirements;

(2) detailed unit administrative requirements, including the responsibilities of each operating position;

(3) amplification and/or ex-organisation planation of provisions of the national requirements, where necessary;

(4) coordination procedures between internal and external agencies;

(5) contingency arrangements in the event of a communications, navigation aids or facility failure; and

(6) letters of agreement with other agencies as applicable.

2.3 Equipment Maintenance Control Manual

(a) A provider shall submit to the Authority an equipment maintenance control manual and subsequent amendments, for the use and guidance of equipment maintenance and operational personnel concerned, containing details of the organisation's structure including;

(1) the accountable manager and designated person(s) responsible for the equipment maintenance system;

(2) procedures to be followed to satisfy the maintenance responsibility of this regulation and manufacturer specifications;

(3) procedures for the reporting of failures, malfunctions, and defects to the Authority (within 24 hours of discovery); and, items that warrant immediate notification to the Authority by telephone/telex/fax or email, with a written follow-on report as soon as possible, (but no later than within 72 hours of discovery), are;

(i) failure of any piece of surveillance equipment resulting in partial or complete failure;

(ii) partial or complete communication system failure;

(iii) failure of any component of the aeronautical fixed network;

(iv) failure or malfunction of any automation system under jurisdiction of the provider's jurisdiction;

(v) failure or malfunction of any automatic voice or data recording system;

(vi) any software or hardware malfunction resulting in a disruption to the safe provision of air traffic services;

(vii) any other condition considered an imminent hazard to safety.

(b) Control manuals shall be amended or revised as is necessary to ensure that the information contained therein is kept up-to-date.

(c) A provider shall ensure that any control manual described in this section, or pertinent portions, together with all amendments and revisions are made available to all personnel and organisations that are required to use it.

(d) No person may provide for use any CNS equipment maintenance control manual, or portion of such a manual, which has not been reviewed and approved for use by the provider by the Authority.

(e) Upon receipt of material that the Authority prescribes as mandatory for inclusion in any portion of an equipment maintenance control manual, a provider shall make the necessary amendments as soon as reasonably possible.

2.4 Submission and Revision of Manuals

(a) Manuals shall;

(1) include instructions and information necessary to allow the personnel concerned to perform their duties and responsibilities with a high degree of safety;

(2) be in a form that is easy to revise and contains a system which allows personnel to determine the current revision status of each manual;

(3) have a date of the last revision on each page concerned;

(4) not be contrary to any requirement under this regulation or as otherwise may be prescribed by the Authority; and

(5) observe human factors principles in their design and utilisation.

(b) No policy or procedure for any operational function shall be used without prior coordination and approval by the Authority.

(c) A provider shall ensure that both hard and soft copies of all manuals required under this regulation, and any other manual outlining any policy or procedure, are submitted to the Authority;

(1) for initial reviews, no later than 60 working days prior to the intended date of publication; or

(2) for all other reviews, no later than 30 working days

(d) A report or document that demonstrates compliance with the requirements of this regulation and any other procedures as issued from time to time by the Authority, shall accompany all manuals submitted to the Authority as appropriate. Compliance reports or other documents shall be presented in a form that is acceptable and appropriate to the Authority

(e) MANOPs and facility manuals shall be kept up to date and any requests for amendments shall be submitted to the Authority;

(1) at least 15 working days in advance of their effective date; or

(2) in the case of amendments of an urgent or immediate nature, without delay, and no later than the date on which they are effective.

(f) Operations personnel shall be expeditiously informed of the amendments to any manual(s) that are applicable to their duties as well as of their entry into force.

(g) Upon receipt of material the Authority prescribes as mandatory for inclusion in any portion of any manual required under this regulation, a provider shall make all necessary amendments as soon as is reasonably possible, or at a time specified by the Authority.

(h) A provider shall ensure that the contents of a MANOPs and any facility manuals includes at least those subjects prescribed by the Authority that are applicable to a provider's operations, including any additional materials made mandatory by the Authority.

2.5 Documentation

(a) A provider shall establish procedures to identify, collect, index, store, maintain and control all documentation and records which are necessary for the safe provision of operation and maintenance services in order to ensure that;

(1) all incoming documentation, including amendments, are reviewed, and actioned as required by authorised personnel;

(2) all documentation is reviewed and authorised before issue;

(3) all obsolete documentation is removed promptly from all points of issue or use;

(4) any obsolete documents retained as archives are suitably identified as obsolete;

(5) the Authority shall have access to pertinent background information upon which to base reviews and approvals of any changes;

(6) safety-significant changes are assessed in accordance with a provider's safety management system;

(7) current versions of each item of documentation can be identified to preclude the use of out-of-date editions; and

(8) current issues of the following documents shall be made available to personnel at all locations where they need access to such documentation. These documents shall, inter alia, include;

(i) the Civil Aviation Act and this regulation;

(ii) MANOPs and facility manuals;

(iii) air traffic services and aerodrome operations manuals, where applicable; and

(iv) ICAO Annex 10 Volumes I to V, Doc 8071, Doc 9859 and any other relevant ICAO document(s).

(b) Unless part of a formal document control system, paper copies shall be marked as "Uncontrolled when printed".

2.6 Record Keeping

(a) A provider shall establish systems and procedures to identify, collect, file, store securely, maintain, access and dispose of records necessary for;

(1) the operational provision of CNS; and

(2) the purpose of assisting with any accident or incident investigation.

(b) A provider shall ensure that its procedures for providing information to the persons designated to complete a specific record are provided in a timely way so that the record is continuously up-dated and available for consideration for the organisation planning and provision of air navigation services. Every person(s) designated to complete a specific record shall be given that designation in writing and provided training and written policy guidance for the completion of the document with respect to timing and accuracy.

(c) Every person designated to complete and/or sign a record required under this regulation shall make the required entries accurately and in a timely manner so that the record used for organisation planning and provision of CNS reflects the true situation at the time of use.

(d) Every record required for a provider's operations and equipment maintenance purposes shall be completed in ink or indelible pen, unless otherwise approved by the Authority.

(e) Access to recorder equipment and tapes shall be restricted to only the authorised personnel listed in a provider's MANOPs and/or facility manuals, or as prescribed by the Authority.

(f) Any provider that knowingly withholds any records described under this subsection following any request from any Authorised person shall be guilty of an offence.

(g) A provider must ensure that legible and permanent records are kept which provide a traceable history over the lifecycle of services which are to include;

(1) records of design, manufacturing, procurement, installation, testing, commissioning, modification, and decommissioning;

(2) records of the designated authorities for the design, operation and maintenance for each system;

(3) records of hazard analysis and risk assessments;

(4) records of facility performance and facility maintenance history including performance parameter values, test facilities utilized, identity of authorised technicians conducting operation and maintenance, changes to maintenance procedures;

(5) records of the configuration of facilities;

(6) records of facility technical manuals and instructions;

(7) records of interface agreements with other organisations;

(8) records of safety cases;

(9) records of facility operation and maintenance plans;

(10) records of malfunction and safety incident reports;

(11) records of internal audit reports;

(12) records of investigation into serious incidents;

(13) record of functional and technical specifications of services and facilities;

(14) records of job description, training programme and a plan of each staff-technician's competencies, including details of experience, qualifications, training, competency assessments, and facility authorisations; and

(15) other electronic records not already listed.

2.7 Equipment Service and Maintenance Records

(a) A provider shall have an equipment technical log that contains the record of all maintenance records on that equipment during the course of its operations in a form prescribed by the Authority.

(b) Equipment technical logs shall not be used prior to approval by the Authority.

(c) Each page of a log shall be identifiable to the provider, separately numbered with a unique number and shall be arranged chronologically in a bound document. Where approved by the Authority, this may also be submitted in electronic format

(d) Where unique paper documents are used, these will be assigned to a specific piece of equipment operated by a provider until all pages are used.

(e) Documents shall be retained by a provider in safe custody as long as the equipment in operation or for three (3) months, whichever is longer.

(f) The method by which a provider maintains these documents shall only be in a format as approved by the Authority.

2.8 Deferred Defects Summary

(a) A provider shall have for each piece of equipment, a log of the deferred defects for that equipment that is attached to or aligned with the Equipment Technical Log.

(b) This log may be included in the Equipment Technical Log or attached in some manner to the cover of that log and will include the information prescribed by the Authority.

(c) This document shall be retained by each Provider in safe custody as long as the equipment is included in the organisation's equipment inventory.

(d) The maximum period of deferral with respect to any equipment or component of any such equipment that is used by a provider shall be as prescribed by the manufacturer or as approved by the Authority, whichever is shorter.

2.9 Standards for site logs

(a) Site logs shall be kept for all CNS facilities.

(b) A site log shall record all occurrences and actions relating to operation, maintenance, modification, failure, faults, and removal from and restoration to service.

(c) Entries in site logs shall include the date/time of the entry and the occurrence and are signed by the technician or other person making the entry.

(d) Site log records shall be retained for at least five years.

2.10 Maintenance of Inspection(s) Records and Entries

(a) Each person who maintains, performs preventive maintenance, alters or upgrades an aeronautical CNS facility shall, when the work is performed satisfactorily, make an entry in the maintenance logbook of that equipment. The entry shall state a description (or reference to data acceptable to the Authority) of work performed, including:

(1) Appropriate details of alterations and repairs;

(2) The current status of the aeronautical telecommunication facility on return to services;

(3) Completion date of the work performed; and

(4) Name, signature, and unique identification number of the person making such records and of the person approving the work.

CHAPTER 3

SURVEILLANCE AND REVALIDATION

3.1 Continuing Validation of Certification

(a) A provider shall be subject to a continuing system of oversight administered by the Authority to validate the original certification basis and the organisation's continued eligibility to hold its approval.

(b) A provider shall allow the Authority to conduct tests and inspections, at any time or place, to determine whether or not a provider is complying with the applicable laws, regulations and approval terms and conditions.

(c) A provider shall;

(1) Continue to meet the standards stipulated in ICAO Annex 10, and comply with the requirements of this regulation;

(2) Comply with all procedures and programmes detailed in its approved organisation plan and MANOPs; and

(3) Provide, at each location covered by the organisation plan, in hard copy, electronic or other form acceptable to the Authority:

(i) All portions and sufficient copies of the MANOPs that are readily accessible by all personnel who may need to refer to it;

(ii) All applicable portions of the applicable Air Traffic Service Equipment Maintenance Manuals;

(iii) At least one current copy of the relevant sections of its organisation plan applicable to the operation; and

(iv) A current listing that includes the location and individual positions responsible for each record, document and report required to be kept by provider under the applicable aviation law, regulations or standards.

(d) A provider shall make its records available to the Authority upon request, either at the Authority's offices or other location stipulated by the Authority.

(e) Failure by a provider to make available to the Authority upon request, any or all portions of any Certificates, Operations and Equipment Maintenance Manuals or any other required record, document or report may result in the suspension of all or part of the Certificate and associated Air Navigation Services Certificate, approval or authorisation to operate.

3.2 Site validation inspections

(a) An applicant for the issuance of a Provider's Certificate shall permit an Authority Authorised Inspector to carry out such Site validation inspection prior to installation of any facility as may be necessary to verify the validity of any application made in accordance with this regulation.

(b) A provider shall permit an authorised person to carry out such site validation inspection prior to installation of any equipment at any facility as may be necessary to determine compliance with this regulation and ICAO Annex 10.

3.3 Access for Inspection

(a) To determine continued compliance with this and any other applicable regulations, a provider shall;

(1) grant the authority free and uninterrupted access to and co-operation with any of its organisations, facilities and equipment;

(2) ensure that any person authorised by the authority shall have free and uninterrupted access to any documentation relating to activities associated with the approval;

(3) ensure that the authority is granted access to and co-operation with any organisation or facilities that it has contracted for services associated with any air navigation service and equipment maintenance for those services;

(4) grant the authority free and uninterrupted access to any facility at any time during operations; and

(5) be responsible for ensuring that, if requested to do so by an inspector, documentation is produced within a period prescribed by the authority.

3.4 Changes to a Provider's organisation

(a) A provider shall ensure that its Organisation plan is amended so as to remain a valid description of the holder's current and organisation planned organisation and services.

(b) A provider shall ensure that any amendments made to the holder's Organisation plan:

(1) Meets the applicable requirements of this regulation; and

(2) Complies with the amendment procedures contained in the holder's Organisation plan.

(c) Subject to sub-paragraph (d) below, a provider shall provide the Authority with a copy of each amendment to the holder's organisation plan as soon as practicable after its incorporation into the Organisation plan as follows:

(1) Printed amendments, at least 15 working days in advance of their effective date; and

(2) Amendments of an urgent or immediate nature, without delay, and no later than the date on which they are effective.

(d) Prior notification to and acceptance by the Authority is required whenever a provider proposes to make a change to any of the following:

(1) The Accountable Manager;

(2) Any of a provider's key persons;

(3) The maintenance engineering staffing; or

(4) The aeronautical telecommunication equipment operated under the authority of the approval.

(e) No significant safety-related change to any system shall be put into effect until a safety assessment has demonstrated that an acceptable level of safety will be met and users have been consulted. When appropriate, providers shall ensure that adequate provision is made for post-implementation monitoring to verify that the defined level of safety continues to be met.

(f) The Authority may prescribe conditions under which a provider may operate during or following any of the changes specified in this paragraph.

(g) Where any of the changes referred to in this paragraph require an amendment to a provider's certificate, the provider shall forward the documentation describing the changes to the Authority for review as soon as practicable.

(h) A provider shall make such amendments to the holder's Organisation plan as the Authority may consider necessary in the interests of aviation safety.

3.5 Subsequent Certification Requirement

The Authority may require that a full certification process be completed prior to the implementation of any major change in any aspect of a provider's service provision or as prescribed by the Authority

CHAPTER 4

SAFETY AND QUALITY MANGEMENT SYSTEMS

4.1 Safety Management System

(a) A provider shall establish a safety management system that complies with CAR SMS. A safety management system shall clearly define lines of safety accountability throughout the provider's organisation, including a direct responsibility for safety on the part of senior management.

(b) A provider shall ensure that, prior to implementation, any significant changes shall be subject to a safety assessment, indicating that an acceptable level of safety shall be met or maintained. Safety assessments shall;

(1) include user consultation; and

(2) be presented to, and accepted by, the Authority prior to implementation of any change.

(c) A provider shall, as part of their SMS, establish target levels of safety and alert levels/key performance indicators for at least the following safety areas;

(1) aeronautical facility reliability,

(2) mean times between outages, and

(3) any others as may be determined by the Authority

(d) A provider shall forward the defined target levels of safety and alert levels for the above safety areas, to the Authority, for acceptance.

(e) A provider shall conduct an analysis of its safety targets every 12 months. The analysis shall include a reassessment of its targets and where required, plans to introduce any measures to improve safety levels. The analysis and any associated action plan shall be submitted to the Authority.

(f) A provider's safety policy shall ensure that it is understood, implemented and maintained at all levels of the organisation.

4.2 Quality Management System

(a) A provider shall have in place a quality management system (QMS) that is acceptable to the Authority.

(b) A provider's QMS shall be used to ensure compliance with this regulation and the standards in Annex 10 Volumes 1 to 5.

(c) A provider's QMS shall include;

(1) a quality management policy and procedures that are relevant to the applicant's organisational goals and the expectations and needs of its customers;

(2) procedures to ensure that data at any moment is traceable to its origin so as to allow any data anomalies or errors, detected during maintenance phases or in operational use, to be corrected;

(3) procedures to ensure quality indicators, including equipment availabilities, malfunctions, faults, and personnel and customer feedback, are monitored to identify existing problems or potential causes of problems within the system;

(4) a procedure for corrective action to ensure existing problems that have been identified within the system are corrected;

(5) a procedure for preventive action to ensure that potential causes of problems that have been identified within the system are remedied;

(6) an internal quality audit programme to audit the applicant's organisation for conformity with its quality management system;

(7) an external quality programme including letters of agreement with users of systems maintained by the provider, suppliers and adjacent CNS units and a supplier audit programme; and

(8) management review procedures that may, where appropriate, include the use of statistical analysis, to ensure the continuing suitability and effectiveness of the internal quality management system in satisfying the requirements of this regulation and Annex 10.

CHAPTER 5

SECURITY PROGRAMME

5.1 Requirements

(a) The purpose of a security programme is to minimize the risk of unauthorised access, entry by animals, or malicious damage to a service or facilities.

(b) The security programme shall specify the physical security measures, and the procedures to be followed, for;

(1) preventing and detecting intentional or unintentional damage to any facility or equipment used for providing an aeronautical telecommunication or radio navigation service;

(2) responding to a threat of intentional damage to a facility or equipment; and

(3) preventing unauthorised personnel from having access to any facility or equipment used by the provider.

(c) The security programme shall conform to all requirements prescribed in in accordance with CAR SEC.

(d) The security programme shall include and specify such physical security requirements, practices and procedures that may be necessary to ensure that;

(1) all appropriate personnel are familiar, and comply with, the relevant requirements of all national security programmes;

(2) all employees are acquainted with preventive security measures and techniques in regards to all related air transport operations so that they may contribute to the prevention of acts of sabotage or other forms of unlawful interference;

(3) these personnel are able to take appropriate action to prevent acts of unlawful interference and to minimize the consequences of such events should they occur; and

(4) all units contain a checklist of the procedures to be followed in the event of unlawful interference or other security provisions. All checklists shall observe Human Factors Principles and shall be supported by guidance;

(i) on the course of action to be taken should a bomb or suspicious object be found;

(ii) to ensure that access to permanent air navigation facilities operated by a provider are subject to control to prevent unauthorised entry;

(iii) to protect personnel on duty;

(iv) to secure operational information and data that is received or produced or otherwise employed, so that access to it is restricted only to those authorised;

(v) to be followed in the event of a bomb threat or other threat of violence against an air navigation facility;

(vi) to monitor unattended telecommunication buildings to ensure that any intrusion or interference is detected;

(vii) to conduct security risk assessments and mitigation, security monitoring and improvement, security reviews and lesson dissemination; and

(viii) to contain the effects of security breaches and to identify recovery action and mitigation procedures to prevent re- occurrence.

(e) A provider shall ensure the security clearance of all personnel as required under the CAR SEC and coordinate with the relevant authorities to ensure the security of its facilities, personnel, information and data

CHAPTER 6

CNS ORGANISATION

6.1 Personnel Requirements

(a) A provider shall, at all times, maintain an appropriate organisation with a sound and effective management structure to enable it to provide, in accordance with the standards set out in this regulation, the level of service covered by its approval from the Authority.

(b) A provider shall ensure it has a sufficient number of competent qualified and trained personnel to perform the operation and maintenance of the aeronautical telecommunication service for each facility taking into account the duties and workload required.

(c) A provider shall develop a job description for each of its personnel which shall describe the job purpose, key responsibilities, and outcome to be achieved by each personnel.

(d) A provider shall engage, employ or contract, as a minimum, the following key personnel:

(1) An Accountable Manager responsible for;

(i) managing safety levels;

(ii) ensuring that the organisation complies with the requirements of this regulation;

(iii) ensuring that safety is given the highest priority when assessing commercial, operational, environmental or social pressures; and

(iv) managing personnel in relation to safety and compliance with this regulation.

(2) A person that is competent and qualified in respect of inspection, supervision and maintenance; and

(3) A person who is responsible for quality control, and who shall have direct access to the person referred to the accountable manager on matters affecting aviation safety.

(e) The Accountable Manager and other key personnel shall ensure that all activities undertaken by a unit are carried out in accordance with the applicable requirements prescribed in this regulation and where applicable, ICAO Annex 10. In addition, the Accountable Manager and other key personnel shall;

(1) assess and maintain the competence of personnel with the authority or responsibility for those functions;

(2) ensure that written records and procedures are established in respect of commissioning, operating and maintaining all services and equipment for which the provider is responsible;

(3) establish a means to provide all personnel with signed written evidence of the scope of their authority and responsibility; and

(4) establish the job descriptions containing safety responsibilities.

(f) A provider shall arrange the work flow of Aeronautical Telecommunication/CNS Services officers to provide duty rest periods. A copy of the Aeronautical Telecommunications/CNS Services providers fatigue management procedure shall be included in the Operations Manual.

(g) Any individual shall not provide or cause to be provided any services directly or indirectly related to the provision of CNS if he/she knows or suspects that he/she is suffering from fatigue, or, having regards to the circumstances of the period of duty to be undertaken, is likely to suffer from fatigue as may endanger the safety of any aircraft.

(h) Any individual shall not provide any services directly or indirectly related to the provision of CNS whilst under the influence of drugs or alcohol.

6.2 Technician Qualifications

(a) The minimum academic qualification for technicians performing operation and maintenance functions associated with aeronautical telecommunication facilities and/or radio navigation facilities is a diploma of technology in one of the following;

(1) radio engineering;

(2) communications engineering;

(3) electrical engineering;

(4) electronic engineering;

(5) computer science;

(6) information technology; or

(7) qualifications equivalent to the above qualifications.

(b) For those technicians that carry out or supervise electrical and mechanical trades work only, the minimum qualification is an electrical or mechanical trade's qualification, as relevant.

(c) Where an organisation considers, and the Authority agrees, that the operation and maintenance of a particular type of facility is not technically complex, lesser qualifications may be acceptable for those technicians who operate and maintain that type of facility.

6.3 Technician training and certification

(a) The Approved organisation(s) provide technicians with an authorising certificate which:

(1) establishes the identity of the technician;

(2) details the scope of the authorisation granted to the technician by listing the facilities, or types of facilities, which the technician is authorised to operate and/or maintain;

(3) includes a date of effect, and the period of time for which each of the authorisations remain current, and

(4) the effective date.

(b) An organisation must not grant a technician an authorising certificate in respect to a particular facility or a class of facility unless it has established that the technician:

(1) has undergone a competency-based course of instruction or on-the-job training specific to that facility or that class of facility; and

(2) has been assessed to be competent in the operation and maintenance of the facility or the class of facility by an assessor who holds a formal recognition of competency in the unit being assessed, at or above the level being assessed; and has current knowledge of the workplace and job/role of the person being assessed.

(c) However, if an assessor does not have all the competencies listed above, one person with at least one of the competencies and one or more persons with the other competency, may, with the approval of the Authority, work together to conduct assessments.

6.4 Air Traffic Safety Electronics Personnel (ATSEP)

(a) An Air Traffic Safety Electronics Personnel who performs either of the following;

(1) system, operational or functional checks, including associated parameter checks and system performance measurements;

(2) system, component or software inspection, installation, repair, maintenance and modification;

(3) scheduled as well as unscheduled maintenance tasks shall be;

(i) suitably qualified and experienced

(ii) assessed to be competent; and

(iii) approved to perform any of the above functions.

6.5 Training of an ATSEP

(a) A provider shall establish, implement and maintain an ATSEP training programme based on ICAO Doc 9868 and ICAO Doc 10057 that is acceptable to the Authority.

(b) A provider shall conduct a yearly review of the training plan for each ATSEP at the beginning of the year to identify any gaps in competency or changes in training requirements and prioritize the type of training required for the coming year.

(c) A provider shall keep record of individual ATSEP training, competency assessment and approval history, where applicable, and associated documents. The record shall be kept at least until the CNS/ATM system of which the ATSEP was trained on is no longer in use with a provider.

(d) The individual training records for each of ATSEP shall include a training plan detailing the courses completed as well as the time-frame for attending future courses as required under his/her training plan.

6.6 Competency Assessment of an ATSEP

(a) A provider shall develop an assessment methodology to determine the competency of an ATSEP in accordance with the competency framework developed in PANS-Training and which shall be adapted to suit the local context.

(b) A provider may select a person to be a competency assessor only if the person;

(1) is already ATSEP approved and certified on the system that is being used to train or assess an individual technician;

(2) has received adequate training in the conduct of competency assessment, practical checks and oral questionings.

(c) A competency assessor shall not conduct a competency assessment on an ATSEP who is under the direct supervision of the competency assessor, unless the assessment is done in the presence of a second independent assessor.

(d) The assessment methodology shall include a process for on-going competency checking and refresher training to ensure retention of competence.

6.7 Approval of an ATSEP

(a) In the event that a provider wishes to utilise the services of an "approval unit" responsible for the approval of an ATSEP, the provider shall submit to the Authority a request for such an approval.

(b) An approval unit shall be a unit that is involved in the planning, operations and/or maintenance of CNS facilities and is independent of other operational departments.

(c) An approval unit shall develop an approval process that is acceptable to the Authority prior to its administration.

(d) An approval unit may approve an ATSEP only if the ATSEP has;

(1) completed an approved unit training programme; and

(2) been assessed to be competent and suitable to perform the role of an approved signatory for works done on the CNS/ ATM system which the ATSEP has been trained on.

(e) An approval unit shall;

(1) issue an approval document to each approved ATSEP;

(2) exercise appropriate administrative or remedial actions towards approval holders in event of negligence, incompetence or non- conformance; and

(3) ensure that the approval holder is current in the respective CNS/ATM system before deploying him to perform functional checking and maintenance of the respective system

(4) provide records of all current, amended, new or cancelled approvals to the Authority.

(5) An approval unit shall be inspected at least once every 12 months by the Authority, in order to ensure that it remains of a standard acceptable to the Authority to continue to provide individual facility approvals.

6.8 Training and Checking of Staff

(a) A provider shall establish a training programme that covers recruitment, ab-initio training, initial certification, advanced certification and a procedure for maintaining, the competence of the personnel required to operate and maintain the equipment concerned.

(b) A provider's training programme shall be submitted to the Authority for approval prior to any implementation.

6.9 Proficiency

(a) As part of the quality system, the holder of a Provider's Certificate shall assess the CNS personnel under his employment.

(b) A formal proficiency assessment shall be carried out to assess whether a provider has achieved and is maintaining the required level of competence.

(c) At each facility a provider shall nominate a person to establish and maintain unit proficiency standards.

(d) Specific senior officers shall be appointed and tasked by the person responsible for the services as proficiency assessment officers for each discipline.

(e) At units where operational staff are multi - disciplined, the person responsible for the services shall appoint and task at least one proficiency assessment officer. Proficiency assessment officers are to be appointed and tasked for each discipline although operating within a multi- disciplined environment.

(f) At each major facility, the manager shall appoint and task a CNS officer responsible for satellite units as the proficiency assessment officer.

(g) A person assessed as unsatisfactory may not be permitted to continue in the assessed discipline without supervision. If after a reasonable period a person is unable to pass the proficiency check, all details pertaining to the unsatisfactory assessment shall be assembled and sent to the Authority.

(h) Proficiency assessment officers shall prepare proficiency check rosters so that all operational staff are screened on a regular basis. Personnel shall be given advanced notice of a real time annual proficiency check so that adequate preparation, mentally and functionally, can be made.

(i) In addition to the requirements of sub-paragraph (h), a formal assessment shall be carried out at least every 12 months to determine whether all operational personnel are maintaining the required level of competence in the positions for which they are certified. Routine assessments should be conducted on an on - going basis during duty assignment.

(j) Personnel shall be assessed in key elements of the performance areas detailed on an assessment form.

(k) An assessment shall be made of both the quality of work and the level of knowledge of the elements assessed.

(l) The Operations Manual shall also include the procedures for;

(1) personnel to undertake remedial training;

(2) updating personnel skills when introducing new equipment into services and updating communications; and

(3) proficiency and training records shall be maintained for all Aeronautical Telecommunication/CNS Services personnel.

(m) A provider shall ensure that any training requirements are complied with.

6.10 Continuation Training

(a) A provider shall establish and maintain, programmes for:

(1) Continuing assessment of its employees' competency for the purposes of ensuring that they continue to satisfy the currency requirements in relation to ratings and endorsements; and

(2) Familiarisation, retraining and assessment of any of its employees that at any time do not satisfy the currency or frequency requirements in relation to an endorsement.

(b) The provider shall include details of the programme, including necessary training and tests of competency, in its operations manual.

6.11 Prevention of Fatigue

(a) A provider that operates on a 24-hour basis shall establish suitable procedures to mitigate the effects of fatigue on operational staff.

(b) Any fatigue management policy shall be submitted to the Authority for acceptance.

(c) Where a provider has implemented a fatigue management policy, the provider shall;

(1) establish and include the maximum number of hours worked in a given period or minimum number of rest periods in the Organisation plan prescribed in this regulation; and

(2) maintain a record of each person’s assigned and actual duty times and minimum rest period in accordance with a system set out and approved by the Authority in its Operations Manual.

(d) When requested by any person occupying an operational position, a provider shall, within 5 working days of the request being made, provide any such person with a copy of the record required by sub-paragraph (c)(2).

(e) A provider shall ensure that the required records for tracking operational and duty times and rest periods are maintained in a manner so that an updated record is available before a person begins their duty day or their first operational duty assignment of the day.

CHAPTER 7

CNS FACILITIES

7.1 Commissioning of a new facility

(a) A provider shall establish procedures to ensure that each new facility;

(1) is commissioned to meet the specifications for that facility; and

(2) where applicable, it is in compliance with the Standards and specifications prescribed in Annex 10,

(b) A provider shall ensure that the system performance of a new facility has been validated by all necessary tests, and that all parties involved with the operations and maintenance of the facility, including its maintenance contractors have accepted and are satisfied with the results of the tests.

(c) A provider shall ensure that procedures include documentation of tests conducted on the facility prior to the commissioning, including those that test the compliance of the facility with the applicable Annex 10 standards and any flight check required in compliance with ICAO Doc 8071.

7.2 Equipment Requirements

(a) A provider shall list the equipment comprising the service in the CNS plan and shall provide evidence that;

(1) it is designed, installed, and commissioned to meet the safety requirements of the provider's safety management system;

(2) it conforms with the standards prescribed in ICAO Annex 10, including any applicable guidance material unless a justifiable alternative is agreed with the authority;

(3) the monitoring and communication of the operational status shall meet the operational needs of the related air traffic service;

(4) the power supply to the equipment shall meet the operational continuity requirements of the service being supported;

(5) any critical or sensitive site area necessary for protecting the safe operation of equipment listed shall be defined and protected; and

(6) a procedure has been established to ensure sufficient spares are held to ensure the continuity of the aeronautical telecommunication service.

(b) A provider that intends to operate temporary or pre-operational equipment shall;

(1) notify the authority with adequate notice prior to start of the tests; and

(2) demonstrate that the operation does not cause any interference with any other operating aeronautical telecommunication equipment;

7.3 Provisions of appropriate infrastructure, facilities and services

(a) Providers shall ensure that the systems, equipment, installations and services required for an ANSP or aerodrome operator are applicable to the level of service.

(b) A provider shall ensure that it has in place a procedure approved by the Authority that ensures that no facility or equipment provided for the purposes of CNS shall be placed into operational use unless:

(1) The person placing the facility or installing the equipment into operational use is appropriately qualified and experienced;

(2) The facility is notified and approved in accordance with the provider's certificate to operate and any requirements as may be specified in a MANOPs and local facilities manual.

(3) The facility or equipment is correctly connected to a suitable power supply with appropriate back up supplies.

(c) Any temporary facility or equipment shall not be brought in to operational use unless it has been authorised by the Authority, notified to the AIS, a NOTAM issued and, if appropriate, a supplementary instruction issued by any affected ANSP or aerodrome operator.

(d) Any installation of a new facility or the introduction of any new equipment shall be accompanied by a safety case in accordance with the provider's SMS.

7.4 Human Factors

A provider shall ensure that human factors principles are observed in the design, operation and maintenance of all CNS facilities.

CHAPTER 8

MAINTENANCE ACTIVITIES & INSPECTION

8.1 Equipment Maintenance

(a) No person may operate a CNS facility unless the facility and associated components are maintained in accordance with equipment certification procedures and the facility is inspected in accordance with the certification programme approved by the Authority.

(b) Providers shall be responsible for maintaining all facilities under its control by ensuring that:

(1) All maintenance, overhaul, alterations and repairs which may affect or alter continued serviceability are carried out as contained in the equipment maintenance manual:

(2) Maintenance personnel make appropriate entries in the logbook certifying the serviceability of the equipment; and

(3) The approval for return to services is completed to the effect that the maintenance carried out has satisfactorily been completed in accordance with the equipment maintenance manual;

(c) A provider shall establish a procedure for maintenance of the equipment listed in its Organisation plan verifying that it meets the applicable requirements and performance specifications for that equipment, including:

(1) A part of maintenance meeting the manufacturers' recommendations and ICAO Doc 8071 (Manual on Testing of Radio Navigation Aids);

(2) Personnel maintenance instructions meeting manufacturers' recommendations and ICAO Doc 8071, as required by any equipment performance specifications; and

(3) The identification of any maintenance or fault rectification that requires a flight check before the equipment is returned to service.

(d) Any flight checking organisation for maintenance of the aeronautical telecommunications equipment shall be approved by the Authority.

(e) The facility maintenance procedure shall be included in a provider's operations manual and shall include a description of the equipment and components and recommended methods for the accomplishment of maintenance tasks. Such information shall include guidance on fault diagnosis.

(f) A provider's operations manual shall state the specific maintenance tasks to be accomplished regarding each piece of equipment at each air navigation facility and the recommended intervals at which these tasks are to be performed.

(g) Maintenance tasks and frequencies that have been specified as mandatory by the manufacturer of the equipment shall be identified in the operations manuals. Basic details of the maintenance carried out and the chronology of such maintenance shall be maintained in approved technical manuals was carried out.

8.2 Maintenance, Preventive Maintenance, Alterations or Upgrade.

(a) Each person performing maintenance, preventive maintenance, alteration or upgrade on a facility shall use the methods, techniques, and practices as prescribed in the current maintenance manual, or provider's approved operations manual for continued serviceability; and

(b) Any additional methods, techniques and practices required by the Authority; or methods, techniques and practices prescribed by the Authority where the manufacturer's documents were not available or adequate.

(c) Each person performing maintenance, preventive maintenance, or alteration on an aeronautical facility shall do that work in such a manner, and use materials of such a quality, that the condition of the aeronautical telecommunication facility worked on will be restored to its optimal or properly altered condition with regards to acceptable standards by the Authority.

(d) The methods, techniques, and practices contained in a MANOPs and equipment certification maintenance procedure, as approved by the Authority, will constitute an acceptable means of compliance with the requirements of this subsection.

(e) An aeronautical telecommunication equipment/component manufacturer or its representative may;

(1) replace, upgrade, or alter any aeronautical telecommunication facility part manufactured by that manufacturer; and

(2) perform any inspection as prescribed by the Authority and/or an associated ANSP or aerodrome operator's manual.

8.3 Persons Authorised to perform maintenance

(a) No person shall perform maintenance on an aeronautical telecommunication facility, equipment part or component unless such a person is;

(1) an Air Traffic Safety Electronic Personnel (ATSEP) appropriately trained and qualified; or

(2) working under supervision of a person mentioned in sub-paragraph (a) above during the course of a practical component of training in accordance with ICAO Doc 7192-E2 (Training Manual for Air Traffic Safety Electronics Personnel).

(b) A person having under-gone an approved course of training shall only perform, or supervise the maintenance of a facility, once that person has been assessed as being able to demonstrated competency on the applicable facility or equipment in question.

8.4 Equipment performance and return to service

(a) A provider shall ensure that any provision of a CNS service is not returned into operation unless;

(1) it is assessed by a suitably qualified, experienced, competent and authorised person for that specific function;

(2) the appropriate checks detailed in the operating and maintenance instructions have been carried out to verify the performance of the equipment;

(3) equipment records have been completed; and

(4) that the person specified in sub-paragraph (a) knows or suspects that the information being provided by that facility is accurate.

(b) A provider shall apply the requirements of sub-paragraph (a) above before returning any system into service following a flight inspection.

8.5 Approval to return Equipment/Facility to service.

(a) The return to service of any equipment or facility shall not be permitted after a major component of the equipment or facility has been replaced or undergone maintenance or alteration, until such time that it has been approved by the Authority.

(b) ATSEP may only approve return to services, of an aeronautical telecommunication facility after performing maintenance as delegated by the Accountable Manager.

(c) An Accountable manager shall not delegate the authority to approve the return to service of any equipment or facility to any person mentioned unless the person has demonstrated a level of competency equal to that which is required under this regulation.

(d) No person shall approve for return to services any facility that has undergone maintenance, preventive maintenance, alteration or upgrading unless;

(1) The appropriate entry has been made in the maintenance logbook; and

(2) The facility is tested through the conduct of a ground check or flight check as appropriate.

(e) No person shall describe in any required state in a maintenance logbook of a facility as having been altered or upgraded unless it has been disassembled, cleaned, inspected as permitted, repaired as necessary, reassembled, and tested to the same tolerances and limits as a new item, using either new parts or used parts that conform to new part tolerances and limits.

(f) No person shall approve the return to service of equipment or facility after a major alteration or equipment part replacement unless such person has tested the equipment to determine satisfactory performance in accordance with the current manufacturer's recommendations.

8.6 Fault and Defect Reporting

(a) A provider shall maintain system for tracking and rectifying faults within the aeronautical telecommunications services system.

(b) Procedures for reporting and the resolutions of faults and defects shall be documented in a Provider’s MANOPs. This includes procedures for ensuring that the operational status of communications, navigation and surveillance facilities are provided to the units providing Air Traffic Control Services.

(c) A provider shall forward daily, weekly and monthly defect reports to the Authority**.**

(d) A provider shall report power system failures to the Authority as they occur.

8.7 Tools and tests

(a) Each person shall use the tools, equipment, and test apparatus necessary to ensure completion of the work in accordance with accepted industry practices.

(b) If the equipment manufacturer involved recommends special equipment or test apparatus, the person performing maintenance shall use that equipment or apparatus or its equivalent acceptable to the Authority.

(c) A provider shall establish a procedure to control, calibrate, and maintain all the equipment required under sub-paragraph a) above to ensure that it is suitable for purpose.

8.8 Test facilities

(a) A provider is to ensure that it has in place facilities suitable and available for all necessary testing of equipment under its control.

(b) Each facility shall have in place all necessary approved and documented procedures to control, calibrate, and maintain test equipment.

(c) Test equipment shall not be used at any facility unless it is correctly calibrated and approved for use.

(d) A provider shall ensure that the calibration of any equipment is carried out at prescribed intervals for each type of test equipment, and that the calibration shall be traceable to national measurement standards.

(e) Records of the calibration status of each item of test equipment shall be retained.

(f) Each item of test equipment shall carry a visual identification of its calibration status, the date that the equipment was last calibrated, and the prescribed calibration periodicity.

(g) A provider shall assess the validity of all previous test results whenever an item of test equipment is found to be out of calibration.

8.9 Flight Inspection and Calibration

(a) A provider shall either carry out itself or identify the resources required to conduct flight inspection of Navigation and Landing Aids and Surveillance systems in accordance with the provision of ICAO Doc 8071.

(b) Flight tests other than routine checks required under this Part in accordance with manufacturer specifications and guidance material, as appropriate, shall be conducted to inspect any equipment after major maintenance activities or after being subjected to factors outside of standard operating conditions as influenced by external factors such as site conditions, ground conductivity, terrain irregularities, metallic structures, propagation effects, etc.

(d) A provider shall ensure that flight testing is utilised for:

(1) Site proving;

(2) Commissioning;

(3) Routine inspections; and

(4) Non-routine inspections.

(e) Radio navigation aids of the types covered by the specifications in Chapter 3 of Annex 10 Volume 1 and available for use by aircraft engaged in international air navigation shall be the subject of periodic ground and flight tests.

CHAPTER 9

INCIDENT REPORTING AND INVESTIGATION

9.1 Incident Reporting

(a) A provider shall establish procedures for the reporting, collection and notification of facility malfunction incidents and safety incidents.

(b) A provider shall establish, implement and maintain plans and procedures for identifying and responding to incidents and emergency situations, and maintain the continuity of critical activities.

(c) A provider shall periodically review, test and when applicable, revise its plans and procedures for incident and emergency preparedness and response and continuity of any critical management activities.

(d) A provider shall ensure that any serious or safety significant incident is reported to the Authority within 24 hours of the incident occurring

(e) Incident reporting plans shall be compiled and reviewed periodically by a provider with its maintenance contractors to;

(1) determine the cause of the incidents and determine any adverse trends;

(2) implement corrective and preventive actions where necessary to prevent recurrence of the incidents; and

(3) implement any measures to improve the safety performance of the aeronautical telecommunication service.

9.2 Incident Investigation

(a) A provider shall establish, implement and maintain processes and procedures for the handling and investigation of failures, incidents and any non-conformities associated with its assets and systems.

(b) A provider shall ensure that where an investigation involves an incident that is serious or safety significant, the investigation shall commence within 24 hours of the incident occurring.

(c) A copy of any investigation report shall be forwarded to the Authority within 6 weeks of an occurrence. Any lessons learnt from such investigation are to be disseminated to relevant staff to raise their safety awareness.

(d) In the event that the Authority deems it necessary to conduct its own investigation, a provider is to supply the Authority with any information requested by the Authority.

9.3 Equipment check after an accident or incident

(a) A provider shall establish a procedure to check and accurately record the operating condition of any equipment operated under the authority of a CNS approval that is involved in an accident or incident.

9.4 Radio Interference

(a) A provider shall ensure that there is no wilful transmission of unnecessary or anonymous radio signals, messages or data by any of its radio stations.

(b) A provider shall ensure that procedures be established with local telecommunications authorities to address any occurrences of radio frequency interference. Any frequency interference occurrence shall be reported, investigated and follow-up actions taken to prevent any possible recurrence.

CHAPTER 10

CONTINGENCY PLAN

10.1 Contingency Organisation plan

(a) Within one year after initial certification, an Aeronautical Telecommunications Services provider shall develop and maintain Contingency Organisation plans for implementation in the emergencies including degradation, disruption or potential disruption of Aeronautical Telecommunication Services and related supporting services for the facilities it maintains. The disruption may be caused intentionally (sabotage) or unintentionally (equipment failure).

(b) Contingency plans shall include as a minimum;

(1) the actions to be taken by personnel responsible for providing the service during;

(i) emergency situations and;

(ii) degraded modes of operation.

(2) hand-over and service continuity procedures during facility emergency evacuations;

(3) provisions to protect against cyber related threats;

(4) security assessment of emergency/degraded modes;

(5) determination of the need for service continuity including arrangements for cross-border provision of services if applicable;

(6) maximum agreed period of service disruption;

(7) human factors considerations;

(8) the arrangements for resuming normal operations; and

(9) any other requirement prescribed by the Authority.

(c) The contingency organisation plan required under sub-paragraph (a) shall be incorporated in a provider's Operations Manual.