Chapter

Introductory Chapter: Management and Control of Air Traffic

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1. Introduction

After the World War I, a large number of aircraft serving the war turned to civil use. France and Britain successively established airlines, forming an aviation network connecting countries centered on Europe. During the World War II, aviation technology developed rapidly, which laid a solid foundation for the development of civil aviation after the war. B707 is the first generation of jet airliner. Since then, many second-generation jet airliners have appeared in the 1960s, with representative models of B727 and IL 62. In the 1970s, the third-generation jetliner with wide fuselage represented by B747 appeared. The "Concorde" supersonic aircraft jointly developed by Britain and France was officially put into operation on January 21, 1976. However, due to many factors such as high fuel consumption, short range, serious noise pollution, and high operating cost, the "Concorde" aircraft announced its retirement in October 2003. In recent decades, with the rapid development of civil aircraft, its safety, economy, and comfort have been greatly improved. All this comes from the extensive use of composite structures and the upgrading of airborne equipment.

A modern air transportation system can provide very strong service capacity to meet the different needs of various potential users [1, 2]. To meet the different needs of different users for services, the modern air transport system uses advanced technology, equipment, facilities, operation rules, and procedures, and is managed by well-trained, skilled, and well-educated people. Compared with other transportation modes such as highway, railway and sea transportation, air transportation system is a system with high efficiency, high cost, and very sensitive to the changes of internal and external factors.

2. Characteristics of air traffic management and control

Air traffic management is a safe, economic, efficient, dynamic, and comprehensive management of air traffic and airspace. The first-generation of air traffic management is characterized by land-based air traffic control equipment, including land-based communication, navigation, and monitoring equipment. The second-generation air traffic management integrates satellite communication, navigation, and monitoring technologies, improves the processing and transmission of information, expands the scope of monitoring, and improves the navigation accuracy through the global navigation satellite system, to reduce the spacing between aircraft and increase the capacity of airspace. The future navigation system is a complex global system, which is related to many business categories and interests,

such as national defense, homeland security, air traffic, commercial and general aviation, commercial aerospace transportation, passenger and cargo transportation, military flight, and airport. The types of aircraft operating in the future environment will not only increase, but also the performance envelope will become wider, and it is also required to operate in the same airspace, which increases the complexity of air traffic management. The sustainable development and growth of aviation require environmental protection and reduce the adverse impact of noise and emissions on air quality. Even with the increase of air traffic, it will be significantly reduced compared with today. At the same time, it is also necessary to mitigate the impact of aviation on water quality, energy use, and climate.

3. Summary and conclusion

As air traffic grows, so does the need for efficient, globally harmonized and interoperable Air Traffic Management (ATM). A structured and globally harmonized ATM framework, supported by a cost-effective and sustainable Communications, Navigation and Surveillance (CNS) infrastructure, should be developed in the future.

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