International Civil Aviation Organization

MID Air Navigation Plan Ad-hoc Working Group

Second Meeting (ANP WG/2)
(Cairo, Egypt, 27 - 29 May 2013)

Agenda Item 3:   **Development of the new MID Air Navigation**

REVIEW OF VOLUMES I and II - PART III - CNS

(Presented by the Secretariat)

SUMMARY
This paper presents Part III-CNS of Volumes I and II of the MID eANP.
Action by the meeting is at paragraph 3.

REFERENCES
- MIDANPIRG/14 Report
- MSG/4 Report

1.   INTRODUCTION

1.1   The Council approved the new eANP Template (Volumes I, II and III) and corresponding procedure for amendment on 18 June 2014 (202nd session, Fourth meeting).

2.   DISCUSSION

2.1   A consolidated version of the MID eANP Volumes I and II - Part III - CNS developed based on the Council approved Template are at **Appendices A** and **B**.

3.   ACTION BY THE MEETING

3.1   The meeting is invited to review and update, as appropriate, the MID eANP Volumes I and II Parts III – CNS at **Appendices A** and **B**, in particular Tables CNS II-1, CNS II-2, CNS II-3 and CNS II-4.

MID ANP, VOLUME I
PART III – COMMUNICATIONS, NAVIGATION AND SURVEILLANCE (CNS)

1. INTRODUCTION

1.1   This part of the MID ANP constitutes the agreed regional requirements considered to be the minimum necessary for effective planning and implementation of Communications, Navigation and Surveillance (CNS) facilities and services in the MID Region and complements the provisions of ICAO SARPs and PANS related to CNS. It contains stable plan elements related to the assignment of responsibilities to States for the provision of CNS facilities and services within the ICAO MID region in accordance with Article 28 of the *Convention on International Civil Aviation* (Doc 7300) and mandatory requirements related to the CNS facilities and services to be implemented by States in accordance with regional air navigation agreements.

1.2   The dynamic plan elements related to the assignment of responsibilities to States for the provision of CNS facilities and services and the mandatory requirements based on regional air navigation agreements related to CNS are contained in the MID ANP Volume II, Part III – CNS.

1.3   The MID ANP Volume III contains dynamic/flexible plan elements related to the implementation of air navigation systems and their modernization in line with the ICAO Aviation System Block Upgrades (ASBUs) methodology and associated technology roadmaps described in the Global Air Navigation Plan. The ASBU modules are aimed at increasing capacity and improving efficiency of the aviation system whilst maintaining or enhancing safety level, and achieving the necessary harmonization and interoperability at regional and global level. This includes the regionally agreed ASBU modules applicable to the specified ICAO region/sub-region and associated elements/enablers necessary for the monitoring of the status of implementation of these ASBU modules.

1.4   In planning for these elements, economy and efficiency should be taken into account in order to ensure that the requirements for the provision of CNS facilities and services can be kept to a minimum. CNS facilities and services should fulfil multiple functions whenever this is feasible.

Standards and Recommended Practices and Procedures for Air Navigation Services

1.5   The SARPs and PANS and related guidance material applicable to the provision of CNS are contained in:

a)   Annex 10 – *Aeronautical Telecommunications*, Volumes I, II, III, IV and V;

b)   Annex 2 – Rules of the Air;

c)   Annex 3 – Meteorological Service for international air navigation;

d)   Annex 6 – Operation of Aircraft, Parts I (Chapter 7), II (Chapter 7) and III (Chapter 5);

e)   Annex 11 – Air Traffic Services;

f)   Annex 12 – Search and Rescue;

g)   Annex 15 – Aeronautical Information Services;

h)   Procedures for Air Navigation Services – Air Traffic Management (PANS-ATM) (Doc 4444);

i)   Regional Supplementary Procedures (Doc 7030);

j)   GNSS Manual (Doc 9849);

k) Manual on Detailed Technical Specifications for the Aeronautical Telecommunication Network (ATN) using ISO/OSI Standards and Protocols (Doc 9880);

l) ICAO Aeronautical Telecommunication Network (ATN) Manual for the ATN using IPS Standards and Protocols (Doc 9896);

m) *Manual of Testing of Radio Navigation Aids* (Doc 8071);

n) *Manual on the Planning and Engineering of the Aeronautical Fixed Telecommunications Network* (Doc 8259);

o) *Manual on Required Communication Performance (RCP)* (Doc 9869);

p) *Training Manual* (Doc 7192);

q) *Performance-based Navigation Manual* (Doc 9613);

r) *Handbook on Radio Frequency Spectrum Requirements for Civil Aviation* (Doc 9718);

s) *ICAO Manual on the Secondary Surveillance Radar (SSR) Systems* (Doc 9684);

t) *Manual on Airborne Surveillance Applications* (Doc 9994); and

u) *Manual of Air Traffic Services Data Link Applications* (Doc 9694).

2. GENERAL REGIONAL REQUIREMENTS

Communications

Aeronautical Fixed Service (AFS)

2.1 The aeronautical fixed service (AFS) should satisfy the communication requirements of ATS, AIS/AIM, MET and SAR, including specific requirements in terms of system reliability, message integrity and transit times, with respect to printed as well as digital data and speech communications. If need be, it should, following agreement between individual States and aircraft operators, satisfy the requirements for airline operational control.

The Aeronautical Telecommunication Network (ATN)

2.2 The ATN of the Region(s) should have sufficient capacity to meet the minimum requirements for data communications for the services mentioned in paragraph 2.1 above.

Aeronautical Mobile Service (AMS)

2.3 Air-ground communications facilities should meet the agreed communication requirements of the air traffic services, as well as all other types of communications which are acceptable on the AMS to the extent that the latter types of communications can be accommodated.

Air-ground communications for ATS

2.4 Air-ground communications for ATS purposes should be so designed to require the least number of frequency and channel changes for aircraft in flight compatible with the provision of the required service. They should also provide for the minimum amount of coordination between ATS units and provide for optimum economy in the frequency spectrum used for this purpose.

Air-ground data link communications

2.5   Air-ground data link communications should be implemented in such a way that they are regionally and globally harmonised and make efficient use of available communication means and ensure optimum economy in frequency spectrum use and system automation.

Navigation

2.6   Planning of aeronautical radio navigation services should be done on a total system basis, taking full account of the navigation capabilities as well as cost effectiveness. The total system composed of station-referenced navigation aids, satellite-based navigation systems and airborne capabilities should meet the performance based navigation (PBN) requirements for all aircraft using the system and should form an adequate basis for the provision of positioning, guidance and air traffic services.

2.7   Account should be taken of the fact that certain aircraft may be able to meet their navigation needs by means of self-contained or satellite-based aids, thus eliminating the need for the provision of station-referenced aids along the ATS routes used by such aircraft, as well as the need to carry on board excessive redundancies.

Surveillance

2.8   Planning of aeronautical surveillance systems should be made based on a system approach concept, where collaboration and sharing of data sources should be considered in support of an efficient use of the airspace.

Frequency Management

2.9   Frequency assignment planning in the Region should be carried out in accordance with the provisions of Annex 10 and *ICAO Handbook on Radio Frequency spectrum for Civil Aviation* (Doc 9718), supplemented, as necessary, by regional recommendations and technical criteria developed for this purpose.

3.   SPECIFIC REGIONAL REQUIREMENTS

None.

————————————

MID ANP, VOLUME II

PART III – COMMUNICATIONS, NAVIGATION AND SURVEILLANCE (CNS)

1.   INTRODUCTION

1.1   This part of the MID ANP, Volume II, complements the provisions in ICAO SARPs and PANS related to communication, navigation and surveillance (CNS). It contains dynamic plan elements related to the assignment of responsibilities to States for the provision of CNS facilities and services within a specified area in accordance with Article 28 of the *Convention on International Civil Aviation* (Doc 7300); and mandatory requirements related to CNS facilities and services to be implemented by States in accordance with regional air navigation agreements. Such agreement indicates a commitment on the part of the State(s) concerned to implement the requirement(s) specified.

2.   GENERAL REGIONAL REQUIREMENTS

Communications

Aeronautical Fixed Service (AFS)

2.1   The aeronautical fixed service should comprise the following systems and applications that are used for ground-ground (i.e. point-to-point and/or point-to-multipoint) communications in the international aeronautical telecommunication service:

a)   ATS direct speech circuits and networks;

b)   meteorological operational circuits, networks and broadcast systems, including World Area Forecast System – Internet File Service (WIFS) and/or Satellite Distribution System for Information Relating to Air Navigation (SADIS);

c)   the aeronautical fixed telecommunications network (AFTN);

d)   the common ICAO data interchange network (CIDIN);

e)   the air traffic services (ATS) message handling services (AMHS); and

f)   the inter-centre communications (ICC).

2.2   To meet the data communication requirements, a uniform high-grade aeronautical network should be provided, based on the aeronautical telecommunication network (ATN), taking into account the existence and continuation of current networks.

2.3   Contingency procedures should be in place to ensure that, in case of a communication centre breakdown, all the parties concerned are promptly informed of the prevailing situation. All possible arrangements should be made to ensure that, in case of breakdown of a communications centre or circuit, at least high-priority traffic continues to be handled by appropriate means.

2.4   AFS planning should permit flexibility in detailed development and implementation. The required AFTN Stations and Centres are listed in the AFTN Plan in **Table CNS II-1**.

The Aeronautical Telecommunication Network (ATN)

2.5   The ATN should be able to:

a)   support applications carried by the existing networks;

b)   support gateways enabling inter-operation with existing networks; and

c)   support ground-ground communications traffic associated with air-ground data link applications.

2.6   The ATN should make optimum use of dedicated bilateral/multilateral aeronautical links and other communication means commensurate with the operational Quality of Service (QoS) requirements.

2.7   The implementation of the ATN should take into account the need for cost-effective evolution in terms of network capacity, requirements and time-frame and allow for a progressive transition from existing communication networks and services to a uniform, harmonised and integrated communications infrastructure, capable of supporting the implementation of future aeronautical services such as Flight and Flow Information in a Collaborative Environment (F-FICE), System-Wide Information Management (SWIM) applications, etc.

2.8   In case means other than dedicated bilateral links are used by the ATN, States should ensure that service level agreements (SLA) are met in terms of implementation priority, high availability, priority in restoration of service and appropriate levels of security.

2.9   The ATN should provide for interregional connections to support data exchange and mobile routing within the global ATN.

2.10   In planning the ATN, provisions should be made, where required, for interfacing with other international networks. The Required ATN Infrastructure Routing Plan is described under **Table CNS II-2**.

Network services

2.11   The Internet Society (ISOC) communications standards for the Internet Protocol Suite (IPS) should be used for the implementation of AMHS.

2.12   The migration from legacy bit-oriented protocols such as X.25 Protocol suite to IPS should be planned.

2.13   The migration of international or sub-regional ground networks to the ATN based on Internet Protocol (IP) to support AFS communication requirements, while reducing costs, should be planned.

2.14   States should ensure that the solutions provided for the implementation of the ATN meet the air traffic management and aeronautical fixed service requirements. Such requirements should consist of:

a)   Performance requirements: availability, continuity, integrity, monitoring and alerting criteria per data flow. In the case where a required communication performance (RCP) is globally prescribed, requirements derived from RCP should be stated;
b)   Interoperability requirements;
c)   Safety and security requirements, duly derived after the identification of operational hazards and threats, and allocation of objectives; and
d)   Implementation process requirements (creation, test, migration, upgrades, priority in restoration of service, termination).

Network management

2.15   An ICAO centralised off-line network management service is provided to participating AFTN/ AMHS centres in the MID Region under the ATS Messaging Centre (AMC).

2.16   In the case of integrated communications services procured and shared by several States, organizational provisions should allow for the planning and performing of the management of technical performance, network configuration, fault, security, cost division/allocation, contract, orders and payment.

Specific air traffic management (ATM) requirements

2.17   Where ATS speech and data communication links between any two points are provided, the engineering arrangements should be such as to avoid the simultaneous loss of both circuits. The required ATS direct speech circuits plan is detailed under **Table CNS II-3**.

2.18   Special provisions should be made to ensure a rapid restoration of ATS speech circuits in case of outage, as derived from the performance and safety requirements.

2.19   Data circuits between ATS systems should provide for both high capacity and message integrity.

2.20   The Inter-Centre Communication (ICC), consisting of ATS Inter-facility Data Communication (AIDC) application and the Online Data Interchange (OLDI) application, should be used for automated exchange of flight data between ATS units to enhance the overall safety of the ATM operation and increase airspace capacity.

2.21   Where Voice over IP is planned or implemented between ATS units for voice communications, it should meet the ATS requirements. When data and voice are multiplexed, particular attention should be paid to the achievement of the ATM performance and safety requirements.

Specific meteorological (MET) requirements

2.22   The increasing use of the GRIB (Gridded Binary or General Regularly-distributed Information in Binary form) and BUFR (Binary Universal Form for the Representation of meteorological data) code forms for the dissemination of the upper wind and temperature and significant weather forecasts and the planned transition to digital form using extensible markup language (XML)/geography markup language (GML) for the dissemination of OPMET data should be taken into account in the planning process of the ATN.

2.23   In planning the ATN, account should be taken of changes in the current pattern of distribution of meteorological information resulting from the increasing number of long-range direct flights and the trend towards centralized flight planning.

Specific aeronautical information management (AIM) requirements

2.24   The aeronautical fixed service should meet the requirements to support efficient provision of aeronautical information services through appropriate connections to area control centres (ACCs), flight information centres (FICs), aerodromes and heliports at which an information service is established.

Aeronautical Mobile Service (AMS)

2.25   To meet the air-ground data communication requirements, a high-grade aeronautical network should be provided based on the ATN, recognising that other technologies may be used as part of the transition. The network needs to integrate the various data links in a seamless fashion and provide for end-to-end communications between airborne and ground-based facilities.

2.26   Whenever required, use of suitable techniques on VHF or higher frequencies should be made. The required HF network designators applicable for the MID Region are listed in **Table CNS II-4**.

2.27   Aerodromes having a significant volume of International General Aviation (IGA) traffic should also be provided with appropriate air-ground communication channels.

Air-Ground Data Link Communications

2.28   A Strategy for the harmonised implementation of the data link communications in the MID Region should be developed based on the Global Operational Data Link Document (GOLD) adopted by ICAO Regions and the Aviation System Block Upgrade (ASBU) methodology.

2.29   Where applicable, controller-pilot data link communications (CPDLC), based on ATN VDL data link Mode 2 (VDL2) and/or FANS-1/A, should be implemented for air-ground data link communications.

2.30   Partial or divergent aircraft data link evolutions that result in excluding messages from aircraft systems should not be pursued. Interim steps or phases toward full implementation of the common technical definition in ground systems should only be pursued on a regional basis, after coordination between all States concerned.

2.31   Harmonization of operational procedures for implementation of the above packages is essential. States, Planning and Implementation Regional Groups (PIRGs) and air navigation services providers should adopt common procedures to support seamless ATS provision across FIR boundaries, rather than each State or Region developing and promulgating unique procedures for common functions.

Required Communication Performance (RCP)

2.32   The Required Communication Performance (RCP) concept characterizing the performance required for communication capabilities that support ATM functions without reference to any specific technology should be applied wherever possible.

2.33   States should determine, prescribe and monitor the implementation of the RCP in line with the provisions laid down in the *ICAO Manual on Required Communication Performance* (Doc 9869).

Navigation

Navigation Infrastructure

2.34   The navigation infrastructure should meet the requirements for all phases of flight from take-off to final approach and landing.

        Note: Annex 10 to the Convention on International Civil Aviation—Aeronautical Telecommunications, Volume I — Radio Navigation Aids, Attachment B, provides the strategy for introduction and application of non-visual aids to approach and landing.

2.35   The *MID Region PBN Implementation Plan* provides guidance to air navigation service providers, airspace operators and users, regulators, and international organizations, on the expected evolution of the regional air navigation system in order to allow planning of airspace changes, enabling ATM systems and aircraft equipage. It takes due account of the operational environment of the MID Region.

PBN Transition Strategy

2.36   During transition to performance-based navigation (PBN), sufficient ground infrastructure for conventional navigation systems should remain available. Before existing ground infrastructure is considered for removal, users should be given reasonable transition time to allow them to equip appropriately to attain a performance level equivalent to PBN. States should approach removal of existing ground infrastructure with caution to ensure that safety is not compromised. This should be guaranteed by conducting safety assessments and consultations with the users.

Use of specific navigation aids

2.37   Where, within a given airspace, specific groups of users have been authorized by the competent authorities to use special aids for navigation. The respective ground facilities should be located and aligned so as to provide for full compatibility of navigational guidance with that derived from the SARPs.

2.38   States should ensure and oversee that service providers take appropriate corrective measures promptly whenever required by a significant degradation in the accuracy of navigation aids (either space based or ground based or both) is detected.

Surveillance

2.40   An important element of modern air navigation infrastructure required to manage safely increasing levels and complexity of air traffic is aeronautical surveillance systems.

2.41   When operating Mode S radars, States should coordinate with their respective ICAO Regional Office the assignment of their corresponding interrogator identifier (II) codes and surveillance identifier (SI) codes, particularly where areas of overlapping coverage will occur.

Frequency Management

Aeronautical Mobile Service (AMS)

2.42   Frequencies should be assigned to all VHF aeronautical mobile service (AMS) facilities in accordance with the principles laid out in Annex 10, Volume V and *ICAO Handbook on Radio Frequency Spectrum Requirements for Civil Aviation* (Doc 9718) Volumes I and II, and take into account:

> a) agreed geographical separation criteria based on 25 kHz or 8.33 kHz interleaving between channels;
> b) agreed geographical separation criteria for the implementation of VDL services;
> c) the need for maximum economy in frequency demands and in radio spectrum utilization; and
> d) a deployment of frequencies which ensures that international services are planned to be free of interference from other services using the same band.

2.43   The priority order to be followed in the assignment of frequencies to service is:

> a) ATS channels serving international services (ACC, APP, TWR, FIS);
> b) ATS channels serving national purposes;

    c)   channels serving international VOLMET services;

    d)   channels serving ATIS and PAR; and

    e)   channels used for other than ATS purposes.

2.44   The criteria used for frequency assignment planning for VHF AMS facilities serving international requirements should, to the extent practicable, also be used to satisfy the need for national VHF AMS facilities.

2.45   Special provisions should be made, by agreement between the States concerned, for the sharing and the application of reduced protection of non-ATS frequencies in the national sub-bands, so as to obtain a more economical use of the available frequency spectrum consistent with operational requirements.

2.46   States should ensure that no air/ground frequency is utilized outside its designated operational coverage and that the stated operational requirements for coverage of a given frequency can be met for the transmission sites concerned, taking into account terrain configuration.

Radio navigation aids for Aeronautical Radio Navigation Services (ARNS)

2.47   Frequencies should be assigned to all radio navigation facilities taking into account agreed geographical separation criteria to ILS localizer, VOR and GBAS, X and Y channels to DME, in accordance with the principles laid out in Annex 10, Volume V and *ICAO Handbook on Radio Frequency Spectrum Requirements for Civil Aviation* (Doc 9718) Volumes I and II. Also, the need for maximum economy in frequency demands and in radio spectrum utilization and a deployment of frequencies which ensures that international services are planned to be free of interference from other services using the same band, need to be considered.

2.48   The principles used for frequency assignment planning for radio navigation aids serving international requirements should, to the extent possible, also be used to satisfy the needs for national radio aids to navigation.

Support to ICAO Positions for ITU World Radiocommunication Conferences (WRCs)

2.49   Considering the importance and continuous demand of the radio frequency spectrum and for the protection of the current aeronautical spectrum and the allocation of new spectrum for the new services and system to be implemented in civil air navigation, States and international organizations are to support ICAO's position at ITU World Radiocommunication Conferences (WRCs) and in regional and other international activities conducted in preparation for ITU WRCs.

        Note: The Handbook on Radio Frequency Spectrum Requirements for Civil Aviation *(Doc 9718) Volume I, contains ICAO policy statements relevant to the aviation requirements for radio frequency spectrum. The handbook is intended to assist States and ICAO in preparing for ITU WRCs.*

3.   SPECIFIC REGIONAL REQUIREMENTS

None.

                      _____

TABLE CNS II-1 - AERONAUTICAL FIXED TELECOMMUNICATIONS NETWORK (AFTN) PLAN
EXPLANATION OF THE TABLE

Column

1	The AFTN Centres/Stations of each State are listed alphabetically. Each circuit appears twice in the table. The categories of these facilities are as follows:

        M - Main AFTN COM Centre
        T - Tributary AFTN COM Centre
        S - AFTN Station

2	Category of circuit:

        M - Main trunk circuit connecting Main AFTN communication centres.
        T - Tributary circuit connecting Main AFTN communication centre and Tributary AFTN Communications Centre.
        S - AFTN circuit connecting an AFTN Station to an AFTN Communication Centre.

3	Type of circuit provided:

        LTT/a - Landline teletypewriter, analogue (e.g. cable, microwave)
        LTT/d - Landline teletypewriter, digital (e.g. cable, microwave)
        LDD/a - Landline data circuit, analogue (e.g. cable, microwave)
        LDD/d - Landline data circuit, digital (e.g. cable, microwave)
        SAT/a/d - Satellite link, with /a for analogue or /d for digital

4	Circuit signalling speed in bits/s.
5	Circuit protocols
6	Data transfer code (syntax):

        ITA-2 - International Telegraph Alphabet No. 2 (5-unit Baudot code).
        IA-5 - International Alphabet No. 5 (ICAO 7-unit code).
        CBI - Code and Byte Independency (ATN compliant).

7	Remarks

State/Station	Category	Requirement				Remarks
		Type	Signalling Speed	Protocol	Code	
1	**2**	**3**	**4**	**5**	**6**	
BAHRAIN						
BAHRAIN	M					
ABU DHABI	M		64 – 96 bps	CIDIN	IA-5	
BEIRUT	T		9600 bps	CIDIN	IA-5	
DOHA	M		64 – 96 bps	None	IA-5	
JEDDAH	T		64 – 96 bps		IA-5	
~~KABUL~~	M		--	None		
KUWAIT	M		64 – 96 bps	None	IA-5	
MUSCAT	M		300 baud	None	IA-5	
SINGAPORE	M		9600 bps	None	IA-5	
TEHRAN			64 – 96 bps		IA-5	

State/Station	Category	Requirement				Remarks
		Type	Signalling Speed	Protocol	Code	
1	2	3	4	5	6	
EGYPT						
CAIRO	M					
AMMAN	M		64/9.6	None	IA-5	
ATHENS	T		64/9.6	CIDIN	IA-5	
BEN GURION	M		64/9.6	None	IA-5	
BEIRUT	M		9600	CIDIN	IA-5	
JEDDAH	T		128/9.6	CIDIN	IA-5	
KHARTOUM	M		9600	None	IA-5	
NAIROBI	M		9600	None	IA-5	
TUNIS	M		64/9.6	None	IA-5	
TRIPOLI	M		64/19.2	None	IA-5	
TRIPOLI	M		9600	None	IA-5	
DAMASCUS			64/9.6	None	IA-5	
IRAN						
TEHRAN	T					
BAHRAIN	M		64 Kbps	None	IA-5	
KABUL	T		-			
KUWAIT	M		64 Kbps	None	IA-5	
ABU-DHABI						
IRAQ						
BAGHDAD	T					
AMMAN	T		-	None	IA-5	
BEIRUT			-	None	IA-5	
KUWAIT						
ANKARA						
JORDAN						
AMMAN	T					
BAGHDAD	M		-	-	-	
BEIRUT	T		-	-	-	
BEN GURION	M		1200	None	IA-5	
CAIRO	T		64/9.6	None	IA-5	
DAMASCUS	S		64/9.2	None	IA-5	
JEDDAH	T		64/19.2	None		

State/Station	Category	Requirement				Remarks
		Type	Signalling Speed	Protocol	Code	
1	**2**	**3**	**4**	**5**	**6**	
KUWAIT KUWAIT						
BAHRAIN	M	LDD/d	64/9.6 bps	None	I A-5	
DAMASCUS	T	LDD/a	50 BD	None	ITA-2	
BEIRUT	M	LDD/a	100 baud	None	ITA-2	
DOHA	M	LDD/a	64/9.6 bps	None	IA- 5	
(EUR)	-					
KARACHI	M	LDD/d	2.4 K	None	IA-5	
TEHRAN	M	LDD/d	64/9.6 baud	None	IA-5	
BAGHDAD	T	SAT/ad	9.6 bps	None	IA- 5	
LEBANON BEIRUT	M					
AMMAN	T		-	-	-	
BAGHDAD	M		-	None	-	
BAHRAIN	M		9600	CIDIN	IA-5	
CAIRO	T		9600	CIDIN	IA-5	
DAMASCUS	M		2 x 50 bd	None	ITA-2	
JEDDAH	M		9600	CIDIN		
KUWAIT	M		100 BD	None	ITA-2	
NICOSIA			9600	CIDIN	IA-5	
LIBYA TRIPOLI	T					
MALTA	T					
TUNIS	M					
BENGHAZI	T					
CAIRO	T					
KHARTOUM	T					
OMAN MUSCAT ABU DHABI	T		9600	AMHS		
BAHRAIN	M		300 BD	None	IA-5	
MUMBAI	M		9600	None	ITA-2	
JEDDAH	M		300 BD	None	ITA-2	
SANA'A	T		100 BD	None	ITA-2	

State/Station	Category	Requirement				Remarks
		Type	Signalling Speed	Protocol	Code	
1	2	3	4	5	6	
QATAR DOHA BAHRAIN KUWAIT ABU DHABI	 M M T		 9600 100 BD 9600	 None None AMHS	 IA-5 ITA-2	
SAUDI ARABIA JEDDAH ADDIS-ABABA BAHRAIN BEIRUT CAIRO MUSCAT SANA'A AMMAN	 M M M M M T		 9600 64 /9.6 9600 128/9.6 300 9600	 None CIDIN CIDIN CIDIN None None	 IA-5 IA-5 IA-5 IA-5 ITA-2 IA-5	
SUDAN KHARTOUM CAIRO JEDDAH TRIPOLI NDJAMENA KIGALI	 M T M T M M					
SYRIA DAMASCUS ATHENS AMMAN BEIRUT CAIRO KUWAIT TEHRAN	 M T M M M T		 2 X 50 64/9.6 2 X 50 50 BD 50BD 50BD	 None None None None None None	 ITA-2 ITA-2 ITA-2 ITA-2 ITA-2	
UAE ABU DHABI BAHRAIN AMMAN MUSCAT QATAR TEHRAN	 M T M M		 64 – 96 bps 2 MG bps 9600 bps 64 – 96 bps	 CIDIN AMHS None None	 IA-5 IA-5 IA-5	

State/Station	Category	Requirement				Remarks
		Type	Signalling Speed	Protocol	Code	
1	2	3	4	5	6	
YEMEN SANA'A JEDDAH MUSCAT	 M M		 9600 9600	 None None	 IA-5 IA-5	

_____

TABLE CNS II-2 - REQUIRED ATN INFRASTRUCTURE ROUTING PLAN
Chapter 1 EXPLANATION OF THE TABLE

Column

1 Name of the Administration and Location of the ATN Router
2 Type of Router (in end systems (ES) of the Administration shown in column 1)
3 Type of Interconnection:
   Inter Regional: Connection between different Regions/ domains
   Intra Regional: Connection within a Region/ domain.
4 Connected Router: List of the Administration and location of the ATN routers to be connected with the router shown in column 1.
5 Bandwidth: Link Speed expressed in bits per second (bps)
6 Network Protocol: If Internet Protocol Suite is used, indicate version of IP (IPv4 or IPv6)
7 Via: The media used to implement the interconnection of the routers. (in case of IP service bought from a service provider, indicate VPN)
8 Remarks

Administration and Location	Type of Router	Type of Interconnection	Connected Router	Bandwidth	Network Protocol	Via	Remarks
1	2	3	4	5	6	7	8
BAHRAIN, Bahrain	BIS		ASIA/PAC Oman,Saudi Arabia Kuwait,Lebanon Iran, Afganistan Qatar, UAE				
EGYPT, Cairo	BIS		AFI, EUR Israel, Jordan, Lebanon, Athena Saudi Arabia				
IRAN, Tehran	BIS		Kuwait, Bahrain Afganistan				
IRAQ, Baghdad	IS		Jordan, Lebanon				
JORDAN, Amman	BIS		Egypt,Israel Lebanon,Iraq,Syria				
KUWAIT,Kuwait	BIS		EUR, Pakistan, Iran,Qatar,Bahrain, Lebanon				
LEBANON, Beirut	BIS		EUR Jordan,Syria Iraq,Kuwait,Bahrain Saudi Arabia,Egypt				
LIBYA	IS						
OMAN, Muscat	BIS		ASIA/PAC Yemen, Bahrain, UAE, Saudi Arabia				
QATAR, Doha	IS		Kuwait, Bahrain				
SAUDI ARABIA, Jeddah	BIS		AFI Egypt, Lebanon Bahrain,Oman Yemen				
SUDAN	IS						
SYRIA, Damascus	IS		Jordan, Lebanon				
U.A.E, Abu Dhabi	BIS		Bahrain, Oman Qatar				
YEMEN, Sana'a	IS		Oman, Saudi Arabia				

_____

TABLE CNS II-3 - ATS DIRECT SPEECH CIRCUITS PLAN
EXPLANATION OF THE TABLE

Column

1 and 2	Circuit terminal stations are listed alphabetically by the Terminal I.
3	A — indicates ATS requirement for the establishment of voice communication within 15 seconds.
	D — indicates requirements for instantaneous communications.
4	Type of service specified:
	LTF — landline telephone (landline, cable, UHF, VHF, satellite).
	RTF — radiotelephone.
5	Type of circuits; Direct (DIR) or Switched (SW).
	D — indicates a direct circuit connecting Terminals I and II.
	S — indicates that a direct circuit does not exist and that the connection is established via switching at the switching centre(s) indicated in column 6.
	IDD — International direct dialling by public switch telephone network
	Note 1.— Number of D and/or S circuits between Terminals I and II are indicated by numerical prefix, i.e. 2 D/S means 2 direct circuits and one switched circuit.
	Note 2.— Pending the implementation of proper ATS voice circuits, and provided that aeronautical operational requirements are met, IDD services may be used for the ATS voice communications in low traffic areas.
6	Location of switching centre(s). Alternate routing location, if available, is indicated in brackets.
7	Remarks

ATS REQUIREMENTS FOR SPEECH COMMUNICATIONS			CIRCUIT			
TERMINAL I	**TERMINAL II**	**TYPE**	**SERVICE**	**DIR/SW**	**TO BE SWITCHED VIA**	**REMARKS**
1	**2**	**3**	**4**	**5**	**6**	**7**
BAHRAIN						
Bahrain	Emirates ACC	A	LTF	DIR		2 LINES
	Dammam	A	LTF	DIR		
	Doha	A	LTF	DIR		2 LINES
	Jeddah	A	LTF	DIR		2 LINES
	Kuwait	A	LTF	DIR		
	Muscat	A	LTF	DIR		
	Riyadh	A	LTF	DIR		
	Shiraz	A	LTF			
	Tehran	A	LTF	DIR		
EGYPT						
Cairo	Amman	A	LTF	DIR		
	Athens	A	LTF	DIR		
	Jeddah	A	LTF	DIR		
	Khartoum	A	LTF			
	Nicosia	A	LTF	DIR		
	Tel Aviv	A	LTF	DIR		
	Tripoli	A	LTF	DIR		

ATS REQUIREMENTS FOR SPEECH COMMUNICATIONS			CIRCUIT			
TERMINAL I	TERMINAL II	TYPE	SERVICE	DIR/SW	TO BE SWITCHED VIA	REMARKS
1	2	3	4	5	6	7
IRAN (ISLAMIC REPUBLIC OF)						
Abadan	Basrah	A	LTF			
	Shiraz	A	LTF	DIR		
Shiraz	Abadan	A	LTF	DIR		
	Bahrain	A	LTF	DIR		
	Basrah	A	LTF			
	Doha	A	LTF	DIR		
	Karachi	A	LTF	DIR		
	Kuwait	A	LTF	DIR		
	Tehran	A	LTF	DIR		
Tehran	Emirates ACC	A	LTF	DIR		1I
	Ankara	A	LTF	DIR		
	Ashgabat	A	LTF	DIR		
	Baghdad	A	LTF			
	Bahrain	A	LTF	DIR		
	Baku	A	LTF	DIR		
	Basrah	A	LTF			
	Doha	A	LTF	DIR		
	Kabul	A	LTF			
	Karachi	A	LTF	DIR		
	Kuwait	A	LTF	DIR		
	Muscat	A	LTF	DIR		
	Shiraz	A	LTF	DIR		
	Yerevan/Zvartnots	A	LTF	DIR		
IRAQ						
Baghdad	Amman	A	LTF			
	Ankara	A	SAT			
	Basrah	A	LTF			
	Damascus	A	LTF			
	Jeddah	A	LTF			
	Kuwait	A	LTF			
	Mosul	A	LTF			
	Tehran	A				
Basrah	Abadan	A	LTF			
	Baghdad	A	LTF			
	Kuwait	A	LTF			
	Shiraz	A	LTF			
	Tehran	A	LTF			

ATS REQUIREMENTS FOR SPEECH COMMUNICATIONS			CIRCUIT			REMARKS
TERMINAL I	TERMINAL II	TYPE	SERVICE	DIR/SW	TO BE SWITCHED VIA	REMARKS
1	2	3	4	5	6	7
Mosul	Baghdad	A	LTF			
JORDAN						
Amman	Baghdad	A	LTF			
	Cairo	A	LTF			
	Damascus	A	LTF			
	Jeddah	A	LTF			
	Tel Aviv	A	LTF			
KUWAIT						
	Baghdad	A	LTF			
Kuwait	Bahrain	A	LTF	DIR		
	Basrah	A	LTF			
	Jeddah	A	LTF	DIR		
	Shiraz	A	LTF	DIR		
	Tehran	A	LTF	DIR		
LEBANON						
Beirut	Ankara	A	LTF	DIR		
	Damascus	A	LTF	DIR		
	Nicosia	A	LTF	DIR		
LIBYA						
Tripoli	Cairo					
	Malta					
	Khartoum					
OMAN						
Muscat	Emirates ACC	A	LTF	DIR		
	Bahrain	A	LTF	DIR		
	Mumbai	A	LTF	DIR		
	Jeddah	A	LTF	DIR		
	Karachi	A	LTF	DIR		
	Salalah	A	LTF	DIR		
	Sana'a	A	LTF	DIR		
	Tehran	A	LTF	DIR		
Salalah	Muscat	A	LTF			

ATS REQUIREMENTS FOR SPEECH COMMUNICATIONS			CIRCUIT			
TERMINAL I	TERMINAL II	TYPE	SERVICE	DIR/SW	TO BE SWITCHED VIA	REMARKS
1	2	3	4	5	6	7
QATAR						
Doha	Emirates ACC	A	LTF	DIR		1I + 1
	Bahrain	A	LTF	DIR		
	Shiraz	A	LTF	DIR		
	Tehran	A	LTF	DIR		
SAUDI ARABIA						
Dammam	Bahrain	A	LTF	DIR		
	Jeddah	A	LTF	DIR		
	Riyadh	A	LTF	DIR		
Jeddah	Addis Ababa	A	LTF			
	Amman	A	LTF	DIR		
	Asmara	A	LTF			
	Baghdad	A	LTF			
	Bahrain	A	LTF	DIR		
	Cairo	A	LTF	DIR		
	Dammam	A	LTF	DIR		
	Khartoum	A	LTF			
	Kuwait	A	LTF	DIR		
	Muscat	A	LTF	DIR		
	Riyadh	A	LTF	DIR		
	Sana'a	A	LTF	SW	Via Bahrain	
Riyadh	Bahrain	A	LTF	DIR		
	Jeddah	A	LTF	DIR		
	Dammam	A	LTF	DIR		
SUDAN						
Khartoum	Cairo	A	LTF			
	Jeddah	A	LTF			
SYRIAN ARAB REPUBLIC						
Damascus	Amman	A	LTF			
	Ankara	A	LTF			
	Baghdad	A	LTF			
	Beirut	A	LTF	DIR		

ATS REQUIREMENTS FOR SPEECH COMMUNICATIONS			CIRCUIT			REMARKS
TERMINAL I	TERMINAL II	TYPE	SERVICE	DIR/SW	TO BE SWITCHED VIA	
1	2	3	4	5	6	7
	Nicosia	A	LTF			
UNITED ARAB EMIRATES						
Emirates ACC	Abu Dhabi	A	LTF	DIR		21
	Al Ain	A	LTF	SW		
	Bahrain	A	LTF	DIR		
	Doha	A	LTF	DIR		
	Dubai	A	LTF	DIR		
	Muscat	A	LTF	DIR		
	Tehran	A	LTF	DIR		
Abu Dhabi	Emirates ACC	A	LTF	SW		21
	Al Ain	A	LTF	DIR		21
	Dubai	A	LTF	SW		21
Al Ain	Emirates ACC	A	LTF	SW		21
	Abu Dhabi	A	LTF	DIR		21
	Dubai	A	LTF	SW		21
Dubai	Emirates ACC	A	LTF	DIR		2I + 1
	Abu Dhabi	A	LTF	DIR		2I
	Al Ain	A	LTF	SW		1I
	Fujairah	A	LTF	DIR		1I
	Ras Al KhaimahSharjah	A	LTF	DIR		1I
	Sharjah	A	LTF	DIR		3I
Fujairah	Ras Al Khaimah	A	LTF	DIR		1I
	Emirates ACC	A	LTF	DIR		1I
Ras Al Khaimah	Dubai	A	LTF	DIR		1I
Sharjah	Dubai	A	LTF	DIR		31
YEMEN						
Aden	Djibouti	A	LTF			
	Sana'a	A	LTF			

ATS REQUIREMENTS FOR SPEECH COMMUNICATIONS			CIRCUIT			REMARKS
TERMINAL I	TERMINAL II	TYPE	SERVICE	DIR/SW	TO BE SWITCHED VIA	
1	2	3	4	5	6	7
Mukalla	Aden	A	LTF			
	Sana'a	A	LTF			
Sana'a	Aden	A	LTF			
	Addis Ababa	A	LTF			
	Asmara	A	LTF			
	Mumbai	A	LTF			
	Djibouti	A	LTF			
	Jeddah	A	LTF		Via Bahrain	
	Mogadishu	A	LTF	DIR		
	Muscat	A	LTF			
	Riyan	A	LTF			

_____

TABLE CNS II-4 - HF NETWORK DESIGNATORS
EXPLANATION OF THE TABLE

Column
  1   Name of station, preceded by its location indicator.
  2   Network designators assigned to the facility providing HF radiotelephony en-route communications (selected from the provisions of the allotment plan in Appendix S27 to the ITU Radio Regulations).

NOTES
The ICAO designators for HF MWARA and VOLMET networks in the MID region are derived from the ITU allotment area abbreviations as contained in Appendix S27 to the ITU Radio Regulations.
ITU allotment area:
*Two- and three-letter alpha entries indicate major world air route areas (MWARA): **TBD***
*Four-letter alpha entries indicate VOLMET areas: **TBD***

Location Indicator and Name of location	HF en-route family
1	2
Aden	MID-1, AFI-3
Bahrain	MID-1, MID-2
Jeddah	AFI-3
Riyan	MID-1, AFI-3
Sanaa	MID-1, AFI-3
Shiraz	MID-1, MID-2
Tehran	MID-1, MID-2

HF FREQUENCIES AND THEIR ICAO NETWORK DESIGNATORS BASED ON ITU
APPENDIX S27 ALLOTMENT AREAS

Frequency (kHz)	ITU allotment area	AFI-3	MID-1	MID-2	MID-3	V MID	Remarks
1	2	3	4	5	6	7	8
2944	MID				X		
2956	V MID					X	
2992	MID		X				
3467	MID, AFI	X		X			
3473	MID (1)						
4669	MID				X		
5589	V MID					X	
5658	MID, AFI	X		X			
5667	MID		X				
6625	MID (1)						
6631	MID			X			
8918	MID		X				
8945	V MID					X	
8951	MID				X		
10018	MID		X				
11375	MID				X		

11393	V MID (2)					X	
13288	MID, AFI	X		X			
13312	MID		X				
17961	AFI, MID	X			X		

- End -