Airspace Volumes & Sectorisation
Module 13 – Activity 9
European Airspace Concept Workshops for PBN Implementation

Objective
- This module will provide a good understanding of Airspace volumes and Sectorisation supporting ATM
Three GOLDEN RULES

Airspace Volumes protect the IFR Flight paths. They are Designed AFTER the routes have been designed.

Routes should not be designed so as to fit into pre-existing Airspace Volumes.

Only delineate as much airspace volume as needed.

Context & Iterations
TMA

Terminal control area

A control area normally established at the confluence of ATS routes in the vicinity of one or more major aerodromes. [Doc. 4444]

Terminal Airspace

Terminal Airspace (TA) – is a generic term describing airspace which is part of the airspace continuum. Terminal airspace surrounds an airport, and it is an airspace within which air traffic services are provided. It encompasses all the various terminologies currently used throughout the ECAC region. Such airspace predominantly contains traffic operating along Terminal Routes or, to a lesser extent, ATS Routes of the ARN.

[Explanatory note: The above description is aimed at including TMA, CTA, CTR, ATZ airspace classification or any other nomenclature used to describe the airspace around an airport].

[The 2015 Airspace Concept & Strategy for the ECAC Area & Key Enablers]
Competing Interests

STRUCTURES & SECTORS: Objectives

- ATC Requirements
- Safety, Capacity & Efficiency
- Sufficient Airspace to accommodate:
  - Routes (tactical and published)
  - Holding patterns
  - Traffic sequencing techniques

Airspace 'Prohibitions' over cities, natural parks, residential areas

Unhindered airspace access

Airspace Volumes

Controlled Airspace

Arrivals

Departures

Airspace Concept Workshop
Airspace Volumes

Protect IFR Flight Paths

Take the airspace required – not more.
Terminal Airspace System

(*= Metroplexes in US*)

Terminal Airspace System (TAS) – A system that combines two or more terminal airspace Volumes, aimed at improving the design and management of terminal routes and ATC sectorisation, servicing several airports in close proximity.

(The 2015 Airspace Concept & Strategy for the ECAC Area & Key Enablers)
Evolution of functions

Sectorisation

- Functional
- Geographical
ATC Sectorisation

Chalk and Talk

Sectorisation
Sectorisation

- Avoid Sector designs that cause stepped climbs or descents

ATC Sectorisation

- Maintain holding area in same sector
- Avoid crossing too close to sector boundary
- Sector boundaries should not coincide with route centre lines
- Preferably, keep sectors the same when runway changes
Sectorisation

**SE4.2:** The vertical limits of a geographically defined sector need not be uniform i.e. fixed at one upper level or one lower level, nor need these vertical limits coincide with the vertical limits of (horizontally) adjoining sectors.

![Diagram showing vertical sector boundaries and crossing routes](image)

**Figure 6-15:** Vertical Sector boundaries and crossing routes

Terminal Airspace Systems

1. 1 Terminal Airspace (As per Chapter 6)
2. 2 Terminal Airspaces New northern Holds More IFR Traffic
3. 2 Terminal Airspaces New southern Hold More Traffic
4. 2 larger Terminal Airspaces Two-Phase holding system More Traffic
5. 1 Terminal Airspace system with Entry Gates Revised Sectorisation

![Diagram showing terminal airspace systems](image)
Iterations

Activity 6
Agree CNS/ATM Assumptions

Activity 7
Airspace Design Route & Holds

Activity 8
Initial Procedure Design

Activity 9
Airspace Design Volumes & Sectors

Activity 12
Finalisation of Procedure Design

Design Options (1)

ACC EN-ROUTE AND ARRIVAL/DEPARTURE SECTOR

No separate ARP ATSU is established. All sectorisation is associated with the ACC.
Traffic density is insufficiently low to be handled by a single ACC en-route sector.

ACC EN-ROUTE SECTOR

As traffic density increases, it may be necessary to establish a dedicated ACC Sector, combining the functions of en-route and arrival/departure.
Design Options (2)

Design Options (3)
## Geographical Sectorisation

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controller can fully exploit the space available in sector to manipulate best levels for inbounds/outbounds and expedite climb and descent without need for co-ordination.</td>
<td>Controller handles mixed traffic i.e. arrival, departure and transit traffic.</td>
</tr>
<tr>
<td>Easier to balance workload between sectors.</td>
<td>In instances where the sector division runs along the runway centre-line, departing aircraft departing in different directions may be controlled by different controllers after take-off. (Effective mitigation can be provided by putting appropriate procedures in place).</td>
</tr>
<tr>
<td>Can be less demanding in terms of the Radar Display and ATC system</td>
<td>In cases where an aircraft is required to transit more than one geographic sector in the Terminal Airspace, this can add to complexity by requiring additional co-ordination.</td>
</tr>
</tbody>
</table>
**Functional Sectorisation**

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>➤ Controller handles one traffic type i.e. either departures or arrivals because sector defined as a function of task.</td>
<td>➤ Vertical/Lateral limits of sector can prove overly restrictive as one (vertical) band is unlikely to cater for all aircraft performance types.</td>
</tr>
<tr>
<td>➤ Usually, <em>all</em> Departing aircraft are on the same frequency after take-off.</td>
<td>➤ Difficult to balance workload between sectors especially where departure and arrival peaks do <em>not</em> coincide.</td>
</tr>
<tr>
<td>➤ In some configurations, can prove more flexible to operate.</td>
<td>➤ Can be demanding in terms of the Radar Display and ATC System</td>
</tr>
<tr>
<td></td>
<td>➤ Operating instructions for ATC can be difficult to formulate with respect to areas of responsibility;</td>
</tr>
</tbody>
</table>