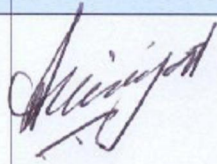

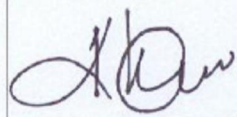
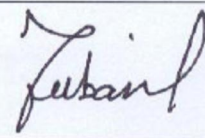
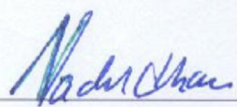




**CERTIFICATION REQUIREMENTS FOR
CNS FACILITY SERVICE PROVIDERS**

AIR NAVIGATION ORDER

VERSION : 1.0
DATE OF IMPLEMENTATION : 30-08-2012
OFFICE OF PRIME INTEREST : Technical Standards Branch (DAAR)
(Directorate of Airspace & Aerodrome Regulations)

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TYPE OF DOCUMENT	AIR NAVIGATION ORDER (ANO)		
STATUS OF DOCUMENT	CONTROLLED		



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

A. AUTHORITY:

A1. This Air Navigation Order (ANO) has been issued by the Director General, Pakistan Civil Aviation Authority in pursuance of Rules 4, 5, 84, 180, 360 and other enabling provisions of Civil Aviation Rules, 1994 (CARs, 94, 94).

B. PURPOSE:

The purpose of this ANO is to describe the basic requirements for **Communication, Navigation and Surveillance (CNS)** Service Providers on operation and maintenance of **Communication, Navigation and Surveillance (CNS)** equipment. This ANO is being enforced in line with requirements laid down in ICAO SARPS as mentioned in Annex-10 Vol I to V and ANO-001-DRTS-1.0, ANO-002-DRTS-1.0, ANO-003-DRTS-1.0, ANO-004-DRTS-1.0, ANO-005-DRTS-1.0 and ANO-006-DRTS-1.0. Operations of all CNS facilities in line with the procedures laid down in this ANO will be binding on CNS Service Providers. Any non-conformity to the Standards and Recommended practices as laid down in this ANO-008-DRTS-1.0, has to be notified to P.D (Regulatory) by the CNS Service Providers so that the Regulatory Wing may, after vetting the non-conformity, file the difference of the same with ICAO.

C. SCOPE:

C1. This ANO shall apply to **Communication, Navigation and Surveillance (CNS)** Service Providers responsible for:

C1.1 Efficient provisioning of **operation and maintenance of Communication, Navigation and Surveillance Systems** in the Pakistan airspace.

C1.2 Implementation of procedures and practices as detailed in ANO-001-DRTS-1.0 to ANO-008-DRTS-1.0 for smooth and uninterrupted operation of CNS facilities in Pakistan Airspace and at Aerodromes engaged in the operation of air traffic.

D. DESCRIPTION:

D1. DEFINITIONS:

The following terms used in this ANO, have the meanings assigned to them respectively. However, any term used in this ANO but not defined herein shall have the same meaning as given in the Civil Aviation Ordinance, 1960, Pakistan Civil Aviation Authority Ordinance, 1982, Civil Aviation Rules, 1994 (CARs, 94, 1994) and relevant ICAO Annexes, as the case may be accordingly.

D1.1 ACCOUNTING MANAGEMENT: An ATN systems management facility to monitor users for use of network resources and to limit the use of those resources.

D1.2 ADS APPLICATION: An ATN application that provides ADS data from the aircraft to the ATS unit(s) for surveillance purposes.

D1.3 AERONAUTICAL ADMINISTRATIVE COMMUNICATION (AAC): Communication used by aeronautical operating agencies related to the business aspects of operating their flights and transport services. This communication is used for a variety of purposes, such as flight and ground transportation, bookings, deployment of crew and aircraft or any other logistical purposes that maintain or enhance the efficiency of over-all flight operation.



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

D1.4 **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.

D1.5 **AERONAUTICAL RADIO NAVIGATION SERVICE**: A radio navigation service intended for the benefit and for the safe operation of aircraft.

D1.6 **COMMUNICATION, NAVIGATION AND SURVEILLANCE FACILITIES WHICH PROVIDE THE FOLLOWING:**

D1.6.1 Types of radio navigation aids for aeronautical radio navigation service:

- D1.6.1.1 Instrument Landing System (ILS).
- D1.6.1.2 VHF Omni-Directional Radio Range (VOR).
- D1.6.1.3 Doppler VOR.
- D1.6.1.4 Distance Measuring Equipment (DME).
- D1.6.1.5 Non-directional Beacon (NDB)
- D1.6.1.6 Terminal Distance Measuring Equipment (TDME) .

D1.6.2 Types of communication systems for the aeronautical broadcast service:

- D1.6.2.1 Meteorological information for aircraft in flight (VOLMET):
- D1.6.2.2 Automatic Terminal Information Service (ATIS).

D1.6.3 Types of communication systems for aeronautical fixed services:

- D1.6.3.1 ATS direct speech circuits.
- D1.6.3.2 Aeronautical fixed telecommunication network (AFTN).
- D1.6.3.3 Aeronautical Message Handling System (AMHS).
- D1.6.3.4 Ground-ground data interchange.

D1.6.4 Ground elements of the following types of communication systems for aeronautical radio navigation service:

- D1.6.4.1 HF air-ground communication.
- D1.6.4.2 VHF air-ground communication.
- D1.6.4.3 UHF air-ground communication.
- D1.6.4.4 HF ground-ground communication (S SB).
- D1.6.4.5 Satellite ground-ground communications.
- D1.6.4.6 Microwave communication systems.

D1.6.5 Types of surveillance Radar and collision avoidance systems:

- D1.6.5.1 Primary Surveillance Radar (PSR).
- D1.6.5.2 Secondary Surveillance Radar (SSR).
- D1.6.5.3 Precision Approach Radar (PAR).

D1.6.6 Types of automation systems that support an air traffic services:



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

- D1.6.6.1 Airport Flight Data Processing System (AFDPS).
- D1.6.6.2 Airspace Management System (AMS).
- D1.6.6.3 Data Processing & Display System (DPDS).
- D1.6.6.4 Aircraft Movement Radar Indicator (IRMA).
- D1.6.6.5 Airfield Overview System (AOS).
- D1.6.6.6 CAA Pakistan Aeronautical Fixed Telecommunication Network AFTN / AMHS
- D1.6.7** Types of communication systems:
- D1.6.7.1 Voice Communication Switching System (VCSS).
- D1.6.7.2 Central Exchange and Telephony System.
- D1.6.8** Any environmental facility to support the above facilities could have one or more of the following systems:
- D1.6.8.1 Main powers supply system.
- D1.6.8.2 Uninterrupted Power Supply (UPS) system.
- D1.6.8.3 Air conditioning system & cooling systems
- D1.7** **AERONAUTICAL TELECOMMUNICATION NETWORK (ATN)**: An internetwork architecture that allows ground, air-ground and avionic data sub networks to interoperate by adopting common interface services and protocols based on the International Organization for Standardization (ISO) Open Systems Interconnection (OSI) reference model.
- D1.8** **AERONAUTICAL TELECOMMUNICATION SERVICE**: A telecommunication service provided for any aeronautical purpose.
- D1.9** **AIDC APPLICATION**: An ATN application dedicated to exchanges between ATS units (ATSUs) of air traffic control (ATC) information in support of flight notification, flight coordination, transfer of control, transfer of communication, transfer of surveillance data and transfer of general data.
- D1.10** **ALTERNATIVE MEANS OF COMMUNICATION**: A means of communication provided with equal status, and in addition to the primary means.
- D1.11** **ATIS APPLICATION**: A FIS application that supports the D-ATIS.
- D1.12** **ATN DIRECTORY SERVICES (DIR)**: A service which provides the capability for an application entity or user in the ATN community to query a distributed directory data base and retrieve addressing, security and technical capabilities information relating to other users or entities within the ATN community.
- D1.13** **ATS COMMUNICATIONS (ATSC)**. Communication related to air traffic services including air traffic control, aeronautical and meteorological information, position reporting and services related to safety and regularity of flight. This communication involves one or more air traffic service administrations. This term is used for purposes of address administration.
- D1.14** **ATS DIRECT SPEECH CIRCUIT**: An aeronautical fixed service (AFS) telephone circuit, for direct exchange of information between air traffic services (ATS) units.
- D1.15** **ATS INTERFACILITY DATA COMMUNICATION (AIDC)**.: Automated data exchange between air traffic services units, particularly in regard to co-ordination and transfer of flights.



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

- D1.16** **ATS MESSAGE HANDLING SERVICES (ATSMHS):** Procedures used to exchange ATS messages 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.
- D1.17** **ATS UNIT (ATSU):** A generic term meaning variously, air traffic control unit, flight information centre or air traffic services reporting office.
- D1.18** **ATSC CLASS:** The ATSC class parameter enables the ATSC user to specify the quality of service expected for the offered data. The ATSC class value is specified in terms of ATN end-to-end transit delay at 95 per cent probability.
- D1.19** **AUTHENTICATION:** A process used to ensure the identity of a person/user/network entity.
- D1.20** **AUTHORIZED PATH:** A communication path that the administrator(s) of the routing domain(s) has pre-defined as suitable for a given traffic type and category.
- D1.21** **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.
- D1.22** **BROADCAST:** A transmission of information relating to air navigation that is not addressed to a specific station or stations.
- D1.23** **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.
- D1.24** **CARRIER-TO-NOISE DENSITY RATIO (C/NO):** The ratio of the total carrier power to the average noise power in a 1 Hz bandwidth, usually expressed in dBHz.
- D1.25** **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 106 implies the maximum allowed error in the clock is $\pm 1.2 \times 10^{-3}$ Hz.
- D1.26** **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.
- D1.27** **CIRCUIT MODE:** A configuration of the communications network which gives the appearance to the application of a dedicated transmission path.
- D1.28** **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.
- D1.29** **CONFIGURATION MANAGEMENT:** An ATN systems management facility for managers to change the configuration of remote elements.
- D1.30** **CONTEXT MANAGEMENT (CM) APPLICATION:** An ATN application that provides a log-on service allowing initial aircraft introduction into the ATN and a directory of all other data link applications on the aircraft. It also includes functionality to forward addresses between ATS units.
- D1.31** **CONTEXT MANAGEMENT (CM) SERVER:** An ATS facility that is capable of providing application information relating to other ATSUs to requesting aircraft or ATSUs.



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

- D1.32** **CPDLC APPLICATION:** An ATN application that provides a means of ATC data communication between controlling, receiving or downstream ATS units and the aircraft, using air-ground and ground-ground sub networks, and which is consistent with the ICAO phraseology for the current ATC voice communication.
- D1.33** **CRITICAL PERFORMANCE PARAMETER:** means a performance parameter that has a direct effect on the operational integrity of a facility.
- D1.34** **DATA INTEGRITY:** The probability that data has not been altered or destroyed.
- D1.35** **D-METAR:** The symbol used to designate data link aviation weather report service.
- D1.36** **DOPPLER SHIFT:** The frequency shift observed at a receiver due to any relative motion between transmitter and receiver.
- D1.37** **DOUBLE CHANNEL SIMPLEX:** Simplex using two frequency channels, one in each direction.
- D1.38** **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.
- D1.39** **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.
- D1.40** **END SYSTEM (ES):** A system that contains the OSI seven layers and contains one or more end user application processes.
- D1.41** **END-USER:** An ultimate source and/or consumer of information.
- D1.42** **ENERGY PER SYMBOL TO NOISE DENSITY RATIO (Es/No):** 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.
- D1.43** **ENTITY:** An active element in any layer which can be either a software entity (such as a process) or a hardware entity (such as an intelligent I/O chip).
- D1.44** **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).
- D1.45** **FAULT MANAGEMENT:** An ATN systems management facility to detect, isolate and correct problems.
- D1.46** **FIS APPLICATION:** An ATN application that provides to aircraft information and advice useful for the safe and efficient conduct of flights.
- D1.47** **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.
- D1.48** **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.



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

D1.49 **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.

D1.50 **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.

D1.51 **MAGNETIC RADIO BEARING**: is one for which the reference direction is that of magnetic North.

D1.52 **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.

D1.53 **METAR APPLICATION**: A FIS application that supports the D-METAR.

D1.54 **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.

D1.55 **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.

D1.56 **OPEN SYSTEMS INTERCONNECTION (OSI) REFERENCE MODEL**: A model providing a standard approach to network design introducing modularity by dividing the complex set of functions into seven more manageable, self-contained, functional layers. By convention these are usually depicted as a vertical stack.

D1.57 **OPERATING POSITION**: means the work station from which one or more air traffic controllers or flight service operators provide air traffic services within an allocated area or areas of responsibility.

D1.58 **PACKET LAYER PROTOCOL (PLP)**. A protocol to establish and maintain a connection between peer level entities at the network layer, and to transfer data packets between them. In the context of this standard, the term refers to the protocol defined by the ISO 8208 standard used in this document.

D1.59 **PACKET**. The basic unit of data transfer among communications devices within the network layer.

D1.60 **PERFORMANCE MANAGEMENT**: An ATN systems management facility to monitor and evaluate the performance of the systems.

D1.61 **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.

D1.62 **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.

D1.63 **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.



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

D1.64 **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.

D1.65 **RATED AIR NAVIGATION FACILITY MAINTENANCE ENGINEER/TECHNICIAN:** means maintenance engineer/technician holding a current license, and a rating, or ratings, validated for the particular facility.

D1.66 **RATED AIR NAVIGATION FACILITY:** means an air navigation facility (Airdrome, area control center, air navigation station, flight information service station, air/ground communication center) holding a current certificate issued by the Authority.

D1.67 **SECURITY MANAGEMENT:** An ATN systems management facility for access control, authentication and data integrity.

D1.68 **SERVICE AGREEMENT:** means an agreement between the AT/RN facilities inside /outside the organization.

D1.69 **SINGLE CHANNEL SIMPLEX:** Simplex using the same frequency channel in each direction.

D1.70 **SUBNETWORK:** An actual implementation of a data network that employs a homogeneous protocol and addressing plan and is under control of a single authority.

D1.71 **TIME DIVISION MULTIPLE ACCESS (TDMA).** A multiple access scheme based on time-shared use of an RF channel employing:

D1.71.1 Discrete contiguous time slots as the fundamental shared resource; and

D1.71.2 A set of operating protocols that allows users to interact with a master control station to mediate access to the channel.

D1.72 **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.

D1.73 **TOUCHDOWN:** The point where the nominal glide path intercepts the runway.

D1.74 **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.

D1.75 **UPPER LAYERS (UL) COMMUNICATIONS SERVICE:** A term pertaining to the session, presentation and application layers of the OSI reference model.

D1.76 **Z MARKER BEACON:** A type of radio beacon, the emissions of which radiate in a vertical cone-shaped pattern.

D2. CERTIFICATION REQUIREMENTS FOR CNS SERVICE PROVIDERS IN PAKISTAN:



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

D2.1 DOCUMENTATION:

D2.1.1 The service provider of Communication, Navigation and Surveillance facility, shall hold copies of the relevant equipment maintenance/ operational manuals, technical standards ANOs/Manuals, international standards and recommended practices (including Annex 10) and any other documents necessary for planning, provisioning, maintenance and operation of the CNS facilities including training requirements, job descriptions, SOPs, work instructions and all related administration and management;

D2.1.2 The applicant shall establish a procedure to control all the documentation required under D2.1.1. The procedure shall ensure that:

D2.1.2.1 All incoming documentation is reviewed, and directed as required, by authorized personnel;

D2.1.2.2 All documentation is reviewed by appropriate personnel;

D2.1.2.3 The current version of each item of documentation are available to personnel at all locations where they need access to such documentation for the provision and operation of facilities;

D2.1.2.4 All obsolete documentation is promptly removed from all points of issue or use;

D2.1.2.5 Any obsolete documents retained as archives are suitably identified as obsolete;

D2.1.2.6 Changes to documentation are properly reviewed and duly approved by appropriate personnel who shall have access to pertinent background information upon which to base their review and approval; and

D2.1.2.7 The current version of each item of documentation can be identified to preclude the use of out-of-date editions.

D2.2 RECORDS:

D2.2.1 The service provider of CNS facility, shall establish systems and procedures to identify, collect, index, file, store, secure, maintain, access, and dispose of, in a manner to facilitate:

D2.2.1.1 Safe provision and operation of the facilities listed in their exposition; and

D2.2.1.2 Assistance with any accident or incident investigation.

D2.2.2 The procedures shall ensure that:

D2.2.2.1 A record is kept for each facility in order to:

D2.2.2.1.1 Provide date of installation;

D2.2.2.1.2 Document the performance of the facility; and

D2.2.2.1.3 Provide a history of its maintenance and the periodic inspections and tests. The history shall be traceable to the person or persons responsible for each of the recorded activities.

D2.2.2.2 A record for each item of test equipment required for the measurement of critical performance parameters. The record shall provide a traceable history of the location, maintenance, and the calibration checks for such test equipment;

D2.2.2.3 A record of each facility malfunction recorded and investigated under the procedures required in D3.17 (facility malfunction). The record shall detail the nature of the malfunction, the findings of the investigation, the follow up corrective actions, or where applicable include a copy of the report forwarded the Authority

D2.2.2.4 A record of each internal quality assurance review of the applicant's organization carried out under the procedures required in D2.4 (internal quality management system);

D2.2.2.5 A record for each person who is authorized by the applicant to place facilities into



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

operational service. The record shall include details of their experience, qualifications, training, competence assessments and current authorizations;

D2.2.2.6 The record can be either a paper or computer system or any combination of both and shall be stored in a safe way with regards to fire, food and theft;

D2.2.2.7 Paper system shall use robust material which can withstand normal handling and filling. The record shall legible throughout the required retention period;

D2.2.2.8 Computer systems used for maintenance records shall have at least one backup system which shall be updated;

D2.2.2.9 Each terminal is required to contain program safeguards against the ability of authorized personnel to alter the data base;

D2.2.2.10 All facility records are retained for a period of at least 3 years unless a longer period is required to establish a performance history for a facility; and

D2.2.2.11 The maintenance record shall be inspected and stored as required by the Authority.

D2.3 FACILITY MAINTENANCE LOGBOOK:

D2.3.1 The service provider of Communication, Navigation and Surveillance facility shall establish procedures

D2.3.2 The procedure shall ensure that:

D2.3.2.1 The logbook should be numbered on each page;

D2.3.2.2 The logbook is maintained by the senior person, or the person on duty at a nominated operating position;

D2.3.2.3 The logbook is maintained throughout the operating hours of the facility;

D2.3.2.4 All entries include the date, time of entry and signature with name;

D2.3.2.5 Every page of the logbook must be signed by the facility manager or senior person;

D2.3.2.6 Logbook entries are:

D2.3.2.5.1 In chronological sequence and in ink;

D2.3.2.5.2 Without erasure, defacement, or obliteration; and

D2.3.2.5.3 Corrected by drawing a single line through the erroneous information and initialing the correction.

D2.3.2.7 Actual times of opening and closing facility are recorded in the logbook, together with the reason for every variation from published hours of service; and

D2.3.2.8 Logbooks are retained for a period of 3 years from the date of final entry.

D2.3.3 The procedure shall ensure that the facility maintenance log:

D2.3.3.1 Contains sufficient information in the first pages of the logbook to identify:

D2.3.3.1.1 Facility information;

D2.3.3.1.2 Precautions of operation or its reference number that included in the exposition; and

D2.3.3.1.3 The services are being provided from the facility.

D2.3.3.2 Is retained for a period of 3 years from the date of first filing.



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

D2.4 QUALITY CONTROL MANAGEMENT SYSTEM:

D2.4.1 The service provider for the Communication, Navigation and Surveillance facility, shall establish an internal quality management system to ensure compliance with, and the adequacy of, the procedures required by this Subpart as approved by the Authority;

D2.4.2 The internal quality management system shall include:

D2.4.2.1 An inspection policy;

D2.4.2.2 Inspection procedures that are understood, implemented, and maintained at all levels of the organization;

D2.4.2.3 A procedure to ensure quality control indicators, including maintenance records, defect, interference and incident reports, and personnel and customer feedback, are monitored to implement required performance standards and to identify existing problems or potential causes of problems within the system;

D2.4.2.4 A procedure for corrective action specifying how to:

D2.4.2.4.1 Correct an existing problem;

D2.4.2.4.2 Follow up a corrective action to ensure the action is effective; and

D2.4.2.4.3 Measure the effectiveness of any corrective action taken.

D2.4.2.5 A procedure for preventive action specifying how to manage a potential problem;

D2.5 COMMUNICATION, NAVIGATION AND SURVEILLANCE FACILITIES SECURITY PROGRAM:

D2.5.1 The service provider of Communication, Navigation and Surveillance (CNS) facilities, shall prepare a security program under the National safety plan

D2.5.2 Each security program shall specify the physical security requirements, practices, and procedures to be followed for the purposes of minimizing the risk of destruction of, damage to, or interference with the operation of, any facility operated by the applicant where such destruction, damage, or interference is likely to endanger the safety of aircraft; and

D2.5.3 Without limiting the generality described in D2.5, the security program shall specify such physical security requirements, practices, and procedures as may be necessary:

D2.5.3.1 To ensure that entrances to permanent facilities operated by the applicant are subject to positive access control at all times, so as to prevent unauthorized entry; to protect personnel on duty;

D2.5.3.2 To be followed in the event of a bomb threat or other threat of violence / terrorism against a facility; and

D2.5.3.3 To monitor unattended facility buildings to ensure that any intrusion or interference is detected.

D2.6 COORDINATION:

D2.6.1 The service provider of CNS facility, shall establish systems and procedures to ensure, where applicable, co-ordination between each facility listed in the applicant's exposition and the following agencies:

D2.6.1.1 The Service provider of the air traffic service.

D2.6.1.2 Pakistan Air Force.

D2.6.1.3 Search and rescue authorities.

D2.6.1.4 Telecommunication Regulatory authorities to coordinate:



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

- D2.6.1.5 Frequencies for CNS;
- D2.6.1.6 Meteorological Department; and
- D2.6.1.7 Telecommunication service provider to coordinate:
- D2.6.1.6.1 National telecommunication facilities;
- D2.6.1.6.2 International telecommunication facilities;
- D2.6.2 The service provider shall establish procedures to ensure facility letter of agreement is in place between each facility listed in the applicant's exposition and:
- D2.6.2.1 Entities providing services to the facility;
- D2.6.2.2 Entities receiving services from the facility; and
- D2.6.2.3 The entities described in D2.6.2.1 and D2.6.2.2 may be internal within the service provider facilities or external to the service providers such as the electric power company or the telecommunication service company.

D3. PERSONNEL MATTERS AND FACILITIES:

D3.1 TRAINING:

- D3.1.1 Each applicant for the grant of a CNS facility maintenance certificate shall establish procedures acceptable to the Authority and follow the approved training programs for CNS maintenance personnel as follows, as appropriate:
- D3.1.1.1 Basic training;
- D3.1.1.2 Advanced training;
- D3.1.1.3 Specialized training;
- D3.1.1.4 Recurrent training;
- D3.1.1.5 On-job-training; and
- D3.1.1.6 Human factor initial and recurrent training.
- D3.1.2 Each applicant shall ensure that personnel giving instructions and trainings to the maintenance personnel are appropriately qualified / skilled.

D3.2 PREVENTION OF FATIGUE:

Each applicant for the grant of a Communication, Navigation and Surveillance facility certificate shall establish procedures to ensure that CNS facilities maintenance personnel are not subject to fatigue by ensuring that:

- D3.2.1 A maintenance personnel does not serve for more than 8 consecutive hours or does not serve for more than 12 hours (for a low fatigue remote monitoring CNS location) during a period of 24 consecutive hours, unless a rest period of at least 8 hours at or before the end of the 12 hours of duty have been duly attained.
- D3.2.2 At any time two maintenance personnel shall be present in a shift on each CNS facilities/locations; and
- D3.2.3 Except in an emergency situation, maintenance personnel refrains from performing any duties for at least 24 consecutive hours at least once during each 7 consecutive days.



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

D3.3 OPERATING REQUIREMENTS:

D3.3.1 IDENTIFICATION CODES AND CALL SIGNS:

D3.3.1.1 The Communication, Navigation and Surveillance facility service provider should make sure that all required identification code for a radio navigation facility or call sign for a communications facility is appropriately registered locally and internationally; and

D3.3.1.2 Such action is needed prior to commissioning of any new CNS facility.

D3.4 FACILITY OPERATION MANUALS:

D3.4.1 The CNS service provider shall provide an operation manual or system of manuals for the services listed in its duties and complied by its personnel;

D3.4.2 The service provider with more than one facility, or a facility provides services from more than one location, may publish a core manual together with manual supplements specific to each service or location.

D3.5 SHIFT ADMINISTRATION:

D3.5.1 Each holder of a Communication, Navigation and Surveillance facility shall establish a procedure to ensure that:

D3.5.1.1 Adequate time is provided at the beginning and end of each shift, for the performance of those duties required:

D3.5.1.1.1 Before start of the shift; and

D3.5.1.1.2 After the end of the shift

D3.5.1.2 A minimum of 10 minutes is provided for each transfer of duties at an operational facility.

D3.6 CONTINGENCY PLAN:

D3.6.1 Each holder of a Communication, Navigation and Surveillance shall establish an approved contingency plan providing for the safe and orderly continuation of service in the event of a disruption, interruption, or temporary malfunction of facility/equipment or related supporting service.

D3.6.2 The plan shall be made on the equipment level, system level and operational level.

D3.7 COMMUNICATION PROCEDURES:

The service provider of any type of the aeronautical telecommunication facility shall ensure that their procedures for operating the facilities listed in their exposition are in accordance with the applicable communication procedures prescribed in ANO-003-DRTS-1.0.

D3.8 OPERATING AND MAINTENANCE INSTRUCTIONS:

The service provider of a Communication, Navigation and Surveillance facility shall provide the operating and maintenance instructions of the manufacturer for each facility listed in their exposition, for the use and guidance of their personnel, operating and maintenance instructions of the manufacture for each facility listed in their exposition. The instructions shall set out the requirements for operating and maintaining each facility. The instructions shall include a list of:

D3.8.1 The critical performance parameters;

D3.8.2 The test equipment required for the measurement of those parameters;



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

- D3.8.3 The check procedures for placing the facility into operational service; and
D3.8.4 The inspection and test procedures for the operation and maintenance of the facility.

D3.9 PERIODIC INSPECTION AND TESTING:

D3.9.1 The service provider of a Communication, Navigation and Surveillance facility shall establish procedures for the periodic inspection and testing of the facilities listed in their exposition to verify that they meet the applicable operational requirements and performance specifications. These procedures shall:

D3.9.1.1 Cover ground inspection, ground test and flights test where it is necessary according to the manufacturer's technical manual;

D3.9.1.2 Include the criteria for establishing or changing the period between the periodic tests for a facility. The criteria shall have regard to:

D3.9.1.2.1 Any applicable information published by the International Civil Aviation Organization (ICAO), DAAR or the manufacturer;

D3.9.1.2.2 Any applicable reliability data for the facility; and

D3.9.1.2.3 The stability of the facility's operating environment;

D3.9.1.3 Ensure that the basis of establishing or changing the period between the periodic tests for a facility are documented and approved by the Authority.

D3.9.2 In addition, the service provider shall establish:

D3.9.2.1 An approved program of periodic ground inspections for each facility;

D3.9.2.2 An approved program of periodic ground tests for each facility;

D3.9.2.3 An approved program of periodic flight tests for each radio navigation aid unless the applicant can establish from the criteria in D3.9.1.2 that periodic ground tests can replace the periodic flight tests for a facility without affecting the safety of air navigation.

D3.9.3 The programs required in D3.9.2.1 & D3.9.2.2 for the periodic ground and flight tests shall be based on the criteria in D3.9.1.2 and shall specify the maximum period between the tests for each facility.

D3.9.4 The program shall have procedure to check that all equipment in the facility are properly fixed / earthen in accordance with the Air Navigation Order ANO-002-DRTS-1.0 and the technical maintenance manual for equipment earthing to prevent any electrical shocks and/or radio interference with the operating systems;

D3.9.5 The program shall have procedure to check that the data control cables are protected with lightning arrestors;

D3.9.6 The program shall have procedure to check that the antennas and masts of the facilities shall be properly protected against corrosion, lightning and any interference;

D3.9.7 The service provider should notify the Authority (DAAR) of any radio navigation aid that is not subjected to periodic flight tests, etc.

D3.10 CERTIFICATION OF FACILITY PERFORMANCE:

The service provider of Communication, Navigation and Surveillance shall establish a procedure to ensure that no facility listed in their exposition is placed into operational service unless:

D3.10.1 The person placing the facility into operational service is authorized personnel.



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

D3.10.2 The appropriate checks have been carried out to verify the performance of the facility under the procedures required by D3.9; and

D3.10.3 The facility record has been completed in accordance with the procedures required by D2.2.1

D3.11 INSPECTION MEASURING AND TEST EQUIPMENT:

D3.11.1 The service provider of Communication, Navigation and Surveillance shall ensure that appropriate inspection, measuring and test equipment is available for their personnel to maintain the safe operation of each facility listed in their exposition.

D3.11.2 The service provider shall establish a procedure to control, calibrate and maintain all of the applicant's inspection, measuring and test equipment to ensure that each item of equipment has the precision and accuracy that is necessary for the measurements and tests to be performed.

D3.11.3 The procedure shall ensure that each item of test equipment required for the measurement of critical performance parameters is:

D3.11.3.1 Calibrated before use or at prescribed intervals against certified equipment having a known valid relationship to nationally recognized standards. Where no such standards exist, the basis used for the calibration shall be documented. records of such calibrations and the standards used shall be maintained in accordance with the procedures required by D2.2.1;

D3.11.3.2 Identified with a suitable indicator to show its calibration status;

D3.11.3.3 Controlled to:

D3.11.3.3.1 Safeguard against adjustments that would invalidate the calibration setting;

D3.11.3.3.2 Ensure that the handling, preservation and storage are such that the accuracy and fitness for use is maintained.

D3.11.3.4 Where hardware and software systems are used as an alternative form of facility performance testing, the functions of the systems shall be checked before being released for use in order to establish that they are capable of verifying the performance of the facility. These functions shall be checked at prescribed intervals. Records of these checks shall be maintained as evidence and verification of adequate performance of the test system.

D3.12 DEVIATIONS:

D3.12.1 Subject to compliance with D3.14, the service provider of Communication, Navigation and Surveillance may deviate from any requirement of this Part to meet an emergency situation if there is a need to take immediate and prompt action for the protection of life or property involving carriage by air, or any of the means, related thereto.

D3.12.2 The service who deviates from a requirement in D3.12.1 shall provide a written report to the Authority (DAAR) as soon as practicable, but in any event not later than 7 days after the emergency. The report shall cover the nature, the extent and the duration of the deviation.

D3.13 LIMITATIONS ON SERVICE:

D3.13.1 The service provider of Communication, Navigation and Surveillance facility shall not operate a facility if there is any cause to suspect the integrity of the information being provided by the facility. A cause to suspect the integrity of the information being provided by a facility includes the infringement of any critical site area of the facility until performance checks on the facility verify that the



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

infringement does not and will not affect the performance of the facility.

D3.13.2 The service provider shall not operate a radio transmitting facility on an aeronautical radio frequency except pursuant to a written radio apparatus license granted by the Telecommunication Regulatory Authority of the country and subject to the salient provisions of ANO-006-DRTS-1.0.

D3.13.3 Except where a deviation under D3.12 is required, the service provider shall not operate a facility unless:

D3.13.3.1 The facility is listed in the holder's exposition;

D3.13.3.2 The performance of the facility meets the applicable facility published information;

D3.13.3.3 The performance of the facility meets the applicable facility requirements in D3.10;

D3.13.3.4 Any integrity monitoring system for the facility is fully functional;

D3.13.3.5 All the periodic tests for the facility are completed in accordance with the programs established under D3.9.2.2 and D3.9.2.3;

D3.13.3.6 The facility is included in the holder's airways security program, if the destruction, damage, or interference of the facility is likely to endanger the safety of an aircraft in flight;

D3.13.3.7 The provisions of the holder's airways security program for the facility are being complied with.

D3.14 NOTIFICATION OF FACILITY INFORMATION:

D3.14.1 The service provider of Communication, Navigation and Surveillance facility shall establish a procedure to notify the users of the facilities with the operational information for each facility.

D3.14.2 The procedure shall ensure that:

D3.14.2.1 The operational information on any facility that supports an air traffic service or the PCAA Air Navigation System is forwarded to an Aeronautical Information Service (AIS) for publication in Aeronautical Information Publication (AIP);

D3.14.2.2 The users of a facility are notified without delay of any updates in the facility information that if updated, may affect the safety of air navigation. For those facilities published in the AIP the information concerning any change to their information shall be forwarded to the aeronautical information service for the issuance of a NOTAM if so necessarily required.

D3.15 NOTIFICATION OF FACILITY STATUS:

D3.15.1 The service provider of Communication, Navigation and Surveillance shall establish procedures to notify users of its facility of any changes in the operational status of each facility or service listed in the applicant's exposition.

D3.15.2 The procedures shall ensure that:

D3.15.2.1 The change of status for each of the holder's units is forwarded to the holder of the air traffic service provider under CARs, 94 and aeronautical information service provider under CARs, 94 for the Authority AIP Service; and

D3.15.2.2 The users of Communication, Navigation and Surveillance facility are notified without delay of any change in operational status of the facility or service that may affect the safety of air



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

navigation, and, except where the change is temporary in nature, information concerning any change in operational status of the facility is forwarded to the service provider of the aeronautical information service for the NOTAM service.

D3.16 FACILITY CHECK AFTER ACCIDENT OR INCIDENT:

D3.16.1 The service provider of Communication, Navigation and Surveillance shall establish a procedure to check and record the operating condition of any facility listed in their exposition that may have been used by an aircraft or an air traffic service involved in an accident or serious incident, etc .

D3.16.2 The procedure shall ensure that:

D3.16.2.1 The checks are carried out as soon as practicable after notification to the applicant's organization of such an accident or serious incident, etc.; and

D3.16.2.2 The record of the facility's operating condition as checked and the past recorded history are kept in a secure place for possible use by any subsequent investigation.

D3.17 FACILITY MALFUNCTIONS:

D3.17.1 The service provider of Communication, Navigation and Surveillance shall establish a procedure to record, investigate, and rectify any detected or reported malfunction of any facility listed in their exposition.

D3.17.2 The procedure shall ensure that a report is forwarded to the DAAR whenever a facility malfunction investigation reveals that:

D3.17.2.1 The facility has been operating outside the allowable tolerances; or

D3.17.2.2 The facility had the potential to operate outside the allowable tolerance; or

D3.17.2.3 There appears to be a recurring cause for the facility malfunction reports.

D3.17.3 The report required in D3.17.2 shall be forwarded within 7 days of malfunction being detected or reported and shall include full details of the malfunction, the findings of the investigation and the corrective action plan taken to prevent a recurrence.

D3.18 INFORMATION FLOW REQUIREMENTS:

D3.18.1 The service provider of Communication, Navigation and Surveillance shall establish procedures for the receipt of information on the following activities when the activity could affect air traffic services within the area of responsibility:

D3.18.1.1 A technical supervisor shall be available to monitor the status of all en-route facilities or receive them either through the air traffic control supervisor or through the facility technical staff;

D3.18.1.2 A Technical Supervisor shall be available to receive all status of all radio navigation aids facility and report the status to the AIS or to the ATC supervisor depending on the particular case; and

D3.18.1.3 A technical supervisor shall be available to receive all status reported at the aerodromes and take necessary actions including reporting the status to the appropriate authorities.

D3.18.2 The service provider shall establish systems and procedures to ensure that each facility, appropriate to the intended area of responsibility, is kept informed of the operational status and the existence of temporary hazards of:



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

- D3.18.2.1 All navigation aids in the system;
- D3.18.2.2 All surveillance radar in the system;
- D3.18.2.3 All air/ground and ground/ground communication facilities in the system;
- D3.18.2.4 All automation facilities in the system; and
- D3.18.2.5 All environmental facilities in the system.

D3.19 AERONAUTICAL TELECOMMUNICATION FACILITIES:

The service provider of Communication, Navigation and Surveillance shall establish procedures to ensure that:

- D3.19.1 The National Standard and Recommended Practices of ANO-003-DRTS-1.0, ANO-004-DRTS-1.0 and ANO-006-DRTS-1.0 as amended are complied with;
- D3.19.2 All radio communication services listed in the AIP of Pakistan FIRs are being served by physical facilities identified;
- D3.19.3 All radio equipment is fully redundant to ensure service reliability that are required by the system specifications;
- D3.19.4 All remote radio sites are easily accessible to the maintenance personnel to allow on time arrival for them in case of emergencies;
- D3.19.5 All voice switches and position control panels are maintained to guarantee continuity of service according to the specifications;
- D3.19.6 Fully uninterrupted power supply units are available at each separate radio site;
- D3.19.7 Availability of a bypass to the equipment providing the service in case a full failure of voice switching system should occur; and
- D3.19.8 Maintain Very High Frequency (VHF) aeronautical telecommunication facilities (selective calling systems) as an alternative means of communication to aircraft or as main means of communication to aircraft for areas that may not be covered by VHF communications if required.
- D3.19.9 When two or more ATS frequencies are being used by a controller, consideration should be given to provide facilities to allow ATS and aircraft transmissions on any of the frequencies to be simultaneously retransmitted on the other frequencies in use thus permitting aircraft stations within range to hear all transmissions to and from the controller.
- D3.19.10 All aeronautical telecommunication stations, including end systems and intermediate systems of the aeronautical telecommunication network (ATN), shall be protected from unauthorized direct or remote access.
- D3.19.11 No contracts shall be issued with Satellite Service Provider unless it fulfills minimum requirements of D3 of ANO-004-DRTS-1.0.
- D3.19.12 In case of use of the VHF Air-ground Digital Link (VDL) requirements and system characteristics shall be according to D5 of ANO-004-DRTS-1.0. Technical provisions relating to circuits used in the AFTN shall be according to D6 of ANO-004-DRTS-1.0.
- D3.19.13 HF data link system if requirements and system characteristics shall be according to ANO-004-DRTS-1.0 in D11.



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

D3.19.14 Air-Ground VHF Communication System Characteristics and requirements shall be according to D11 of ANO-004-DRTS-1.

D3.19.15 In case of use of HF Communication System / Single Sideband (SSB) Characteristics and requirements shall be according to ANO-004-DRTS-1.0, Part II, D2.4.

D3.19.16 The use of circuit switching and signaling to provide speech circuits to interconnect ATS units not interconnected by dedicated circuits shall be by agreement between the Administrations concerned. The application of aeronautical speech circuit switching and signaling shall be made on the basis of regional air navigation agreements.

D3.19.17 Technical provisions relating to international aeronautical speech circuit switching and signaling for ground-ground applications shall be according to ANO-004-DRTS-1.0 Part II, D4.

D3.20 GROUND TELECOMMUNICATION FACILITIES:

D3.20.1 The service provider of Communication, Navigation and Surveillance shall establish systems and procedures to communicate between the en route (area) control centers and remote air/ground communication stations or en route radar stations or military control centers. The systems and the procedures should be established and maintained to guarantee continuity of service according to the system specifications;

D3.20.2 The service provider shall establish procedures to ensure that:

D3.20.2.1 All service interruptions to the ground telecommunication services are promptly reported and immediately acted upon according to the standard corrective maintenance procedures;

D3.20.2.2 The standard preventive and periodic maintenance procedures are applied to the ground telecommunication facilities to minimize the probability of service interruption; and

D3.20.2.3 Alternative means to ground communications are identified in case of service interruption of the main means of ground communications. Alternative means of ground telecommunications could include direct connections from the telephone company, satellite communications, microwave links and or other systems.

D3.21 RADIO NAVIGATION AIDS FACILITIES:

D3.21.1 The service provider of Communication, Navigation and Surveillance shall establish systems and procedures to:

D3.21.1.1 Ensure compliance with the National Standards and Recommended Practices of ANO-002-DRTS-1.0 (D2 for provisions and D3 for the specification) and ANO-006-DRTS-1.0 for frequency management of the following types of radio navigation facilities:

D3.21.1.1.1 Instrument landing system (ILS) CAT I and/or CAT II at aerodromes;

D3.21.1.1.2 VHF Omni-directional radio range (VOR) for en route and terminal radio navigation services;

D3.21.1.1.3 Non directional radio beacon (NDB) for en route radio navigation if used;

D3.21.1.1.4 UHF distant measuring equipment (DME) for en route and terminal services; and

D3.21.1.1.5 Application for GNSS should be considered in the near future.

D3.21.1.2 Conform to the requirements of the critical and sensitive areas surrounding ILS installation as in attachment C of ANO-002-DRTS-1.0;

D3.21.1.3 Ensure that the minimum distance from the runway centre line to holding position may



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

need to be increased to avoid interference with radio navigation aids as in attachment of ANO-002-DRTS-1.0;

D3.21.1.4 Ensure that VOR siting selection requirements for check-points:

D3.21.1.4.1 The signal strength of the nearby VOR has to be sufficient to ensure satisfactory operation of a typical aircraft VOR installation. In particular, full flag action (no flag showing) must be ensured. The check-points should, within the limits of operating convenience, be located away from buildings or other reflecting objects (fixed or moving) which are likely to degrade the accuracy or stability of the VOR signals;

D3.21.1.4.2 The observed VOR bearing at any selected point should ideally be within plus or minus 1.5 degrees of the bearing accurately determined by survey or chart plotting; and

***Note:** The figure of plus or minus 1.5 degrees has no direct operational significance in that the observed bearing becomes the published bearing; however, where a larger difference is observed, there is some possibility of poor stability.*

D3.21.1.4.3 The VOR information at a selected point should be used operationally only if found to be consistently within plus or minus 2 degrees of the published bearing. The stability of the VOR information at a selected point should be checked periodically with a calibrated receiver to ensure that the plus or minus 2-degree tolerance is satisfied, irrespective of the orientation of the VOR receiving antenna; and

***Note:** The tolerance of plus or minus 2 degrees relates to the consistency of the information at the selected point and includes a small tolerance for the accuracy of the calibrated VOR receiver used in checking the point. The 2-degree figure does not relate to any figure for acceptance or rejection of an aircraft VOR installation, this being a matter for determination by the Authority and users in the light of the operation to be performed.*

D3.21.1.4.4 Checkpoints, which can satisfy the foregoing requirements, should be selected in consultation with the operators concerned. Provision of checkpoints in holding bays, at runway ends and in maintenance and loading areas, is usually desirable.

D3.21.1.5 Ensure that each VOR checkpoint must be distinctively marked. This marking must include the VOR bearing which a pilot would observe on his aircraft instrument if his VOR installation were operating correctly;

D3.21.1.6 Ensure that radio navigation aids shall be provided with suitable power supplies and mains to ensure continuity of service appropriate to the needs of the service provided; and

D3.21.1.7 Ensure that the height of the ILS reference datum must be considered, when studying the location of a threshold as mentioned in attachment C of ANO-002-DRTS-1.0;

D3.21.2 The procedures required in D3.21.1.1 shall ensure that:

D3.21.2.1 All service interruptions to the radio navigation services are promptly reported and instantly acted upon according to the standard corrective maintenance procedures. Notification for the navigation aid systems should take place through at least remote monitoring unit (RMU) Systems at the towers or the en route (area) centers;

D3.21.2.2 The standard preventive and periodic maintenance procedures are applied to the radio navigation facilities to minimize the probability of service interruption; and

D3.21.2.3 Alternative means to radio navigation are identified in case of service interruption of the main radio navigation aids services:



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

D3.21.2.3.1 In case of ILS failures, normally an alternative means needed to take effect such as reducing the system from CAT II to CAT I unless failure is related to equipment. In this case a redundant system and efficient logistic support need to be maintained; and

D3.21.2.3.2 In case of VOR failures, normally an alternative means may involve the use of overlapping VOR coverage or use of other operational means unless failure is related to the equipment. In this case a redundant system and efficient logistics support need to be maintained.

D3.21.2.4 A list of no redundant (main equipment only) radio navigation aid facilities need to be prepared and reported to the head of the technical and operational supervisor to take appropriate operational measures in case of their failure.

D3.21.2.5 In localities and along routes where conditions of traffic density and low visibility necessitate a ground based short. distance radio aid to navigation for the efficient exercises of air traffic control, or where such short. distance aid is required for the safe and efficient conduct of aircraft operations, the standard aid shall be the VHF Omni directional radio range (VOR) of the continuous wave phase comparison type conforming to the standards contained in D3.3.3.

D3.21.3 Aerodrome control towers and units providing approach control service shall be provided without delay with information on the operational status of radio navigation aids essential for approach, landing and takeoff at the aerodrome(s).

D3.21.4 It is permissible to replace non-visual aid with an alternative non-visual aid on the basis of regional air navigation agreement.

D3.22 RADAR SURVEILLANCE FACILITIES:

D3.22.1 The service provider of Communication, Navigation and Surveillance shall establish systems and procedures to:

D3.22.1.1 Ensure compliance with the international standards and recommended practices of ANO-005-DRTS-1.0 (D2 and D3) for the Secondary Surveillance Radar (SSR) systems; and

D3.22.1.2 Ensure that all systems are provided with monitoring facilities to ensure service continuity.

D3.22.1.3 The monopulse secondary surveillance radar (MSSR) shall be modified to the application of S-Mode.

D3.22.1.4 A precision approach radar system conforming to the standards contained in D3 of ANO-002-DRTS-1.0 should be installed and operated as a supplement to a non-visual aid.

D3.22.2 The service provider shall establish a procedure to ensure that:

D3.22.2.1 All service interruptions to the radar surveillance services are promptly reported and swiftly acted upon according to the standard corrective maintenance procedures;

D3.22.2.2 The standard preventive and periodic maintenance procedures are applied to the radar surveillance services facilities to minimize the probability of service interruption;

D3.22.2.3 Alternative operational means to radar surveillance services are identified in case of service interruption of the main radar surveillance services facilities according to the CARs, 94 and associated procedures;

D3.22.2.4 All radar services are provided in accordance with procedures published in document



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

4444 or Document 7030 (as applicable to the Asia Region; and

D3.22.2.5 Full information is made available to air traffic control administration on:

D3.22.2.6 The nature and extent of the radar services provided; and

D3.22.2.6.1 Any significant limitations regarding such radar service.

D3.23 DATA AUTOMATION FACILITIES:

D3.23.1 The service provider of Communication, Navigation and Surveillance shall establish procedures to ensure that:

D3.23.1.1 All automation systems that serve the en route, the approach and the tower facilities are maintained according to the maintenance manual of the manufacturer of each system;

D3.23.1.2 The ATS message service of the ATS (Air Traffic Services) message handling service (ATSMHS) application shall be used to exchange ATS messages between users over the aeronautical telecommunication network (ATN) internet;

D3.23.1.3 The inter-center communications (ICC) applications set shall be used to exchange ATS messages between air traffic service users over the ATN internet when used;

D3.23.1.4 When ATN applications and communication services are implemented, it shall be established according to D3 of ANO-004-DRTS-1.0;

D3.23.1.5 Accounting management. An ATN systems management facility to monitor users for use of network resources and to limit the use of those resources;

D3.23.1.6 Terminals staffed either by the technical or the operational supervisors continuously monitor the automation systems functions. Data monitored by the technical supervisor are normally complemented by the data monitored by the operational supervisor to form a complete data monitoring and control system of the facility;

D3.23.1.7 Automatic dependent surveillances (ADS) application shall establish its procedure according to D3 of ANO-005-DRTS-1.0 when it is in use; and

D3.23.1.8 Controller-Pilot Data Link Communications (CPDLC) Application shall establish its procedure and requirements according to D8 of ANO-003-DRTS-1.0 when it is used.

D3.23.2 The holder shall establish a procedure to ensure that:

D3.23.2.1 Inputs and outputs to the central processors of the automation system are properly interfaced with each other;

D3.23.2.2 All power supplies of the processor are redundant, properly adjusted and thoroughly tested; and

D3.23.2.3 Ability to upload and download programs to the central processor unit / system in case of modifications in the system.

D3.24 CLOCKS AND TIME RECORDING DEVICES:

D3.24.1 The service provider of Communication, Navigation and Surveillance shall establish procedures to ensure:



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

D3.24.1.1 Compliance with CARs, 94, regarding the clocks and time recording system of the ATC communications;

D3.24.1.2 Coordinated universal time devices that express time in hours and minutes of the 24-hour day beginning at 0000 UTC are available and properly maintained;

D3.24.1.3 Facility is checked as necessary to ensure the correct time within 5 seconds of UTC as determined by reference to a standard time station or GPS time standard.

D3.24.2 Wherever data link communications are utilized, the service provider shall establish a procedure to ensure that all clocks and time-recording devices be checked as necessary to ensure correct time to within 1 second of UTC.

D3.24.3 The service provider shall establish a procedure to ensure that the correct time, to the nearest half minute, is provided:

D3.24.3.1 In respect of any aerodrome control service or aerodrome AIS, to IFR aircraft prior to taxiing for take-off; and

D3.24.3.2 To any aircraft on request.

D3.25 RECORD OF COMMUNICATION:

D3.25.1 The service provider of Communication, Navigation and Surveillance shall establish a procedure to ensure:

D3.25.1.1 Compliance with the International Standards and Recommended Practices of D3.5 of ANO-003-DRTS-1.0 regarding the recording system of the ATC communications, and

D3.25.1.2 Compliance with CARs, 94, regarding the recording system of the ATC communications.

D3.25.2 The service provider shall establish a procedure to ensure:

D3.25.2.1 The recording systems capacity and quality are according to the international standards, and

D3.25.2.2 The recording system maintenance and recording tapes handling system is in accordance to the best international practices.

D3.26 AERONAUTICAL RADIO FREQUENCY SPECTRUM UTILIZATION:

D3.26.1 The service provider of Communication, Navigation and Surveillance shall establish procedures to ensure:

D3.26.1.1 Compliance with the international standards and recommended practices described in D2 and D3 of ANO-006-DRTS-1.0 for the aeronautical radio frequency spectrum utilization;

D3.26.1.2 Compliance with frequency allocations of the navigation aids according to ANO-002-DRTS-1.0 and ANO-006-DRTS-1.0;

D3.26.1.3 Compliance with frequency allocations of the aeronautical telecommunications spectrum (VHF and UHF) according to ANO-006-DRTS-1.0 ; and

D3.26.1.4 Compliance with frequency allocations of Surveillance Radar contained in ANO-002-DRTS-1.0.

D3.26.2 The service provider shall establish a procedure to ensure:



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

D3.26.2.1 Frequencies allocated for services outside those mentioned in D3.26.1.1 through D3.26.1.4 are coordinated with the Telecommunications Regulatory Authority, and

D3.26.2.2 Compliance with frequency allocation protection procedures contained in ANO-006-DRTS-1.0; attachments A, B and C and ANO-003-DRTS-1.0 regarding VHF frequencies.

D3.27 ENVIRONMENTAL FACILITIES:

D3.27.1 The service provider of Communication, Navigation and Surveillance shall establish procedures to ensure that:

D3.27.1.1 All power supply systems CNS facilities shall have a main feed power and UPS system;

D3.27.1.2 The power supply switchover time for CNS facilities shall comply with the following table:

TYPE OF RUNWAY	AIDS REQUIRING POWER	MAXIMUM SWITCH – OVER TIMES (SECONDS)
INSTRUMENT APPROACH	SRE	15
	VOR	15
	NDB	15
	D/F FACILITY	15
PRECISION APPROACH (CATEGORY I)	ILS LOCALIZER	10
	ILS GLIDE PATH	10
	ILS MIDDLE MAKER	10
	ILS OUTER MAKER	10
PRECISION APPROACH (CATEGORY II)	PAR	10
	ILS LOCALIZER	0
	ILS GLIDE PATH	0
	ILS INNER MAKER	1
	ILS MIDDLE MAKER	1
	ILS OUTER MAKER	10
PRECISION APPROACH (CATEGORY III)	(SAME AS CATEGORY II)	(SAME AS CATEGORY II)

D3.27.1.3 The power supply voltage stability shall comply with the manufacturer of the specific equipment specifications;

D3.27.1.4 All CNS facilities equipment rooms environmental condition including room temperature and humidity are within the recommended values by the specific CNS equipment manufacturer;

D3.27.1.5 All CNS facilities equipment rooms are shielded and insulated against leakage of air and dust. All exit doors and windows shall be closed to ensure the environmental conditions meet the requirements of paragraph D3.27 ; and

D3.27.1.6 All CNS facilities are provided by a diesel powered electrical generators even when the facility is supplied by the commercial electric power. In the later case, the diesel powered electrical generator is considered stand-by source of power.

D3.27.2 The service provider shall establish a procedure to ensure that:



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

D3.27.2.1 All water supply is adequate to provide the water required for firefighting equipment and other purposes by ensuring proper operation of water pumps; and

D3.27.2.2 All ventilation systems in the CNS facilities are maintained according to the general standards.

D3.27.3 The service provider shall establish procedures to ensure that:

D3.27.3.1 All services interruptions to the environmental facilities are promptly reported and acted upon according to the standard corrective maintenance procedures;

D3.27.3.2 The standard preventive and periodic maintenance procedure are applied to the environmental facilities to minimize the probability of service interruption;

D3.27.3.3 Alternative means to environmental facilities are identified in case of service interruption of the main means of environmental facilities.

D3.27.3.4 The service provider of environmental shall establish systems and procedures to communicate between environmental facilities.

D3.28 PROTECTION OF FACILITIES FROM RADIO INTERFERENCE AND STRUCTURAL OBSTACLES:

D3.28.1 The service provider of Communication, Navigation and Surveillance shall establish procedures to ensure that:

D3.28.1.1 All radio navigation aids are protected from radio frequency interference in accordance with D3.1.4 of ANO-002-DRTS-1.0;

D3.28.1.2 All aeronautical telecommunications facilities are protected from radio frequency interference in accordance to the following procedures:

D3.28.1.2.1 Where the protection heights determined are less than that operationally desirable, separation between facilities operating on the same frequency should not be less than that necessary to ensure that an aircraft at the limit of the functional service range and the operationally desirable protection height of one facility does not come above the radio horizon with respect to adjacent facilities.

D3.28.1.2.2 The problem of inter-State interference on frequencies allotted worldwide or on a regional basis to national services, should be resolved by consultation between the administrations concerned.

D3.28.1.2.3 For ground VHF facilities which provide service beyond the radio horizon, any spurious or harmonic radiation outside the band ± 250 kHz from the assigned carrier frequency should not exceed an effective radiated power of 1 mW in any azimuth.

D3.28.1.3 No radio interfering devices shall be established in the proximity of the CNS facilities utilizing radio reception without prior approval from the Authority.

D3.28.2 The service provider of Communication, Navigation and Surveillance shall establish procedures to fully ensure that all radio navigation aids systems, radio telecommunication systems and radar systems that are using transmit or receive antennas shall not be obstructed by buildings towers structures that would impact their performance. NCASP recommendations on rules for structural obstacle avoidance should be followed.

D3.29 SAFETY MANAGEMENT SYSTEM:

D3.29.1 The service provider shall establish, implement, maintain and adhere to a safety



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

management system that is appropriate to the size, nature and complexity of all activities authorized to be conducted under his duties.

D3.29.2 That system shall as a minimum:

D3.29.2.1 Identify safety hazards;

D3.29.2.2 Ensure that remedial action necessary to maintain an acceptable level of safety is implemented;

D3.29.2.3 Provide for continuous monitoring and regular assessment of the safety level achieved; and

D3.29.2.4 Aim to make continuous improvement to the overall level of safety.

D3.29.3 The results of this system and related audits and corrective actions shall be made available to the Authority upon request.

D3.30 REPORTING SERVICE DISRUPTIONS:

D3.30.1 The service provider of Communication, Navigation and Surveillance facility shall establish procedures to:

D3.30.1.1 Advise the Authority (DAAR) of any planned disruption of equipment that will result in disruption of air traffic services that could have an impact on safety;

D3.30.1.2 Report to the Authority (DAAR) within 48 hours of the occurrence, the circumstances surrounding any unplanned disruption of equipment resulting disruption of air traffic services when the disruption affected, or could have affected, the safety of air traffic including development of a list of such disruptions of equipment that are reportable. All other disruptions that are not affecting the continuation of air traffic services are reportable internally only; and

D3.30.1.3 Investigate any unplanned disruption to the provision of air traffic services and send a report of the investigation to the Authority (DAAR).

D3.30.2 Disruptions reportable in D3.30.1 shall include, but are not limited to, any:

D3.30.2.1 Any interruption, of greater than 10 minutes, to the normal provision of an air traffic service;

D3.30.2.2 Any interference on the air/ground telecommunications channel that may affect the service greater than 10 minutes;

D3.30.2.3 Failure of any radar coverage to areas that are declared as covered in the Pakistan FIRs AIP for greater than 10 minutes;

D3.30.2.4 Failure of any radio navigation aids covered by Pakistan FIR AIP for more than 10 minutes;

D3.30.2.5 Routine maintenance of equipment that will have impact on the service when service brought off air;

D3.30.2.6 New installations or additions on established services that require the service to be off-air; and

D3.30.2.7 Any services that affect the air traffic services without having a contingency plan for operation.

D3.31 REPORTING UNSAFE CONDITIONS:

D3.31.1 The service provider of Communication, Navigation and Surveillance shall establish a policy encouraging the reporting of unsafe conditions or practices observed by facility personnel;



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

D3.31.2 Shift personnel shall have a checklist to report at the beginning of each shift the conditions of equipment in the facility where unsafe condition exists. Unsafe conditions reportable in D3.31.1 may include, but are not limited to:

- D1.31.2.1 Radar signal of fixed targets are not present on the screen;
- D1.31.2.2 Unstable performance of navigation aid;
- D1.31.2.3 Simultaneous failure of radar and voice signals;
- D1.31.2.4 Failure of air conditioning of the facility to operate;
- D1.31.2.5 Failure of the UPS to function when the main power supply is interrupted;
- D1.31.2.6 Persistent power failures without adequate alarms or failure of UPS systems to function in case of power failure;
- D1.31.2.7 Persistent failures of main or standby equipment in the facility;
- D1.31.2.8 Problems with shift administration;
- D1.31.2.9 Failure to comply with Communication, Navigation and Surveillance Facility instructions;
- D1.31.2.10 Significant equipment reading deviations; and
- D1.31.2.11 Procedural errors or inconsistencies that may affect the safety of air navigation services.

D3.32 OPERATION OF FACILITY FOR CONDUCTING TEMPORARY TESTS:

D3.32.1 The service provider of Communication, Navigation and Surveillance shall establish a procedure for the operation of the facility for conducting temporary test to:

- D3.32.1.1 Advise the Authority of a plan to conduct the temporary test;
- D3.32.1.2 Include the time frame for conducting the test;
- D3.32.1.3 The plan shall include the type and class of the facility that the test will be conducted;
- D3.32.1.4 The plan shall indicate the purpose of the test, and

D3.32.2 The service provider of Communication, Navigation and Surveillance shall not operate the facility for temporary tests unless the Authority approval is obtained.

D4. PROTECTION & SAFE CUSTODY OF DOCUMENTS:

D4.1 All documents and information received by the Authority or the Director General CAA (DGCAA) relating to the safety management process and/or otherwise during the process of continuing supervision is subject to protection from public disclosure.

D4.2 The Director General Civil Aviation (DGCAA) Authority will keep all documentation and information, safely in the record, received during the initial implementation of Safety Management System, during changes in this system and use during the supervision of the Service Provider.

D5. AMENDMENTS & MODIFICATION:

D5.1 Responsibility for documentation, review, amendments and publication:

D5.2 Directorate of Airspace and Aerodrome Regulations (DAAR), HQCAA is responsible for development, review and amendments of ANO-001-DRTS-1.0, ANO-002-DRTS-1.0, ANO-003-DRTS-1.0, ANO-004-DRTS-1.0, ANO-005-DRTS-1.0 and ANO-006-DRTS-1.0. Directorate of CNS will ensure that the provision of CNS facilities as detailed in this ANO are in conformity with Standards and Recommended Practices (SARPs) given in the ANOs issued by Technical Standards Branch, DAAR, HQCAA;



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

D6. EXEMPTION / WAIVER:

E. The Director General CAA (DGCAA) may grant exemption / waiver from such compliances in relation to any of the provisions/requirements of this ANO, as deemed fit and appropriate, on case-to-case basis being subject to certain valid reasons / cogent grounds that shall not impede or hamper any aviation activity, etc. or thereby likely cease and may endanger flight safety by any means or terms whatsoever.

F. EVIDENCES (ACRONYMS / RECORDS / REFERENCES):

E1. ACRONYMS:

AAC	AERONAUTICAL ADMINISTRATIVE COMMUNICATION
ACAS	AIRBORNE COLLISION AVOIDANCE SYSTEM
ADS	AUTOMATIC DEPENDENT SURVEILLANCES
AFTN	AERONAUTICAL FIX TELECOMMUNICATION NETWORK
AIDC	ATS INTERFACILITY DATA COMMUNICATION
AIP	AERONAUTICAL INFORMATION PUBLICATION
AIS	AERONAUTICAL INFORMATION SERVICE
AMHS	ATS MESSAGE HANDLING SYSTEM
ANO	AIR NAVIGATION ORDER
ANP	AIR NAVIGATION PLAN
AOC	AERONAUTICAL OPERATIONAL CONTROL
AT	AERONAUTICAL TELECOMMUNICATION
ATN	AERONAUTICAL TELECOMMUNICATION NETWORK
ATS	AIR TRAFFIC SERVICES
ATSC	AIR TRAFFIC SERVICES COMMUNICATIONS
ATSMHS	ATS MESSAGE HANDLING SERVICES
ATSU	ATS UNIT
BER	BIT ERROR RATE
CARs, 94	CIVIL AVIATION RULES, 1994
CAT II	CATEGORY II LANDING PROCEDURE
CNS:	COMMUNICATION, NAVIGATION & SURVEILLANCE
CPDLC	CONTROLLER-PILOT DATA LINK COMMUNICATIONS
DAAR	DIRECTORATE OF AIR NAVIGATION AND AERODROME
DGCAA	DIRECTOR GENERAL CIVIL AVIATION AUTHORITY.
DME	DISTANCE MEASURING EQUIPMENT
EIRP	EQUIVALENT ISOTROPICALLY RADIATED POWER
FACID	FACILITIES AND SERVICES IMPLEMENTATION DOCUMENT
FDPS	FLIGHT DATA PROCESSING SYSTEM
FEC	FORWARD ERROR CORRECTION
FIR	FLIGHT INFORMATION REGION
GNSS	GLOBAL NAVIGATION SATELLITE SYSTEMS
GPS	GLOBAL POSITIONING SYSTEM
HPA	HECTOPASCALS
HQCAA	HEADQUARTERS CIVIL AVIATION AUTHORITY
ICAO	INTERNATIONAL CIVIL AVIATION ORGANIZATION.
ICC	INTER CENTRE COMMUNICATION
IFR	INSTRUMENT FLIGHT ROUTE
ILS	INSTRUMENT LANDING SYSTEM
ISO	INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
MSSR	MONOPULSE SECONDARY SURVEILLANCE RADAR
NCASP	NATIONAL CIVIL AVIATION SECURITY PROGRAMME
NDB	NON DIRECTIONAL BEACON
NOTAM	NOTICE TO AIRMEN
OEM	ORIGINAL EQUIPMENT MANUFACTURER



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CERTIFICATION REQUIREMENTS FOR CNS FACILITY SERVICE PROVIDERS

OSI	OPEN SYSTEMS INTERCONNECTIONS
PLP	PACKET LAYER PROTOCOL
RDPS	RADAR DATA PROCESSING SYSTEM
RMU	REMOTE MONITORING UNIT
RN	RADIO NAVIGATION
SARPS	STANDARD AND RECOMMENDED PRACTICES
SSR	SECONDARY SURVEILLANCE RADAR
TDM	TIME DIVISION MULTIPLEX
TDMA	TIME DIVISION MULTIPLE ACCESS
UHF	ULTRA HIGH FREQUENCY
UPS	UNINTERRUPTIBLE POWER SUPPLY
VDL	VHF AIR-GROUND DIGITAL LINK
VHF	VERY HIGH FREQUENCY
VOR	VHF OMNI RANGE

E2. RECORDS:

Nil

E3. REFERENCES:

- E3.1 ANO-002-DRTS-1.0
- E3.2 ANO-003-DRTS-1.0
- E3.3 ANO-004-DRTS-1.0
- E3.4 ANO-005-DRTS-1.0
- E3.5 ANO-006-DRTS-1.0
- E3.6 ICAO Document 8071 Volume-1
- E3.7 ICAO Document 8071 Volume-2

IMPLEMENTATION:

This Air Navigation Order shall be implemented with effect from 30th August, 2012.


(NADEEM KHAN YOUSUFZAI)
Director General
Pakistan Civil Aviation Authority

Dated: - 30 August, 2012


(MUHAMMAD ZIA KHAN)
Air Cdre.
Director Airspace & Aerodrome Regulations

Dated- 30 August, 2012

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