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Study of a Complete Free Route Implementation in the European Airspace

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Abstract : Harmonized with SESAR (Single European Sky Research) initiatives, a new concept related with airspace structures have been introduced in Europe, the Free Route Airspace. The key of free route is based in an airspace where users may freely plan a route between a defined entry and exit waypoint, with the possibility of routing via intermediate points, the free route flights remain subject to air traffic control (ATC) for the established separations. Free route airspace does not present anymore fixed airways to airspace users, as a consequence it brings a new paradigm for managing safe separations of aircrafts inside these airspace blocks . Nowadays, several European nations have been introduced the concept, some of them in a complete or partial stage, but finally offering limited benefits to airspace users for this condition. This research evaluates the future scenario of free route implementation across Europe, considering a unique airspace block configuration with a complete upper airspace with free route. The paper is centered in investigating the benefits for airspace users, and the study of possible increments of Air Traffic Controllers task loads with a full application. In this research, fast time simulations are carrying out for discovering how much flight time and distance aircrafts can save with an overall free route establishment. In the other side, the paper explains the evolution of conflicts derivate from possible separation losses between aircrafts in this new environment. Free route conflicts can emerges in any points of the airspace, requiring a great effort for solving it, in comparison with fixed airways, where conflicts normally were found by controllers in known waypoints, and they solved using the fixed network as reference. The airspace configuration modelled in this study take into account the actual navigation waypoints structure, moving into a future scenario, where new ones waypoints are added and new traffic flow patterns appears. In this sense, this research explores the advantages and unknown difficulties that a large scale application of free route concept can carry out in the European airspace.

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