

ICAO CIRCULAR



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ECONOMICS OF SATELLITE-BASED AIR NAVIGATION SERVICES

Guidelines for cost/benefit analysis of communications, navigation
and surveillance/air traffic management (CNS/ATM) systems

*Approved by the Secretary General
and published under his authority*

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Foreword



1. The introduction of satellite-based air navigation services to replace many of the existing line-of-sight systems represents a quantum step forward for civil aviation. Following comprehensive studies over several years, the global “communications, navigation and surveillance/air traffic management (CNS/ATM) systems” concept was endorsed by the ICAO Tenth Air Navigation Conference in 1991 and by the 29th Session of the ICAO Assembly in 1992.
2. Apart from the evident technological benefits of the new systems, support for this endorsement had been supplied by a broad economic study which indicated that, at the global level, the benefits from the new systems greatly exceeded the costs of implementing them. The Air Navigation Conference recommended that States perform their own individual cost-effectiveness and/or cost/benefit analyses to determine how they would be affected by the new systems (Recommendation 6/1) and requested that ICAO provide assistance to States in carrying out these analyses (Recommendation 6/2, to which the Assembly subsequently attached high priority). These studies were to give consideration to such factors as the costs of transition to the new systems, including (re)training, which had not been included in the global study.
3. The guidance material presented in this circular is an important element of the envisaged assistance to States. It describes how to identify, measure and aggregate the incremental costs and benefits associated with the replacement of the existing communications, navigation and surveillance systems with the new CNS/ATM systems, and how to use this information to draw conclusions about the expected economic viability of the new systems and their economic impact on service providers (States) and users (air carriers). Guidance is also provided to assist in the choice of the most cost-effective approach to implementation. It will become clear that there is a large element of uncertainty in this process because of the difficulty of quantifying the impact of a number of relevant factors which will affect the actual economic outcome. Planning decisions will therefore require the exercise of judgement as well as economic analysis based on the techniques described in this document.
4. The guidance material presented in this circular is consistent with and complementary to the comprehensive explanatory circular “The ICAO CNS/ATM Systems: Coping with Air Traffic Demand” and to the “Global Co-ordinated Plan for the Transition to the ICAO CNS/ATM Systems”, both of which were adopted in 1993 by the committee charged with developing the framework for introducing the new systems (known as the “FANS Phase II Committee”), were subsequently endorsed by the ICAO Council and are being published as ICAO Circular 251 and ICAO Doc 9629, respectively. The purpose of the circular is to present economic evaluation methodologies using illustrative configurations of CNS/ATM

systems and existing technology systems. It does not contain advice on technical specifications of systems. The guidance material draws on reports supplied by States on the subject of cost/benefit methodology and on the application of cost/benefit techniques to CNS/ATM investments. Of particular value was a CNS/ATM cost/benefit analysis guide prepared by the Canadian Government and its consultant (THA-MONENCO) and subsequently adapted for the FANS Phase II Committee (and referred to in this circular as the "FANS Guide").

5. The cost/benefit guidance material in this circular focuses on the methodological approach of Net Present Value, which takes into account transition costs and which is widely recognized and used by financial institutions such as those potentially involved in funding CNS/ATM. The methodology is presented using a step-by-step tabular approach which may be applied manually or through a computer spreadsheet; formatted spreadsheets using Quattro Pro or Lotus software to apply the approach used in this circular are available on diskette from the ICAO Secretariat on request. Some of the tables include calculations based on hypothetical assumptions about various cost and benefit elements. Analysts undertaking cost/benefit studies for particular airspaces must develop assumptions appropriate for those airspaces, using inputs from interested parties such as service providers, aircraft operators and equipment manufacturers.

6. The circular includes a glossary which provides brief explanations of the more common technical terms and acronyms. These explanations should be viewed as an aid to the general understanding of the reader and are not necessarily officially endorsed by ICAO.

7. Unless indicated otherwise, all references in this circular to "cents" mean U.S. cents, and all references to "dollars" mean U.S. dollars.

Table of Contents

	<i>Page</i>
Glossary ..	(v)
Chapter 1 — Introduction	1
1. CNS/ATM and its advantages	1
2. Reasons for cost/benefit analysis	5
3. Measures of economic viability	6
4. Global economic evaluation of CNS/ATM	8
5. Evaluation of CNS/ATM at State and regional levels	9
Chapter 2 — Configurations of alternative systems	10
1. Introduction	10
2. Airspace types and system evolution	10
3. Examples of CNS/ATM equipment configurations	12
4. Concept of incremental costs	15
Chapter 3 — Policy and institutional assumptions	17
1. Introduction	17
2. National and regional policies	17
3. Assumptions about the rate of transition	18
4. Economic links between States, service providers and airlines	19
Chapter 4 — Net present value analysis	21
1. Outline of the approach	21
2. Traffic demand and aircraft numbers	23
3. Expenditures on CNS/ATM equipment	25
4. Purchase of services from third-party suppliers	31
5. Expenditures on present-technology equipment	33
6. Efficiency benefits for aircraft operators	38
7. Time savings for passengers	41
8. Other costs and benefits	42
9. Summary of costs and benefits for the present value approach	43
10. Net present values	46

	<i>Page</i>
Chapter 5 — Issues and applications	48
1. Introduction	48
2. Cost recovery	48
3. CNS/ATM and MLS	49
4. Sensitivity analysis	51
5. Regional differences in economic impact	54
6. Choice of implementation option	55
7. The choice between VHF and Mode S	55
Chapter 6 — Alternative methods of economic evaluation	58
1. Introduction	58
2. Cost-effectiveness analysis	58
3. Least-cost analysis	59
4. Snapshot approach	59
5. Pay-off period	63
6. Utility value analysis	64
Appendix 1 Efficiency improvements due to CNS/ATM	65
Appendix 2 Selected bibliography	66