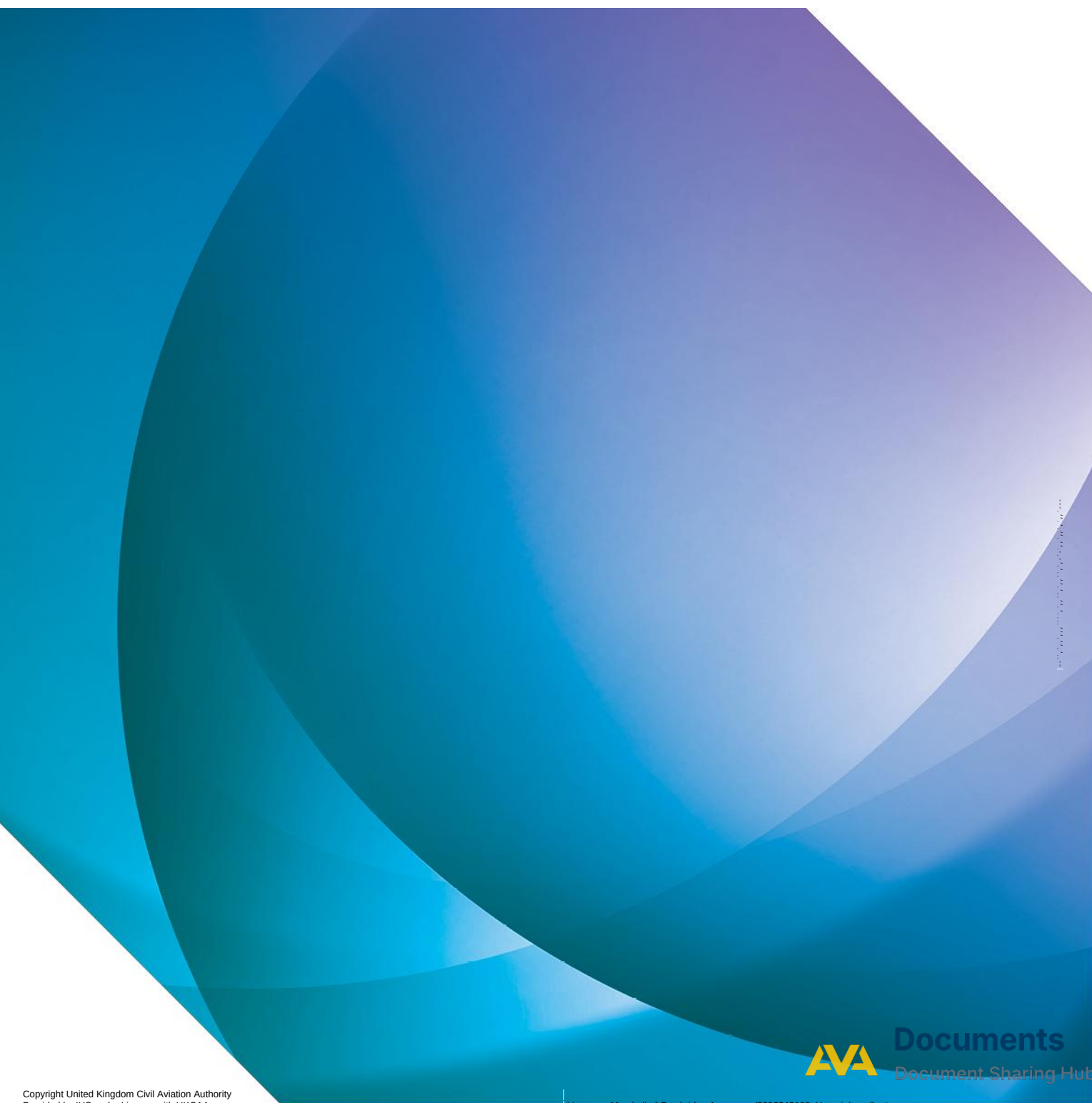


Description of Today's ATC Route Structure and Operational Techniques

CAP 1379



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Introduction

This CAP has been developed through the work of the Future Airspace Strategy Noise Task force which was convened as a temporary group to investigate the Noise implications of deploying Performance Based Navigation, which is published as a separate CAP document – [CAP1378](#).

This CAP describes some of the Air Traffic Management techniques used to manage air traffic in the UK, the material is intended to support engagement between industry experts and those not engaged in the aviation industry but may be interested or affected by operations.

Chapter 1

The air traffic management route structure and operation

The Air Traffic Control (ATC) task needs to be supported through a highly structured and systemised operation in order to manage air traffic to deliver the high levels of traffic throughput required whilst maintaining high safety levels.

Part of this system is a network of routes which aircraft fly. The majority of these routes are made up of the following components:

- Standard Instrument Departures (SIDs);
- Airways;
- Standard Arrival Routes (STARs).

Air Traffic Controllers (ATCOs) relay instructions to the pilots of aircraft verbally via radio transmissions. Each ATC instruction is required to be read back by the pilot to ATC so as to ensure it has been understood correctly

Standard instrument departures (SIDs)

On departure from a runway, aircraft are flying a SID. This includes a vertical profile including an associated minimum rate of climb. The SID ensures obstacle clearance (e.g. tall buildings, radio masts, terrain etc.) and also separation¹ against aircraft following other SIDs from adjacent aerodromes. Some SIDs have associated Noise Preferential Routes (NPRs) and are designed to maintain separation between successive aircraft departing from the same runway. For this reason, SIDs do not always follow the optimum lateral profile (i.e. a direct track) and often have extra track miles built in to ensure separation from other SIDs.

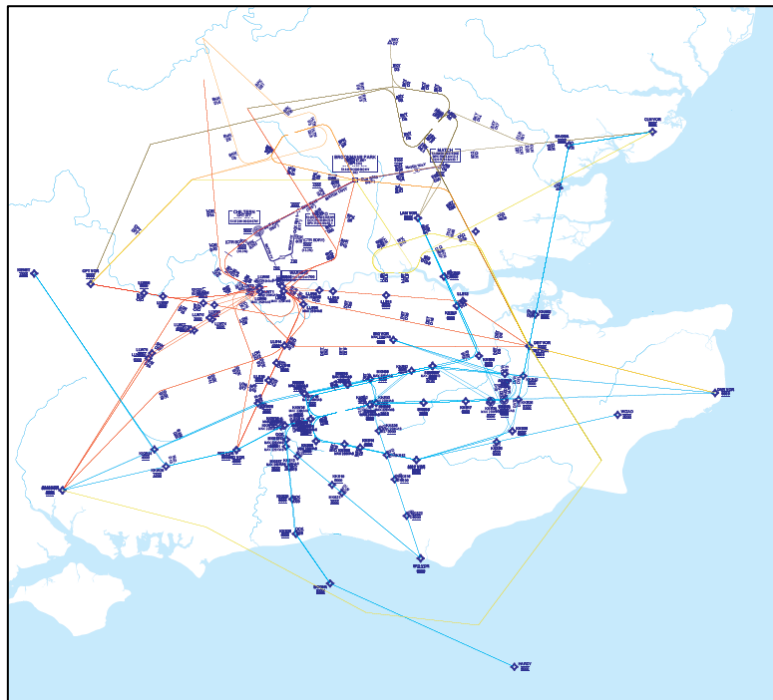
¹ Usually a minimum of 3 or 5nm laterally depending on the surveillance environment or 1,000ft vertically

Currently, most of the UK's SIDs are designed using a Conventional Navigation Specification which requires aircraft to use ground-based navigational aids (NAVAids). This results in aircraft having to route towards and over physical, permanent locations which can add on extra track miles with an associated fuel burn.

The numbers of ground based NAVAids are limited therefore multiple SIDs converge on the same places albeit separated vertically.

Consider these NAVAids to be junctions and like a busy railway station. Multiple routes are all feeding into one place. The rail network manages this by stopping trains and holding them outside of the junction until there is room to fit them in. The only way ATC can stop aircraft is by not letting them depart. Permitting only a few aircraft at a time to depart from a network of adjacent airports would lead to exceptionally high delays. So if ATC let all aircraft stay on their SIDs, navigating by the same point, the network would be highly inefficient.

Figure 1: SIDs from Heathrow, Gatwick, Stansted, Luton and London City

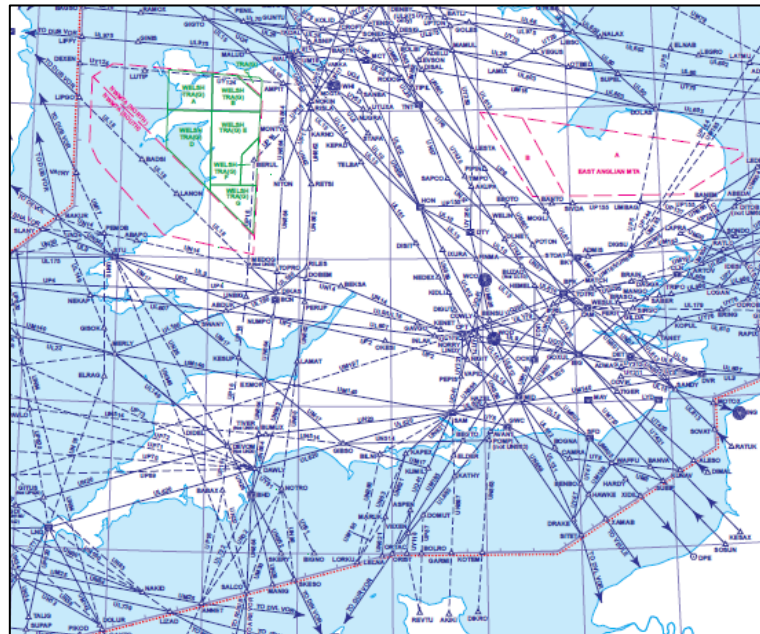


Airways

The SID links to an airway and multiple SIDs from multiple aerodromes can link to the same airway. The airways form the en-route network which enables aircraft to

safely navigate from A to B. The UK airway network is also currently designed using a Conventional Navigation Specification.

Figure 2: The southern UK airway network



Only one aircraft at a time can be at the same point on an airway centreline at the same height. For multiple SIDs all feeding onto the same airway, aircraft would either have to be vertically stacked and climb up underneath each other or metered out of the airports to ensure only one aircraft at a time reaches the airway. If ATC only had this method to rely on, the network would be extremely limited in capacity.

Figure 3: Example of SIDs converging on a NAVaid and airway

