

	<p style="text-align: center;">TANZANIA CIVIL AVIATION AUTHORITY AIR NAVIGATION SERVICES INSPECTORATE</p>	<p style="text-align: right;">Revision: 1</p>
<p>Document No: TCAA/QSP/SR/AC/ANS - 31</p>	<p>Title: Determination of Air Traffic Services Airspace Capacity</p>	<p style="text-align: right;">Page 1 of 4</p>

1.1. Purpose

The purpose of this document is to provide ANSPs providing Air Traffic Services with a guide on how to determine ATC sector capacity, thus allowing ATM planners to develop plans, if necessary, to improve such capacity in order to meet present and future demands of the system.

Airspace capacity is not unlimited but it can be more or less optimised depending on many factors, such as airspace design and flexibility; ATC 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 equipment and type of aircraft in the fleet.

ANSP must take note that the proximity of airports to one another, the relationship of runway alignments, the taxiway system, size of aprons and the nature of operations (IFR or VFR) are the principal inter-airport considerations that affect the airspace capacity. If major or secondary airports are closely spaced, they will share a parcel of airspace and this may to some extent reduce the airspace capacity.

1.2. Reference

- a) Air Traffic Services Planning Manual (Doc 9426)
- b) PANS Air Traffic Management Document 4444
- c) Advisory Circular TCAA/QSP/SR/AC/ANS-08

1.3. Guidance

1.3.1. General

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 ANSP shall ensure that safety levels are not jeopardized.

The number of aircraft provided with an ATC service shall not exceed that which can be safely handled by the ATC unit concerned under the prevailing circumstances. In order to define the maximum number of flights which can be safely accommodated, the appropriate ANSP should assess and **declare** the ATC capacity for control areas, control sectors within a control area and for aerodromes.

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The declared 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.

According to the Manual of ANS Standards, “declared capacity” is the measure of the ability of the ATC 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, ATC unit configuration, available staff and equipment, and any other factor that may affect the workload of the controller responsible for the airspace.

1.3.2. 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 ANSP 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;

- 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 ATC 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).

1.3.3. Regulation of ATC capacity and traffic volumes

Where traffic demand varies significantly on a daily or periodic basis, facilities and procedures should be implemented to vary the number of operational

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sectors or working positions to meet the prevailing and anticipated demand. Applicable procedures should be contained in local instructions.

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.

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

1.3.4. Enhancement of ATC capacity

The appropriate ATS authority should periodically review ATS capacities in relation to traffic demand and provide for flexible use of airspace in order to improve the efficiency of operations and increase capacity.

In the event that traffic demand regularly exceeds ATC capacity, resulting in continuing and frequent traffic delays, or it becomes apparent that forecast traffic demand will exceed capacity values, the appropriate ATS authority should, as far as practicable implement steps aimed at maximizing the use of the existing system capacity and develop plans to increase capacity to meet the actual or forecast demand

1.3.5. Flexible use of airspace

The appropriate ANSP 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.

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;

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- d) conditions for transfer of the airspace to the ATC unit concerned;
- e) conditions for transfer of the airspace from the ATC 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



Tanzania Civil Aviation Authority