



The Sectorless ATM Concept: Flight-centred ATC

Sectorless ATM is a revolutionary concept for air traffic management in upper airspace. It envisions en-route air traffic control without conventional sectors. One controller will be assigned several aircraft regardless of their location and will guide these aircraft during their entire flight in upper airspace. This new concept promises a significant increase in capacity and controller efficiency. Furthermore, this aircraft-centred approach provides more flexibility, fewer handovers and enables user-preferred routes.

The current practice of partitioning airspace into sectors is reaching its limit. Already today there are examples of sectors which cannot be made any smaller, such as the upper airspace sector above Würzburg. Transit times will decrease for such sectors, while the need for controller coordination will increase considerably.

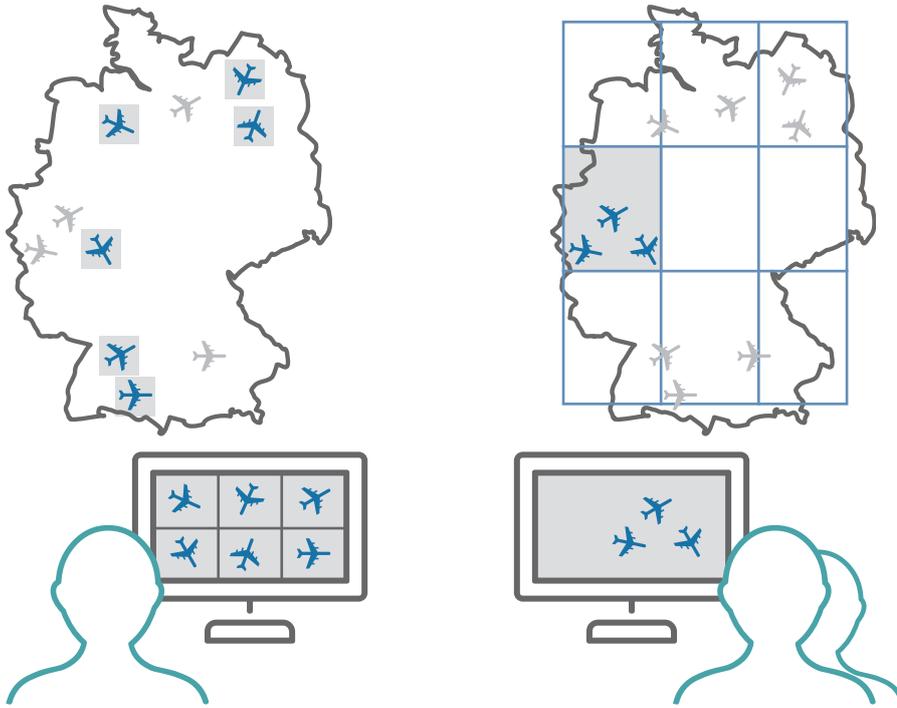
Undivided airspace

Flight-centred ATC addresses these problems by relinquishing the idea of sectors. Instead, it looks at airspace as one piece without conventional sectors. So far, this concept has been validated assigning up to six aircraft to one controller, regardless of the aircraft's geographic position. The controllers are responsible for these flights from the entry into airspace to the exit. A controller may only give instructions to the pilots of assigned aircraft. There are no more handovers between controllers as one controller guides the flight all the way through the airspace. There are no handover points, which decreases the need for controller coordination and enables pilots to follow user-preferred routes. A two-week feasibility analysis with eight controllers at the DLR facilities in Braunschweig has shown that flight-centred ATC could increase controller efficiency by more than 100%.

Future controller working position

The current DLR simulation environment contains a prototype of a future controller working position. The controller has one radar display for each aircraft under control, on which he can track the path of his aircraft and the surrounding traffic.

In case of a predicted conflict, he is warned early on by a medium-term conflict detection tool. Various functionalities support the conflict analysis. A set of unambiguous priority rules help to determine responsibility in case of a conflict and avoid the need for coordination with other controllers. Automatic suggestions for avoidance manoeuvres and probing capabilities complete the support tools and help the controller to find the most efficient conflict solution and maintain safety.



The Sectorless ATM concept with aircraft-centred ATC (left) in comparison with conventional sectoring (right).

Benefits

The fully functional simulation allows you to experience how sectorless air traffic control could be conducted and shows the advantages of such an aircraft-centred control concept. An even workload distribution and greatly reduced need for coordination allows controllers to work more efficiently and concentrate on their main task: conflict resolution. Additionally, controllers can work more flexibly and are no longer restricted by sector-licensing. This opens up new possibilities for contingency solutions. Since there are no handover points between sectors anymore, pilots can follow user-preferred routes and have the advantage of only one contact person during their entire flight. The overall concept allows for easy integration of new vehicle types with different flight performances, such as remotely piloted aircraft systems (RPAS).



Validation trial using large UHD screens, especially suited for dividing the screen into several information areas.

Partner

Since 2008, DLR has been researching this concept together with their partner DFS Deutsche Flugsicherung GmbH. Various validations and simulations have proven that the concept is feasible, and a prototype of a suitable controller working position has been developed. Currently, DLR and DFS are collaborating on an implementation for DFS upper airspace in the national project TeFiS (Technologie für Flugverkehrsmanagement in großen Strukturen).

Flight-centred ATC – Key Facts

Aim	Aircraft-centred en-route ATC in upper airspace without conventional sectors
Benefits	Significantly increased controller efficiency, higher flexibility, user-preferred routes
Status	Proven feasibility, current research focus on implementation and transition
Partner	DFS Deutsche Flugsicherung GmbH