ADVISORY

CIRCULAR

NIGERIA CIVIL AVIATION AUTHORITY

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PROCEDURES FOR DETERMINING ATS SYSTEM CAPACITY AND AIR TRAFFIC FLOW MANAGEMENT IMPLEMENTATION

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CONTENTS

1.0 PURPOSE 3

1.1 APPLICABILITY 3

3.0 GUIDANCE AND PROCEDURES 3

3.1 GENERAL 3

3.2 CAPACITY ASSESSMENT 4

3.3 ATS CAPACITY AND TRAFFIC VOLUMES MANAGEMENT 5

3.4 ENHANCEMENT OF ATS CAPACITY 5

3.5 FLEXIBLE USE OF AIRSPACE 6

3.6 AIR TRAFFIC FLOW MANAGEMENT 6

3.7 LIAISON 9

4.0 EVALUATION AND REPORTING OF ATC AND AERODROME CAPACITY 9

5.0 EFFECTIVE DATE 9

1.0 PURPOSE

1.1. The Air Traffic Services Provider shall establish flow control procedures where, due to limitations in ATS system capacity or aerodrome capacity, the applicant will consider the procedures necessary. ATS Provider is required to develop policies and procedures for determining the capacity of the ATS system, including the number of staff required to ensure the provision of an adequate ATS services.

1.1 APPLICABILITY

This Advisory Circular (AC) is issued to provide guidance to the ATS provider on how to determine the capacity of the ATS system including the number of ATS staff required to ensure the provision of an adequate ATS system.

2.0 REFERENCES

Nig.CARs Part 14 – Air Navigation Services
ICAO DOC 4444 – PANS-ATM
ICAO Doc 9426 – ATS Planning Manual
ICAO Doc 9971 – Manual on Collaborative Air Traffic Flow Management (ATFM)
ICAO Annex 11 – Air Traffic Services

3.0 GUIDANCE AND PROCEDURES

3.1 GENERAL

3.1.1 An Air Traffic Services Provider (ATSP) is required to develop and implement policy and procedures for determining the capacity of the ATS system, including the number of staff required to ensure the provision of an adequate ATS system.

3.1.2 The capacity of an ATS system depends on many factors, including the ATS route structure, the navigation accuracy of the aircraft using the airspace, weather-related factors, and controller workload. Every effort should be made to provide sufficient capacity to cater to both normal and peak traffic levels; however, in implementing any measures to increase capacity, the ATS provider shall ensure that safety levels are not jeopardized.

3.1.3 The number of aircraft provided with an air traffic service shall not exceed that which can be safely handled by the ATS unit concerned under the prevailing circumstances. In order to define

the maximum number of flights which can be safely accommodated, the appropriate ATS provider should assess and declare the ATS capacity for control areas, for control sectors within a control area and for aerodromes.

3.1.4 ATS capacity should be expressed as the maximum number of aircraft which can be accepted over a given period of time within the airspace or at the aerodrome concerned.

Note. — The most appropriate measure of capacity is likely to be the sustainable hourly traffic flow. Such hourly capacities can, for example, be converted into daily, monthly or annual values.

3.1.5 Airspace capacity is not unlimited but it can be more or less optimised depending on many factors, such as airspace design and flexibility; ATS system capacity; number of sectors and their complexity; segregated airspace; availability, training, and response capability of personnel; available CNS infrastructure; degree of automation; and even the equipage and type of aircraft in the fleet.

Note 1. — According to ICAO

"Declared capacity" is the measure of the ability of the ATS system or any of its subsystems or operating positions to provide service to aircraft during normal activities. It is expressed as the number of aircraft entering a specific portion of airspace in a given period of time, taking due account of weather, ATS unit configuration, available staff and equipment, and any other factor that may affect the workload of the controller responsible for the airspace.

3.2 CAPACITY ASSESSMENT

The capacity of an ATC sector can be defined as the *maximum number of aircraft that are controlled in a particular ATC sector in a specified period*, while still permitting an *acceptable level of controller workload*. To assess the capacity, the ATSP needs to define the controller workload and how it is measured and quantify the acceptable level of controller workload in terms of threshold value at full capacity.

In assessing capacity values, factors to be taken into account should include, *inter alia*:

a) the level and type of ATS provided;

b) the structural complexity of the control area, the control sector or the aerodrome concerned;

c) controller workload, including control and coordination tasks to be performed;

d) the types of communications, navigation and surveillance systems in use, their degree of technical reliability and availability as well as the availability of backup systems and/or procedures;

e) availability of ATS systems providing controller support and alert functions; and

f) any other factor or element deemed relevant to controller workload.

Note. — Summaries of techniques which may be used to estimate control sector/position capacities are contained in the Air Traffic Services Planning Manual (Doc 9426).

3.3 ATS CAPACITY AND TRAFFIC VOLUMES MANAGEMENT

3.3.1 Where traffic demand varies significantly on a daily or periodic basis, facilities and procedures should be implemented to vary the number of operational sectors or working positions to meet the prevailing and anticipated demand. Applicable procedures should be contained in local instructions.

3.3.2 In case of particular events which have a negative impact on the declared capacity of an airspace or aerodrome, the capacity of the airspace or aerodrome concerned shall be reduced accordingly for the required time period. Whenever possible, the capacity pertaining to such events should be predetermined.

3.3.3 To ensure that safety is not compromised whenever the traffic demand in an airspace or at an aerodrome is forecast to exceed the available ATS capacity, measures shall be implemented to regulate traffic volumes accordingly.

3.4 ENHANCEMENT OF ATS CAPACITY

3.4.1 The ATS Provider should:

a) Periodically review ATS capacities in relation to traffic demand; and

b) Provide for flexible use of airspace in order to improve the efficiency of operations and increase capacity.

3.4.2 In the event that traffic demand regularly exceeds ATS capacity, resulting in continuing and frequent traffic delays, or it becomes apparent that forecast traffic demand will exceed capacity values, the ATS Provider should, as far as practicable:

a) Implement steps aimed at maximizing the use of the existing system capacity; and

b) Develop plans to increase capacity to meet the actual or forecast demand.

3.5 FLEXIBLE USE OF AIRSPACE

3.5.1 The appropriate authorities should, through the establishment of agreements and procedures, make provision for the flexible use of all airspace in order to increase airspace capacity and to improve the efficiency and flexibility of aircraft operations. When applicable, such agreements and procedures should be established on the basis of a regional air navigation agreement.

3.5.2 Agreements and procedures providing for a flexible use of airspace should specify, *inter alia*:

a) the horizontal and vertical limits of the airspace concerned;

b) the classification of any airspace made available for use by civil air traffic;

c) units or authorities responsible for transfer of the airspace;

d) conditions for transfer of the airspace to the ATS unit concerned;

e) conditions for transfer of the airspace from the ATS unit concerned;

f) periods of availability of the airspace;

g) any limitations on the use of the airspace concerned; and

h) any other relevant procedures or information.

3.6 AIR TRAFFIC FLOW MANAGEMENT

3.6.1 General

3.6.1.1 The Air Traffic Services Provider in respect of an air traffic control service shall establish flow control procedures where, due to limitations in ATS system capacity or aerodrome capacity,

the applicant considers the procedures necessary. An air traffic flow management (ATFM) service shall be implemented for airspace where traffic demand at times exceeds the defined ATS capacity.

3.6.1.2 ATFM should be implemented on the basis of a regional air navigation agreement or, when appropriate, as a multilateral agreement.

3.6.1.3 The ATFM service within a region or other defined area, should be developed and implemented as a centralized ATFM organization, supported by flow management positions established at each area control Centre (ACC) within the region or area of applicability.

3.6.1.4 Certain flights may be exempt from ATFM measures, or be given priority over other flights.

3.6.1.5 Detailed procedures governing the provision of the ATFM measures, and service within a region or area should be prescribed in a regional ATFM manual or handbook.

3.6.2 Flow management procedures

ATFM should be carried out in three phases:

a) *Strategic planning*, if the action is carried out more than one day before the day on which it will take effect. Strategic planning is normally carried out well in advance, typically two to six months ahead;

b) *Pre-tactical planning*, if the action is to be taken on the day before the day on which it will take effect;

c) T*actical operations*, if the action is taken on the day on which it will take effect.

3.6.2.1 Strategic planning

Strategic planning should be carried out in conjunction with ATS and the aircraft operators. It should consist of examining the demand for the forthcoming season, assessing where and when demand is likely to exceed the available ATS capacity and taking steps to resolve the imbalance by:

a) Arranging with the ATS authority to provide adequate capacity at the required place and time;

b) Re-routing certain traffic flows (traffic orientation);

c) Scheduling or rescheduling flights as appropriate; and

d) Identifying the need for tactical ATFM measures.

Where a traffic orientation scheme (TOS) is to be introduced, the routes should, as far as practicable, minimize the time and distance penalties for the flights concerned, and allow some degree of flexibility in the choice of routes, particularly for long-range flights. When a TOS has been agreed, details should be published by all States concerned in a common format.

3.6.2.2 Pre-tactical planning

Pre-tactical planning should entail fine-tuning of the strategic plan in the light of updated demand data. During this phase:

a) Certain traffic flows may be re-routed;

b) Off-load routes may be coordinated;

c) Tactical measures will be decided upon; and

d) Details for the ATFM plan for the following day should be published and made available to all concerned.

3.6.2.3 TACTICAL OPERATIONS

Tactical ATFM operations should consist of:

a) Executing the agreed tactical measures in order to provide a reduced and even flow of traffic where demand would otherwise have exceeded capacity;

b) monitoring the evolution of the air traffic situation to ensure that the ATFM measures applied are having the desired effect and to take or initiate remedial action when long delays are reported, including re-routing of traffic and flight level allocation, in order to utilize the available ATS capacity to the maximum extent.

When the traffic demand exceeds, or is foreseen to exceed, the capacity of a particular sector or aerodrome, the responsible ATS unit shall advise the responsible ATFM unit, where such a unit is established, and other ATS units concerned. Flight crews of aircraft planned to fly in the affected area and operators should be advised, as soon as practicable, of the delays expected or the restrictions which will be applied.

Note. — Operators known or believed to be concerned will normally be advised by the regional air traffic flow management service, when established.

3.7 LIAISON

During all phases of ATFM the responsible units should liaise closely with ATS and the aircraft operators in order to ensure an effective and equitable service.

4.0 EVALUATION AND REPORTING OF ATC AND AERODROME CAPACITY

4.1 The ATS Provider shall establish a capacity evaluation program to monitor sector performance, identify constraints, and report results to the Authority.

4.2 Each report shall include:

a) Declared capacity values;
b) Actual traffic data and delay analysis;
c) Capacity-limiting factors;
d) Recommendations for enhancement.

4.3 The Authority shall review the submitted reports and may conduct independent audits or request updated capacity assessments where necessary.

5.0 EFFECTIVE DATE

This AC becomes effective on the date shown on the cover page and remains valid until superseded or withdrawn by the Authority.