

**Doc 9161**



# **Manual on Air Navigation Services Economics**

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Approved by the Secretary General  
and published under his authority

Fifth Edition — 2013

International Civil Aviation Organization



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## AMENDMENTS

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### RECORD OF AMENDMENTS AND CORRIGENDA

AMENDMENTS		
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# FOREWORD

## ORIGIN AND OBJECTIVE

1. In May 2009, the ICAO Air Transport Committee decided that the *Manual on Air Navigation Services Economics* (Doc 9161) should be revised and updated as a follow-up to the Conference on the Economics of Airports and Air Navigation Services (CEANS 2008).
2. The objective of this manual is to provide practical guidance to States, air navigation services providers, and designated charging and regulatory authorities to assist in the efficient management of air navigation services and in implementing ICAO's *Policies on Charges for Airports and Air Navigation Services* (Doc 9082).

## SCOPE

3. This guidance takes into account the wide range of different circumstances faced by air navigation services providers. It is based on international policies and principles on air navigation services cost-recovery that States have developed through ICAO and describes procedures and practices that are in conformity with these policies and principles. The basis for these policies and principles is set out in Article 15 of the *Convention on International Civil Aviation* (Doc 7100), the charter of ICAO. Extensive policy guidance in this area was subsequently developed by the ICAO Council and is contained in Doc 9082.
4. The guidance material in this manual is presented in six chapters and five associated appendices, including a glossary of terms and abbreviations as used in this manual, and an index. Chapter 1 addresses ICAO's policies on air navigation services charges and States' responsibilities; Chapter 2 focuses on air navigation services ownership, control and governance issues; Chapter 3 deals with international cooperation in the provision of air navigation services; Chapter 4 provides guidance on economic and financial management, including economic performance management; Chapter 5 provides guidance on determining the cost basis for air navigation services charges and on the setting of individual air traffic charges and their collection; and Chapter 6 addresses financing of air navigation services infrastructure.
5. Special care has been taken, throughout this manual, to ensure consistency and harmonization with the companion document — *Airport Economics Manual* (Doc 9562).

## SOURCES

6. In the development of the present fifth edition of the manual, the Secretariat has been assisted by a panel of experts on air navigation services economics — the Air Navigation Services Economics Panel (ANSEP). The principal sources were the fourth edition of the manual, *ICAO's Policies on Charges for Airports and Air Navigation Services* (Doc 9082), the *Report of the Conference on the Economics of Airports and Air Navigation Services (CEANS)* (Doc 9908) and the *Airport Economics Manual* (Doc 9562). Additional ICAO source documents included Annexes to the *Convention on International Civil Aviation* (Doc 7300), manuals, reports, circulars and studies, as well as individual consultations by the Secretariat.





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# GLOSSARY

## ACRONYMS

ACC	Area control centre
ADS	Automatic dependent surveillance
ADS-B	Automatic dependent surveillance-broadcast
ADS-C	Automatic dependent surveillance-contract
AFS	Aeronautical fixed service
AFTN	Aeronautical fixed telecommunication network
AIM	Aeronautical information management
AIP	Aeronautical information publication
AIRMET	Information concerning en-route weather phenomena which may affect the safety of low-level aircraft operations
AIS	Aeronautical information services
AMS	Aeronautical mobile service
AMSS	Aeronautical mobile satellite service
ANP	Air navigation plan
ANSP	Air navigation services provider
ASECNA	Agence pour la Sécurité de la Navigation Aérienne en Afrique et à Madagascar
ASM	Airspace management
ATC	Air traffic control
ATCO	Air traffic controller
ATFM	Air traffic flow management
ATK	Available tonne-kilometre
ATM	Air traffic management
ATN	Aeronautical telecommunication network
ATS	Air traffic services
CAPM	Capital assets pricing model
CBA	Cost-benefit analysis
CFIT	Controlled flight into terrain
CNS	Communications, navigation and surveillance
COCESNA	Corporación Centroamericana de Servicios de Navegación Aérea
COM	Aeronautical telecommunication service
DME	Distance measuring equipment
D-VOLMET	Digital meteorological information for aircraft in flight
EUROCONTROL	European Organisation for the Safety of Air Navigation
FASID	Facilities and services implementation document
FIC	Flight information centre
FIR	Flight information region
GANP	Global air navigation plan
GES	Ground earth station
GLONASS	Global navigation satellite system (Russian Federation)
GNSS	Global navigation satellite system (United States)
GPS	Global positioning system
HF	High frequency
IAS	International accounting standards
IFR	Instrument flight rules

IKSANO	International Organization Information Coordinating Council on Air Navigation Charges
ILS	Instrument landing system
IPO	Initial public offering
KPA	Key performance area
KPI	Key performance indicator
LAQ	Local air quality
MET	Meteorological services for air navigation
METAR	Aerodrome routine meteorological report
Mode S	Mode select
NDB	Non-directional radio beacon
NOTAM	Notice to airmen
NPV	Net present value
OECD	Organisation for Economic Co-operation and Development
OPMET	Operational meteorological information
OPS	Operations
PBA	Performance-based approach
PBN	Performance-based navigation
PIRG	Planning and implementation regional group
RMA	Regional monitoring agency
RNAV	Area navigation
RSOO	Regional safety oversight organization
RVSM	Reduced vertical separation minimum
SADIS	Satellite distribution system for information relating to air navigation
SAR	Search and rescue
SARPS	Standards and recommended practices
SES	Single European Sky
SESAR	Single European Air Traffic Management Research
SIGMET	Information concerning en-route weather phenomena which may affect the safety of aircraft operations
SLA	Service level agreement
SPECI	Aerodrome special meteorological report
TAF	Aerodrome forecast
TC	Tropical cyclone
TMA	Terminal control area
TWR	Aerodrome control tower <i>or</i> aerodrome control
UIR	Upper flight information region
VA	Volcanic ash
VFR	Visual flight rules
VHF	Very high frequency
VOLMET	Meteorological information for aircraft in flight
VOR	VHF omnidirectional radio range
VSAT	Very small aperture terminal
WAAC	Weighted average cost of capital
WAFS	World area forecast system

## TERMS

*Note.— The following terms are described as they apply in the context of this manual. This list is not exhaustive. Other terms, for which a definition is provided in the body of the manual, may be found in the Index.*

**Aerodrome control service.** Air traffic control service for aerodrome traffic.

**Air navigation services.** This term includes air traffic management (ATM), communications, navigation and surveillance systems (CNS), meteorological services for air navigation (MET), search and rescue (SAR) and aeronautical information services/aeronautical information management (AIS/AIM). These services are provided to air traffic during all phases of operations (approach, aerodrome and en route).

**Air navigation services provider (ANSP).** Any entity providing ATM and/or other air navigation services mentioned above.

**Airport phase of operations.** Any or all phases of aircraft operations involving approach, landing, take-off and/or departure.

**Air traffic control (ATC) service.** A service provided for the purpose of: a) preventing collisions (between aircraft and on the manoeuvring area between aircraft and obstructions); and b) expediting and maintaining an orderly flow of air traffic.

**Air traffic management (ATM).** The aggregation of the airborne functions and ground-based functions (air traffic services, airspace management and air traffic flow management) required to ensure the safe and efficient movement of aircraft during all phases of operations.

**Air traffic service (ATS).** A generic term meaning variously, flight information service, alerting service, air traffic advisory service, air traffic control service (area control service, approach control service or aerodrome control service).

**Alerting service.** A service provided to notify appropriate organizations regarding aircraft in need of search and rescue aid, and assist such organizations as required.

**Amortization.** The gradual extinguishment of the cost of an asset by periodic (annual) charges to expenses, usually applicable to intangible assets (e.g. development costs).

**Approach control service.** Air traffic control service for arriving or departing controlled flights.

**Area control service.** Air traffic control service for controlled flights in control areas (en route).

**Asset.** A resource from which future economic benefits are expected to flow to the entity that owns or controls it.

**Autonomous entity.** An independent entity established for the purpose of operating and managing one or more airports and/or air navigation services, which is empowered to manage and use the revenues it generates to cover its costs.

**Benchmarking.** The process of either making comparisons over time within a single organization (internal benchmarking) or of comparing the performance of two or more organizations (external benchmarking) in order to make improvements.

**Best practices.** Practices that, over time, have proven cost-effective, efficient and successful in bringing quality products and services to the marketplace.

**Bond.** Documentary promise to repay long-term borrowed money with interest at a definite or determinable future date.

**Capital assets.** Assets, whether tangible or intangible, acquired with the expectation that they will remain in service for a number of accounting periods. (Compare fixed assets.)

**Capitalizing expenditure.** The recording and carrying forward into one or more future financial periods as a depreciable asset any costs the benefits of which will be realized over the period(s) concerned.

**Cash flow.** The net amount of money received by an entity over a given period.

**Charge.** A levy that is designed and applied specifically to recover the costs of providing facilities and services for civil aviation.

**Commercialization.** An approach to management of facilities and services in which business principles are applied or emphasis is placed on development of commercial activities.

**Convertible currency.** A currency which can be exchanged for gold or a major currency.

**Corporate governance.** Overseeing the running of a company or an entity by its management and its accountability to shareholders and other interested parties.

**Cost of capital.** The cost of raising debt or equity funds.

**Current assets.** Assets that can be realized within one year.

**Depreciation of assets.** The decrease in the value of an asset due to wear and tear through use, action of the elements, inadequacy or obsolescence, normally over a predetermined period of time (depreciation period/book life of the asset).

**Differential charges.** Any preferential charges, rebates, discounts or other reductions in the charges normally payable for the use of air navigation facilities and services.

**Dividends.** Distribution of earnings in cash or in stock.

**Economic life (of an asset).** The period during which an asset is expected to yield a rate of return.

**Economic oversight.** The function by which a State supervises the commercial and operational practices of an air navigation services provider.

**En-route phase.** That part of flight from the end of the take-off and initial climb phase to the commencement of the approach and landing phase.

**Equity capital.** Money furnished by the owner(s) of the entity.

**Financial statements.** These include the income statement and the balance sheet. The income statement summarizes all revenues and expenses, with the difference between the two totals being either a profit or a loss. The balance sheet summarizes assets and liabilities, with the difference between the two representing an increase or decrease in net worth.

**Fixed assets.** Tangible assets that are permanent in nature and generally held for a period of more than one year (normally buildings and equipment).

**Fixed costs.** Costs which, in the short-term, remain unchanged regardless of whether or not the volume of services provided increases or decreases.

**Flight information region (FIR).** An airspace of defined dimensions within which flight information service and alerting service are provided.

**Flight information service.** A service provided for the purpose of giving advice and information useful for the safe and efficient conduct of flights.

**General aviation.** All civil aviation operations other than scheduled air services and non-scheduled air transport operations for remuneration or hire.

**Great circle.** A circle on the surface of the earth, the plane of which passes through the centre of the earth.

**Great circle distance.** The length of the shorter arc of the great circle joining two points.

**Key performance areas (KPAs).** Key areas of performance corresponding to the expectations of providers, regulators, users and other interested parties.

**Key performance indicators (KPIs).** Current/past performance, expected future performance (estimated as part of forecasting and performance modelling), as well as actual progress in achieving performance objectives are quantitatively expressed by means of indicators. Since indicators support objectives, they should be defined having a specific performance objective in mind.

**Lease.** The right to occupy certain defined premises or possess some equipment for a fixed period, which may be used for business purposes. The premises or equipment is returned to the owner on expiry of the lease, generally without paying any compensation.

**Liabilities.** Debt of the entity in the form of financial claims on an entity's assets.

**Liquidity.** A state or situation determined by the extent or degree of possession of assets which are immediately available for discharge of financial obligations.

**Marginal cost.** The cost of producing another unit or output.

**Modulated charges.** Charges that are adjusted according to the time and/or situation of use of the facility or service concerned (for example, peak/off-peak hours, air traffic congestion, noise and local air quality aspects).

**Multinational facility or service.** A facility or service established for the purpose of servicing international air navigation in airspace extending beyond the airspace serviced by a single State. It could be operated by one State, a group of States or an international operating agency. Guidance on the establishment of such a facility or service is included in all regional air navigation plans.

**Multiplier effect.** Normally expressed as a factor showing how much the direct economic impact of the air navigation facilities and services is increased by the indirect and induced economic effects of the air navigation facilities.

**Net asset value.** The value of the total assets of an entity after deduction of all debts (equals equity capital).

**Operating life (of an asset).** Period of time that a fixed asset can be used.

**Performance management.** An interactive process through which the performance of providers is expected to improve over time. This process consists of several steps, i.e. defining performance objectives, selecting performance indicators and setting their targets, monitoring performance, and reporting and assessing performance.

**Pre-funding.** Partial or complete financing of an air navigation facility project through charges levied on users prior to completion of the facility concerned.

**Price cap.** The maximum price set under a prices policy or under specific legislation.

**Private involvement.** Minority participation or involvement of a private entity in the ownership of certain facilities and services. Private involvement may also take the forms of management contract or lease.

**Privatization.** Transfer of full or majority ownership of facilities and services to the private sector.

**Regional air navigation plans (ANPs).** Air navigation plans that set forth in detail the facilities, services and procedures required for international air navigation within a specified area.

**Residual value.** Cost (of an asset) less any part of the cost that has been depreciated or amortized, or treated as an expense or loss.

**Tax.** A levy that is designed to raise national or local government revenues which are generally not applied to civil aviation in their entirety or on a cost-specific basis.

**Users.** This term refers to aircraft operators as users of air navigation facilities and services. The term “end-users” refers to ultimate consumers in general (for example, passengers and shippers).

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# CHAPTER 1

## ICAO's Policies on Charges and States' Responsibilities

This chapter focuses on ICAO's key policies on air navigation services charges and the responsibilities assigned to Contracting States under the *Convention on International Civil Aviation* (Doc 7300).

Part A addresses the basic principles expressed in: a) Article 15 of Doc 7300; b) Assembly resolutions on policies in the air transport field; and c) *ICAO's Policies on Charges for Airports and Air Navigation Services* (Doc 9082).

Part B focuses on States' responsibilities regarding the provision of airport and air navigation facilities and services.

Part C summarizes ICAO's policies on objectives, forms and implementation of economic oversight for air navigation services, as well as dispute resolution.

Finally, Part D summarizes ICAO's policies with regard to consultation with users on charges and air navigation services development plans.

### **PART A — ARTICLE 15 OF THE CONVENTION ON INTERNATIONAL CIVIL AVIATION, ASSEMBLY RESOLUTIONS AND ICAO'S POLICIES ON CHARGES**

#### CONVENTION ON INTERNATIONAL CIVIL AVIATION

1.1 The basic principles established by ICAO in the area of charges for airports and air navigation services are expressed in Article 15 of the *Convention on International Civil Aviation* (Doc 7300), usually referred to as the Chicago Convention, as follows:

##### *Airport and similar charges*

Every airport in a Contracting State that is open to public use by its national aircraft shall likewise, subject to the provisions of Article 68, be open under uniform conditions to the aircraft of all the other Contracting States. The like uniform conditions shall apply to the use, by aircraft of every Contracting State, of all air navigation facilities, including radio and meteorological services, which may be provided for public use for the safety and expedition of air navigation.

Any charges that may be imposed or permitted to be imposed by a Contracting State for the use of such airports and air navigation facilities by the aircraft of any other Contracting State shall not be higher,

- a) As to aircraft not engaged in scheduled international air services, than those that would be paid by its national aircraft of the same class engaged in similar operations, and
- b) As to aircraft engaged in scheduled international air services, than those that would be paid by its national aircraft engaged in similar international air services.

All such charges shall be published and communicated to the International Civil Aviation Organization, provided that, upon representation by an interested Contracting State, the charges imposed for the use of airports and other facilities shall be subject to review by the Council, which shall report and make recommendations thereon for the consideration of the State or States concerned. No fees, dues or other charges shall be imposed by any Contracting State in respect solely of the right of transit over or entry into or exit from its territory of any aircraft of a Contracting State or persons or property thereon.

1.2 In summary, Article 15 of the Chicago Convention sets out the following three basic principles:

- a) uniform conditions shall apply to the use of airports and air navigation services in a Contracting State by aircraft of all other Contracting States;
- b) the charges imposed by a Contracting State for the use of such airports or air navigation services shall not be higher for aircraft of other Contracting States than those paid by its national aircraft engaged in similar international operations; and
- c) no charge shall be imposed by any Contracting State solely for the right of transit over or entry into or exit from its territory of any aircraft of a Contracting State or persons or property thereon.

The two first principles, which relate to non-discrimination, do not appear to have given rise to misunderstandings. Nevertheless, in some instances, the third principle has been interpreted to mean that no charges are to be levied when an aircraft flies into, out of or over a State. That, however, is not the intent of this principle, since all States are fully within their rights to recover, through charges, the costs incurred in the provision of airport and air navigation facilities and services. The substance of this principle is in fact that a State should not charge solely for granting an authorization for a flight to operate into, out of or over its territory.

1.3 Two other aspects are also addressed in Article 15. The first is that States are obliged to publish their airport and air navigation services charges and also communicate them to ICAO. This information is collected and published by ICAO in the *Tariffs for Airports and Air Navigation Services* (Doc 7100).

1.4 Article 15 also provides for ICAO, upon representation by an interested Contracting State, to review the charges imposed and make recommendations thereon to the State or States concerned. It should be noted that the Article specifically refers to representation by an interested Contracting State only, not by any other party.

1.5 As to the status of the principles in Article 15 and, for that matter, all the Articles of the Chicago Convention, an ICAO Contracting State cannot exempt itself from applying any of the principles expressed therein since by signing the Chicago Convention the signatory State binds itself to adhere to all its Articles without exception.

## ASSEMBLY RESOLUTIONS

1.6 ICAO's policies in the air transport field are expressed in consolidated Assembly resolutions, which are updated at each ordinary session of the Assembly. These resolutions address policy matters in all sectors of the ICAO Air Transport Programme, through dedicated appendices. The latest Assembly resolution in force is A37-20 — *Consolidated statement of continuing ICAO policies in the air transport field*, where Appendix F relates to airports and air

navigation services. A37-20, Appendix F, urges Contracting States to ensure that Article 15 of the Convention is fully respected, regardless of the organizational structure under which airports and air navigation services are operated, and reminds States that they alone remain responsible for the commitments they have assumed under Article 28 of the Chicago Convention.

1.7 ICAO's policies on environmental levies are expressed in Assembly Resolution A37-18 — *Consolidated statement of continuing ICAO policies and practices related to environmental protection — General provisions, noise and local air quality*.

1.8 The use of charges for the purpose of environmental protection may be applied in two areas: aircraft noise and aircraft engine emissions. ICAO's existing policies on noise-related charges are not applicable to air navigation services. Aircraft engine emissions have an impact on the environment at two levels:

- a) on local air quality (LAQ); and
- b) globally.

Policies regarding LAQ-related charges, which are contained in *ICAO's Policies on Charges for Airports and Air Navigation Services* (Doc 9082), Section II, paragraph 9, are not applicable to air navigation services; at the global level, ICAO's policies are in favour of using measures other than levies.

#### ICAO'S POLICIES ON CHARGES

1.9 Additional and more detailed policy guidance on charges for airport and air navigation services is provided in Doc 9082. The policies on charges are revised periodically by the Council following major international conferences on airport and air navigation services economics, although most of the basic philosophy and principles have remained unchanged over the years. ICAO's policies on charges differ in status from the Chicago Convention in that an ICAO Contracting State is not legally bound to adhere thereto, unlike the Articles of the Chicago Convention. However, since the principles in Doc 9082 are based on recommendations by major international conferences, States are morally committed to follow them and to ensure that their cost-recovery practices conform thereto. Paragraph 1 of the Foreword to Doc 9082 notes that, as per a recommendation adopted by the Conference on the Economics of Airports and Air Navigation Services (CEANS 2008), States are encouraged to incorporate the four key charging principles of non-discrimination, cost-relatedness, transparency and consultation with users in their national legislation, regulation or policies, as well as into their air services agreements, in order to ensure compliance by airport operators and air navigation services providers (ANSPs).

1.10 An important consideration of Doc 9082 is that there should be a balance between the respective interests of airports and ANSPs on one hand and of aircraft operators on the other, particularly in view of the importance of an air transport system to States and its influence in fostering economic, cultural and social interchanges between States. This especially applies during periods of economic difficulty; therefore, it is recommended that States encourage increased cooperation between airports and ANSPs and aircraft operators to ensure that economic difficulties facing them all are shared in a reasonable manner (Doc 9082, Foreword, paragraphs 4 and 8 refer).

1.11 Section I of Doc 9082 addresses some issues that are common to airports and air navigation services: scope and proliferation of charges, organizational and managerial issues, economic oversight, economic performance, consultation with users, prefunding of projects, and currency issues.

1.12 Section III of Doc 9082 concerns air navigation services charges and is, together with Section I, the focus for the description in this part of the manual.<sup>1</sup>

1.13 In Section I of Doc 9082, Section I, paragraphs 2 and 3, concern is expressed over the proliferation of charges on air traffic. It is recommended that States:

- a) permit the imposition of charges only for services and functions which are provided for, directly related to, or ultimately beneficial for, civil aviation operations; and
- b) refrain from imposing charges which discriminate against international civil aviation in relation to other modes of international transport.

1.14 Experience gained worldwide indicates that where airports and air navigation services have been operated by autonomous entities, their overall financial situation and managerial efficiency have generally tended to improve (Doc 9082, Section I, paragraph 4). Therefore, it is recommended that, where this is economically viable and in the best interests of providers and users, States consider establishing autonomous entities to operate their airports and air navigation services (Doc 9082, Section I, paragraph 5). When considering the commercialization or privatization of airports and ANSPs, States should bear in mind that they are ultimately responsible for safety, security and economic oversight of these entities (Doc 9082, Section I, paragraph 6). Whenever an autonomous entity is established to operate an airport(s) and/or provide air navigation services, the State should ensure that all relevant obligations of the State specified in the Convention on International Civil Aviation, its Annexes and in air services agreements are complied with, and that ICAO's policies on charges are observed (Doc 9082, Section I, paragraph 7). Furthermore, States should ensure the use of best practices of good corporate governance for airports and ANSPs. In order to promote transparency, efficiency and cost-effectiveness in the provision of an appropriate quality of facilities and services, airports and ANSPs should apply management best practices in all areas of their business (Doc 9082, Section I, paragraphs 9 and 10).

1.15 The principles contained in Section III of Doc 9082 cover such subjects as the cost basis for air navigation services charges, allocation of costs of air navigation services among aeronautical users, air navigation services charging systems, approach and aerodrome control charges, route air navigation services charges, and charges for air navigation services used by aircraft when not over the provider State.

1.16 Among the basic principles included in Doc 9082 concerning the cost basis for air navigation services charges are that:

- a) as a general principle, where air navigation services are provided for international use, the State may require the users of such services to pay the portion of costs properly allocable to them. At the same time, international civil aviation should not be asked to meet costs which are not properly allocable to it. States should ensure that ANSPs maintain their accounts, where appropriate in accordance with internationally accepted accounting standards, in a manner that ensures that air navigation services charges levied on international civil aviation are properly calculated (Doc 9082, Section III, paragraph 1); and
- b) the cost to be allocated is the full cost of providing the air navigation services, including appropriate amounts for cost of capital and depreciation of assets, as well as the costs of maintenance, operation, management and administration (Doc 9082, Section III, paragraph 3 i)).

1.17 Other principles and recommendations of particular relevance in the context of the cost basis for air navigation services charges, charging systems and the collection of charges are that:

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1. The highlighting of certain principles in Doc 9082 should not be interpreted to mean that these principles are more important than other principles in Doc 9082.

- a) air navigation services may produce sufficient revenues to exceed all direct and indirect operating costs and so provide for a reasonable return on assets (before tax and cost of capital) to secure efficient financing for the purpose of investing in new or enhanced air navigation services infrastructure (Doc 9082, Section III, paragraph 3 vi));
- b) the allocation of the costs of air navigation services among aeronautical users should be carried out in an equitable manner. The proportions of cost attributable to international civil aviation and attributable to others (including domestic civil aviation, State or other exempted aircraft, and non-aeronautical users) should be determined in such a way as to ensure that no users are burdened with costs not properly allocable to them according to sound accounting principles. It is also recommended that States ensure that basic utilization data in respect of air navigation services are maintained, when such information is relevant to the allocation and recovery of costs. Such data could include the number of flights by user category, whether domestic or international, as well as distances flown and information on aircraft type or weight (Doc 9082, Section III, paragraph 5);
- c) any charging system should, so far as possible, be simple, equitable and, with regard to air navigation services charges, suitable for general application at least on a regional basis. The administrative cost of collecting charges should not exceed a reasonable proportion of the charges collected (Doc 9082, Section III, paragraph 6 i));
- d) charges should not be imposed in such a way as to discourage the use of facilities and services necessary for safety or the introduction of new aids and techniques. The facilities or services provided for in the ICAO regional air navigation plan(s) or in any recommendations of the relevant ICAO regional air navigation meeting as approved by the Council are considered to be necessary for safety and efficiency (Doc 9082, Section III, paragraph 6 ii));
- e) consistent with the form of economic oversight adopted, States should assess, on a case-by-case basis and according to local or national circumstances, the positive and negative effects of differential charges applied by ANSPs. States should ensure that the purpose, creation and criteria for differential charges are transparent. Without prejudice to modulated charging schemes, the costs associated with such differential charges should not be allocated to users not benefiting from them. Charges offered for the purpose of attracting or retaining new air services should only be offered on a temporary basis (Doc 9082, Section III, paragraph 6 v));
- f) when charging systems are introduced or significantly revised, account should be taken of the economic and financial impact on both the users and the provider State or States. To avoid undue disruption to users, resulting increases in charges should be introduced on a gradual basis; however, it is recognized that in some circumstances a departure from this approach may be necessary (Doc 9082, Section III, paragraph 6 vii)); and
- g) charges should be levied in such a way that no facility or service is charged for twice with respect to the same utilization. In cases where certain facilities or services have a dual role (for example, approach and aerodrome control as well as en-route air traffic control), their cost should be equitably allocated for charging purposes (Doc 9082, Section III, paragraph 6 viii)).

1.18 A noteworthy aspect of ICAO's policies on charges with reference to search and rescue services and accident investigation is the limitation to any permanent civil establishment of equipment and personnel when determining the total costs of air navigation services (Doc 9082, Appendix 2 — Other ancillary aviation services).

1.19 No specific reference is made in Doc 9082 to particular cost-recovery principles for CNS/ATM systems because all basic ICAO charging principles for air navigation services apply to the implementation of CNS/ATM systems. However, special considerations are required with respect to organizational, managerial and cooperative aspects, as well as financing, costing and cost-recovery mechanisms.

## **PART B — STATES' RESPONSIBILITIES**

1.20 As noted in Part A above, Article 15 of the Chicago Convention establishes the basic charging principles for airports and air navigation services and reinforces the concept of freedom of access and non-discrimination set forth in Article 11 with respect to the use of facilities and services for the aircraft of Contracting States in the operation of international air transport.

1.21 Also relevant is Article 68, which sets forth that each Contracting State may designate the route to be followed within its territory by any international air service and the airports which any such service may use.

1.22 Under Article 28 of the Chicago Convention, basic responsibilities are assigned to Contracting States. For example, it is the State that is responsible for the provision of airport and air navigation facilities and services, in accordance with the standards and practices recommended or established from time to time, pursuant to the Convention.

1.23 In addition, there are obligations that States undertake in air services agreements, where again the State alone is responsible for the observance of stipulations addressing, for example, access to certain airports and routes and key charging principles such as non-discrimination, cost-relatedness, transparency and consultation with users.

## **PART C — ECONOMIC OVERSIGHT OF AIR NAVIGATION SERVICES**

### **INTRODUCTION**

1.24 As noted in Part A above, States, in view of the potential abuse of the dominant position of ANSPs, are responsible for the economic oversight of their operations. Economic oversight is defined as the function by which a State supervises the commercial and operational practices of an ANSP. In performing their economic oversight function, States should, in particular, ensure that ANSPs consult with users and that appropriate performance management systems are in place.

1.25 When goods and services are supplied by competitors vying for customers, the economic well-being of consumers can often be left in the hands of market forces, which act as an "automatic regulator" for ensuring efficiency in setting prices and establishing the quantity and quality of supply. By contrast, when supply in a given market is dominated by a single provider, the question of regulatory intervention becomes a public concern.

1.26 In recent years, the progress of commercialization has been putting more competition and commercial pressure on ANSPs. There are aspects of operations of providers where more limited competition "for" the market is an option that can be considered. For example, there are already many instances where the provision of aerodrome control services is subject to periodic competitive tendering. Moreover, regional cooperation in the provision of air navigation services may lead to the establishment of a certification/designation mechanism where all ANSPs will have to be certified against common requirements. Where these certificates are mutually recognized through an entire region, States will be free to designate any entity with a valid certificate to provide air navigation services in a specific part of their airspace.

1.27 However, these developments do not imply any changes to the responsibility of States regarding economic oversight. In many States, air navigation services continue to be provided by a statutory or natural monopoly not subject to direct or even realistic indirect competition within the same airspace. The focus by ANSPs on commercial activities and cost reduction may sometimes negatively affect the interests of certain categories of users. Furthermore, commercialization may have reduced the awareness of, and adherence by ANSPs to, States' international obligations including ICAO's policies on charges. These responsibilities can be assumed only by the State itself.

## OBJECTIVES OF ECONOMIC OVERSIGHT

1.28 Economic oversight works best when clear objectives and incentives are given to ANSPs so that they can provide services in the most cost-effective manner and with an appropriate level of quality. Paragraph 13 of Section I of Doc 9082 sets out a number of objectives reflecting areas of potential need for appropriate economic oversight as follows:

- a) minimize the risk of ANSPs engaging in anti-competitive practices or abusing any dominant position they may have;
- b) ensure non-discrimination and transparency in the application of charges;
- c) ascertain that investments in capacity meet current and future demand in a cost-effective manner; and
- d) protect the interests of passengers and other end-users.<sup>2</sup>

To promote these objectives, consistent with the form of economic oversight adopted, States should ensure that ANSPs consult with users and that appropriate performance management systems are in place.

1.29 The priority for each objective may vary depending on the specific circumstances in each State, and there should be a balance between such public policy objectives and the interests of the autonomous/private entities to obtain the optimal effects of commercialization or privatization.

## POSSIBLE FORMS OF ECONOMIC OVERSIGHT

1.30 Economic oversight may take several different forms, from a light-handed approach (such as the application of competition law) to a more robust approach (such as direct regulatory interventions in the economic decisions of ANSPs), as follows:

- a) application of competition law;
- b) fallback regulation ("market regulation");
- c) institutional requirements ("institutionalized checks and balances");
- d) price cap regulation ("incentive-based regulation"); and
- e) rate of return regulation ("cost of service regulation").

### **Application of competition law**

1.31 The concept of competition law refers to laws (including regulations and policies) that aim to foster or maintain competition in markets by prohibiting anti-competitive practices. The process of applying competition law normally consists of responding to complaints, monitoring market behaviours, prosecuting offenders, adjudicating liability, and imposing sanctions upon parties adjudged to have violated the law. Such actions are likely to also have a deterrent effect on anti-competitive behaviours.

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2. The term "end-users" refers to ultimate consumers in general (e.g. passengers and shippers).

### Fallback regulation

1.32 Fallback regulation is predicated on making explicit the “threat” of a more robust form of economic oversight if a company does not ensure that its behaviour stays within “acceptable” bounds. The benefit of this light-handed approach is to mitigate a potential risk of abusing dominant position without incurring the regulatory costs and distortions. Normally, this would be accompanied by the application of standard competition law. For this approach to work, the ANSP must have an understanding of what constitutes unacceptable behaviour. A difficulty might be that by defining the commercial boundaries in detail there might be a risk of creating precisely the regulatory distortions that it seeks to avoid.

### Institutional requirements

1.33 Research and experience indicate that the interests of all stakeholders can be best served if users are sufficiently well-informed through the constructive engagement of ANSPs and users. Certain institutional requirements can enhance transparency and the flow of information, thereby transmitting the right signals and responses between ANSPs and users.

1.34 Light-handed types of institutional requirements include conditions on:

- a) *mandatory consultation between ANSPs and users* in the establishment of air navigation services charges and development plans in order to ensure adequate disclosure of costs and transparency in the economic and financial underpinnings of rate and service proposals. If a meaningful consultation process is well-established, it could eliminate or reduce the need for a robust form of economic oversight;
- b) *implementation of a performance management system* (see Chapter 4); and
- c) *establishment of corporate governance* including stakeholder membership on the board of directors, which is a means of promoting the adequate flow of economic information between the ANSP and its users.

1.35 More robust types of institutional requirements include conditions on:

- a) *joint ownership*, or mixed enterprise, as a means of ensuring information flow, consultation and consensus in the establishment of air navigation services charges and development plans; however, there might be potential anti-competitive issues involved regarding airline competition and barriers to entry where joint ownership means airlines having a large say about investment plans and about the management of the ANSP; and
- b) *not-for-profit financial status*. The rationale behind this arrangement is that removing the profit incentive from an otherwise commercially oriented organization relieves it of the stimulus to abuse its dominant position. However, it can also be argued that a profit motive protects the public against the risk of an ANSP failing to generate sufficient surplus revenues to sustain and modernize its facilities on a timely basis. In whatever case, the managers will have to trade off between multiple objectives, which are well-known problems of management incentives.

### Price cap regulation

1.36 Some forms of economic oversight are designed to encompass incentive elements within them. The archetypal example is price cap regulation, under which the regulator sets a maximum chargeable rate applicable for a specific period, normally by using the retail/consumer price index minus (or plus) an incentive target (an “x” factor). If the



ANSP exceeds the target, it may keep any over-recoveries. Where the target is not met, the ANSP would not be allowed to increase charges to compensate for the under-recovery and would have to find the means to balance its accounts during the regulated period. Under this scenario, the ANSP has a strong incentive to improve its efficiency and reduce its costs.

1.37 The price cap regulation has some potential shortcomings. For example, over time, as the ability of the regulated company to outperform the cap is reduced, the incentive effect is less effective. Also, since a price cap is usually set for several years on the basis of projected capital expenditure as well as on existing assets, the ANSP may have an incentive to overstate capital expenditure prior to the price cap being set and, subsequently, not to undertake the full programme (the price cap can give the ANSP a short-term return on the assets without actually having to invest in them). Such issues can largely be dealt with through the establishment of a clear and comprehensive definition of outputs and their pricing, which allows the regulated entity to argue that the lower-than-planned expenditure is the result of (desirable) efficiency gains. The resulting regulatory system does, however, become increasingly complex and hence more expensive for the regulator, the regulated companies and all users.

1.38 Output-based price caps may mitigate this problem. Prices set instead in relation to output performance may provide better incentives to invest efficiently. The price can be varied up or down based on meeting performance specifications. If price caps can be linked closely to outputs over time, the ANSP will have fewer incentives to delay or not undertake productive investments. The barriers to this form of regulation are the long lead times to investment such that the benefits in terms of outputs are often achieved only many years later and the challenge of defining outputs in such a way that they cover service quality as well as capacity.

### Rate of return regulation

1.39 A rate of return regulation (also called cost of service or cost plus regulation) is designed principally to address the issue of excessive profits in enterprises with monopoly characteristics. The ANSP may be required to obtain approval for the level of charges and investments, the objective being to limit the provider's rate of return on capital at the level prevailing in a competitive market. In its simplest form, it allows cost pass-through for both operating and capital expenditures. However, rate of return regulation may provide the ANSP with a strong incentive for over-investment in order to increase the volume of its profit. Where there are no other incentives on efficiency (for example, through governance) rate of return regulation may provide limited incentive to cost-effectiveness and may also encourage over-investment beyond the requirement of users.

### SELECTING APPROPRIATE FORMS OF OVERSIGHT

1.40 The selection of the appropriate form of economic oversight depends, *inter alia*, on the degree of competition, and the legal, institutional and governance frameworks, including the roles, rights and responsibilities of the different parties involved, as well as the costs related to specific oversight forms. Whatever approach is adopted, economic oversight should be performed in a transparent, efficient and cost-effective manner, while keeping regulatory interventions at a minimum and as required, for instance, when there is a disagreement between the parties, where strong market positions create the potential for overcharging, or where there is increased potential for discriminatory behaviour against specific users. Since circumstances change over time, the different options might be more or less appropriate at different times. It is therefore desirable to ensure a certain degree of flexibility so that it can be adapted to changing circumstances.

1.41 In selecting the appropriate form of economic oversight, States should first consider the scope and degree of competition. Where competition or the threat of it is sufficiently strong, the application of competition law is likely to be adequate.

1.42 One of the justifications for selecting other forms of economic oversight, therefore, requires that competition and the application of competition law would be insufficient to address the risk that an ANSP could abuse any dominant position it may have. The issue here is how to identify the circumstances in which competition or the threat of it would not be sufficiently strong. In general, the degree of competitive market constraints could be measured in terms of actual and potential competition from nearby, rival ANSPs or from other modes of transport. The size of the entities and traffic volume relevant to the market are also factors to be taken into account.

1.43 Even where competition may not be considered sufficiently strong, there may be circumstances in which the need for a robust form of economic oversight is less obvious. For example, an ANSP, in collaboration with its users, is the party best placed to determine the optimal service standards, charges system and the level of the charges in relation to the services rendered. In such cases, the scope of economic oversight should be limited to encouraging that changes to the charges system and to the level of charges be made in agreement between the ANSP and all categories of users where this is achievable.

1.44 Other important factors in assessing the most appropriate approach are the potential costs and benefits related to the particular form of economic oversight. The operation and administration of economic oversight is not cost-free, and the cost associated to it may increase as the approach taken by a State moves from a light-handed to a more robust form of economic oversight. In the extreme, the regulatory cost may outweigh the expected benefit. The choice of an appropriate form going beyond the application of competition law is, therefore, a matter of searching the spectrum of options for protecting public interests at an acceptable level and at a minimum regulatory cost.

1.45 It is possible to conceive variations to each form of economic oversight set out above. In some situations, the combination of two or more forms may yield the best form of economic oversight.

#### IMPLEMENTATION OF ECONOMIC OVERSIGHT

1.46 States may perform their economic oversight function through legislation or rule-making, establishment of a regulatory mechanism, etc. The mechanism by which economic oversight takes place can be key to its success in achieving its objectives in an efficient and cost-effective manner. It is important for States to consider carefully the roles, rights and responsibilities of the different parties involved — governments, ANSPs and users — and to exercise their economic oversight function, in particular concerning economic performance management and consultation with users, in an internally consistent manner.

1.47 Where a State chooses not to establish an autonomous ANSP, the economic oversight function should be functionally separated from the operation and provision of air navigation services within the administration and have a clearly defined role and power (see Chapter 2, Part B).

1.48 Taking account of local circumstances, a State may wish to establish an independent economic oversight entity with the responsibility of reviewing and sanctioning any action on pricing, investments and service quality. An appropriate balance is required between independence and accountability for the economic oversight entity as well as for the ANSP that it would regulate. In order to hold the regulating entity accountable, the government would need to give it clear objectives, preferably through statute, coupled with sufficient operating autonomy. Without such a balance, there will be a risk to regulatory commitment and credibility.

1.49 A State can also use a third-party advisory commission as a less formal tool to help perform its economic oversight function. The advisory commission is often considered appropriate when parties concerned do not form cohesive groups and thus have little or no means by which to organize for class action. The advisory commission might be composed of air carriers, general aviation, the military, representatives of end-users, and other principal parties concerned. A strong advisory commission would be equipped to engage in meaningful dialogue with the ANSP management on an ongoing basis and to review specific pricing, investments and service levels proposals.

1.50 Another important aspect to be considered is the possible need for additional resources to perform an economic oversight function. Some States may lack the capacity to adequately fulfil their economic oversight responsibilities, given competing priorities on safety, security, environment and liberalization of air transport. For those States, the adoption of a region-wide regulatory framework could be a useful option to pull their resources together in performing their economic oversight function.

## DISPUTE RESOLUTION

1.51 If a State defines an acceptable standard of behaviour, or if there is a contract between an ANSP and its users, arbitration or a dispute resolution mechanism could come into play when the provider and the users are unable to agree about their application in practice. It might be necessary to specify “triggers” for initiating arbitration and probably also criteria for settling disputes. The main advantage of such arbitration is that it would pressure the parties to reach and adhere to commercial agreements and in doing so would help to reinforce any underlying countervailing market power that the users may possess. However, the success of arbitration is likely to depend, *inter alia*, on the market power of the ANSP, particularly if it is the only “regulatory” mechanism available. It may also give rise to gaming behaviours by the parties, trading off a potential arbitration outcome against a negotiated agreement.

1.52 The involvement of autonomous entities in the management of air navigation services, as well as the growth of new types of aircraft operators, has brought about business practices and new market forces that can potentially result in new and different kinds of disputes that will need to be resolved before they enter the international arena. Economic oversight should provide for equitable, transparent, expeditious and effective dispute settlement mechanisms that build confidence between ANSPs and their users. Its purpose is to instil trust between parties where market forces do not provide for resolution of disputes.

1.53 No single mechanism can meet all needs and circumstances. In general, the procedures for settling a dispute between parties to an agreement may be carried out in two stages: a) consultations between the parties; and/or b) at the request of either party, the submission of the dispute to an arbitration tribunal for a decision. Usually, decisions reached under this latter stage of the mechanism are binding and both parties have the obligation to enforce the decision.

1.54 In addition to administrative and judicial proceedings, a State may consider a “first-resort” mechanism, which could provide for an intermediate level between the two stages of consultation and arbitration. This intermediate level calls for either an independent mediator or an independent dispute settlement panel to be used for the fact-finding investigation, including determination of the substance of the dispute or for providing a recommendation to remedy the dispute. It is based on clear time frames, implementation arrangements, interim measures and provision for third-party involvement.

1.55 An independent tribunal could be established where users could appeal if they had reason to believe they were being subject to abuse of dominant position or other unfair practices, although the need to avoid tactical use of such a mechanism with vexatious claims would need to be considered. This body could also handle appeals lodged with respect to complaints about non-compliance with the required principles for establishing charges. The mechanism should not affect the right of the parties to have access to other dispute resolution mechanisms, including those under general competition laws, nor does it preclude the implementation of the formal arbitration process in an agreement.

1.56 Third-party protection could also be ensured through the use of a less costly mechanism, such as an ombudsman. Note should be taken, however, that while the role of an ombudsman is to provide a neutral forum, an ombudsman ultimately has no enforcement power.

1.57 In addition, with respect to complaints relating to decisions taken by the regulator (such as an economic oversight entity), the right of appeal to a higher tribunal should be available. A compliance and enforcement regime providing for the creation of an administrative monetary penalty system, with appeals to an independent appeal tribunal, could be envisaged. It has to be recognized, however, that while an effective enforcement mechanism is a point of critical importance, it could be very demanding in terms of resources for many States.

## PART D — CONSULTATION WITH USERS

### NATURE OF CONSULTATION

1.58 Good relations between regulators, ANSPs and users are important for the sound development of air transport. Consultation and cooperation lead to increased mutual understanding between ANSPs and users, thereby improving efficiency and cost-effectiveness in the provision and operation of air navigation services with all the parties striving to move in the same direction. Consultation with users covers all aspects referred to in Doc 9082, namely, changes in charging systems or levels of charges, air navigation services planning (capacity development and investment plans), performance management, service quality and pre-funding of projects.

1.59 The key purpose of consultation with users is to ensure that the needs and wishes of users are considered in the context of the ANSP's plans. Effective consultation will help both to prioritize investments and to ensure that adequate capacity and services will be provided to meet the demand of current and future users.

1.60 Consultation with users may provide useful comments and suggestions for improvements in the management of the charging system and lower costs for both ANSPs and users. Consultation might also reveal aspects of the proposed charges that may inadvertently discriminate unfairly against certain user groups. Through consultation, users become aware of the financial implications in terms of the charges that they would have to pay.

1.61 Successful consultation depends on the goodwill and constructive engagement of all the parties involved. However, there is a wide variation between ANSPs in the degree of consultation and users' involvement. While some ANSPs have established cooperative arrangements such as service level agreements (i.e. defining the level of service provided and the rules that govern the ANSP/user relationship on the agreed services), some other ANSPs around the world do not maintain a proper and regular consultation process or do not consult users at all. In some cases, even where a consultation process has been established, there is limited engagement by the ANSP and/or the users in the process, which illustrates the importance of all sides participating in a meaningful way in order to ensure that the process delivers an optimal outcome.

### THE CONSULTATION PROCESS

1.62 As recommended in ICAO's policies on charges in Doc 9082 (Section I, paragraph 13), States should ensure, within their economic oversight responsibilities, that all the users concerned are properly consulted on issues that could materially affect them. Specific procedures for effective consultation should be determined on a case-by-case basis, taking into account the form of economic oversight adopted by the State and the size and scale of the ANSP's activities.

1.63 Where there are no cooperative arrangements in place that are acceptable to all parties, States are encouraged to ensure that their ANSPs establish a clearly defined, regular consultation process with users (Doc 9082, Section I, paragraph 21). The consultation process could be maintained even in times where no changes in charges, capacity development or investments are being contemplated by an ANSP.

1.64 In general, consultation starts with advance notice of proposals. When a revision of existing charges or the imposition of new charges is contemplated by an ANSP or another competent entity, it is recommended that appropriate notice should normally be given to users, either directly or through their representative organizations, at least four months in advance, in accordance with the rules and regulations applicable in each State (Doc 9082, Section I, paragraph 21 i)).

1.65 Consultation documents should make clear the nature of the proposals, the parties most likely to be affected, the specific questions on which feedback is requested, and the time schedule for responses (Doc 9082,

Section I, paragraph 21 iv)). In any revision of charges or imposition of new charges, the users should be provided with transparent and appropriate financial, operational and other relevant information to allow them to make informed comments (Doc 9082, Section I, paragraph 21 ii)). Summaries of the main revenue and expense items as well as other financial data described in Chapter 4, Part A, illustrate, by way of examples, the type of information referred to.

1.66 All interested parties should be given the opportunity to present their views on the proposals (Doc 9082, Section I, paragraph 21 iv)). The written submissions by users or their representative organizations and any feedback obtained through associated consultative discussions should be considered, as far as possible, before reaching a decision. The best outcome from consultation would be consensus, and reasonable measures should be taken to achieve this, although it may not be possible, or even desirable, to reach consensus in each situation.

1.67 It is important to note that the party being consulted (users) has an equal responsibility as the party consulting (ANSP) to actively engage in the consultation process. For example, concerning capacity development and investment plans, the attention of users, particularly air carriers, should be drawn to their responsibility to provide advance planning data to individual ANSPs on a five- to ten-year forecast basis relating to future types, characteristics and number of aircraft expected to be used, the anticipated growth of aircraft movements, and other relevant matters (Doc 9082, Section I, paragraph 19).

1.68 Both ANSPs and users are to provide sufficient information to each other for meaningful consultations, while market-sensitive data should be protected properly. Also, the detail and amount of information to be provided would depend on the size of the ANSP and the nature of the proposals being undertaken. For example, for small ANSPs, a process such as that described in paragraph 1.69 below would be too cumbersome and expensive, and thus a less elaborate process and related information may be needed.

1.69 Decision documents should provide appropriate rationale for the decision taken. Especially where users' views have not been accepted, justification for the decision is necessary. With respect to the revision of charges or imposition of new charges, it is recommended again that reasonable advance notice of the final decision, of at least one month, be given to the users. This one-month period does not need to be in addition to the four months' advance notice period referred to in paragraph 1.64 above. Advance notice could enable the users to make any necessary arrangements for the additional costs involved and make adjustments to their fares, if needed. It also allows the users some time to invoke a dispute resolution mechanism, where available, prior to the revised or new charges taking effect.

#### PRE-FUNDING OF PROJECTS THROUGH CHARGES

1.70 Specific considerations for consultations related to the use of pre-funding charges for project financing are addressed in Appendix 4, paragraph 6.

#### DISPUTE RESOLUTION

1.71 Through consultation, wherever possible, a revision of existing charges or the imposition of new charges should be made in agreement between ANSPs and users. Failing such agreement, paragraph 18 of Section I of Doc 9082 acknowledges that the ANSP would continue to be free to impose the charges proposed, subject to a right of appeal to, or other determination by, a body independent of the airport, where available. The appeal process should be consistent with the form of economic oversight adopted in the State concerned. If there is not an appeal mechanism in place, it is even more important that the ANSP and users make every effort to reach an agreement on any changes in charging systems or levels of charges before they are introduced.

1.72 With the growth in the number of instances where provision of air navigation services is independent from direct government control, there may be a need for a neutral party at the national level to pre-empt and resolve disputes

before they enter the international arena (a “first-resort” mechanism). Balancing the interests of both ANSPs and users would be more effectively achieved through preventive measures including requirements for prior consultation and expeditious national treatment of complaints.

1.73 Paragraph 22 of Section I of Doc 9082 recommends that the first-resort mechanism should be flexible, with focus on conciliation or mediation but with the possibility of arbitration if the State concerned so decides. Specific procedures for consultations of this kind will have to be adapted to the diversity in the administrative, financial and legal frameworks within which ANSPs function. The procedures with regard to individual ANSPs will also need to take into account the size and scale of the ANSP’s activities. The mechanism, if required, should be established in a manner consistent with the form of economic oversight adopted.

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## CHAPTER 2

### Ownership, Control and Governance of Air Navigation Services Providers

This chapter addresses various aspects of ownership and control structures of air navigation services, which have implications for their governance and performance.

Part A provides some basic comments essential for understanding the guidance in this chapter.

Part B describes the organizational structures for the provision of air navigation services by government-owned and controlled entities.

Part C addresses the issue of privatization of, and private participation in, air navigation services providers.

Part D describes the organizational characteristics of air navigation services provision.

Part E stresses the need to apply best practices so as to ensure good corporate governance of air navigation services providers.

Part F refers to the provision of certain air navigation services by third-party operators.

#### PART A — BASIC FACTORS

2.1 This chapter focuses on ownership and control structures of ANSPs, which have implications for their governance and performance. While ANSPs involving private interests, in whole or in part, remain limited to a handful of examples, many States have established autonomous entities by separating the provision of air navigation services from the executive arm of the State and by allowing them to operate on a commercial basis. There are also several cases where the provision of air navigation services is delegated to a multinational entity, as described in Chapter 3. Considering the diverse circumstances involved, it is not the intent of this manual to recommend one organizational format over another, but rather to provide guidance to States by describing relevant aspects of each format.

2.2 The decisions made by individual States as to the organizational format at the national level under which their ANSPs operate will depend on the situation in the State concerned, the organization of their airspace and whether provision of services is delegated to other States. Government policy, as well as the experiences of other States, may also affect decisions on organizational format. The most appropriate choice can be determined in the context of the following factors:

- a) the legal, institutional and governance frameworks of the government and system of administration in the State;

- b) the cost and source of funds required to meet infrastructure needs and to secure the continuity of operations taking into account traffic forecasts and risks (for example, contingency planning to deal with the potential impact of reductions in revenue that could occur due to decreases in air traffic);
- c) market conditions including degrees of competition among ANSPs and users;
- d) the requirements of the aviation industry; and
- e) the contribution of civil aviation to the State's economic and social objectives and the extent to which civil aviation has been developed to meet those needs.

2.3 The process of transition from one format to another will also depend on the circumstances and practices of each State but, in general, the transitional issues that may arise include:

- a) identification, valuation and transfer of assets;
- b) determination of the initial financial structure, staffing and conditions of employment including pension arrangements and maintenance of good labour relations during the transition period;
- c) establishment of good corporate governance;
- d) establishment of formal relationships between the ANSP and the government, including the military;
- e) establishment of formal relationships between the ANSP and the aviation safety and security organization(s);
- f) establishment of an economic oversight framework; and
- g) establishment of appropriate performance management systems and a consultation mechanism with users and other interested parties.

2.4 Regardless of the organizational format, according to Article 28 of the Chicago Convention, it is the State that is ultimately responsible for the provision and operation of air navigation facilities and services. ICAO's policies on charges in Doc 9082 emphasize that the State is ultimately responsible for safety, security and, in view of the potential abuse of dominant position by ANSPs, economic oversight of their operations (Doc 9082, Section I, paragraph 6). It is further stressed that whenever an autonomous entity is established, whether by a government or by private interests, the State should ensure that all relevant obligations of the State specified in the Chicago Convention, its Annexes and in air services agreements are complied with and that ICAO's policies and practices are observed (Doc 9082, Section I, paragraph 7).

2.5 It is noteworthy that the basic characteristics of air navigation services operations differ fundamentally from those of airport operations in several respects. First, unlike airports, air navigation facilities and services provided by a State<sup>1</sup> extend over the whole territory of the State concerned, or even beyond, and are frequently also dependent on facilities and services provided in other States. Second, air navigation services have national defence and external relations implications with respect to the sovereignty of the airspace in each State. Furthermore, in most States all or most of the air navigation services are not provided by a single entity (see Part D — Organizational characteristics of air navigation services provision, paragraphs 2.29 to 2.32, and Part F — Provision of certain air navigation services by third-party operators, paragraphs 2.37 to 2.40). Another major difference is the limited potential for revenues from non-

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1. In this chapter, reference is frequently made to a "State" as the entity providing the air navigation services or participating in various related international or multinational activities. In many instances, though, these services are not provided by the State itself but by a separate entity to which the State has delegated that function.



aeronautical activities to contribute to the financial situation of ANSPs. While revenues from non-aeronautical activities for airports around the world represent on average almost half of their total revenues, according to ICAO studies the average is around three per cent for providers of air navigation services.

## PART B — GOVERNMENT OWNERSHIP AND CONTROL

### GENERAL

2.6 Government or public ownership may take the form of direct control and management, for example, through a civil aviation administration or through another ministerial department including military. Government control can also be exerted through bodies benefiting from a certain degree of autonomy, such as a government body with financial and operational autonomy, an autonomous corporation established under the provisions of a special statute (a statutory body), or a company established under company law.

### GOVERNMENT DEPARTMENT

2.7 The historical organizational format of the ANSP is a fully integrated component of the State's bureaucracy, where the operation and provision of air navigation services represent only one of many functions performed by a government entity. Generally, this organizational format is characterized by the following features:

- a) the head of an air navigation services department reports directly to the executive level of government;
- b) as an organization within government it is funded by the government, sometimes from general taxation. User charges levied for air navigation services can be retained either by the government for general purposes or by the organization; and
- c) the organization may not be subject to taxes as paid by private business.

Another feature that may be relevant is that the organization provides all types of air navigation services and may also provide related services such as search and rescue coordination. It is also normally responsible for the safety regulation of the aviation industry and does not have a formal agreement regarding the provision of services to military aircraft.

2.8 When a government plays both the role of regulator (i.e. performing its economic oversight function) and service provider, consideration needs to be given to a clear separation of the regulatory and operational functions, with roles and powers clearly defined for each function as recommended in ICAO's policies on charges in Doc 9082, Section I, paragraph 12. This is because too close a relationship between the regulator and the service provider can result in conflicts of interest and undermine public confidence and trust in the adequacy of the system, and because overlaps in the regulatory and operational functions may lead to diffuse accountability relationships within the entity. Separation of functions enhances transparency in the decision-making process and makes clear the lines of accountability and the authority of one branch to monitor the activities of the other.

2.9 The internal separation process of the two functions involves delegation of responsibilities for management and finance, giving much greater autonomy to an air navigation services department within the entity. In general, the head of the air navigation services department may have considerable authority in decisions pertaining to the daily operations for the provision of air navigation services, including personnel management, and the authority to make purchases of supplies and arrange for any services required for that purpose. Decisions involving, for example, major purchases or investments in facilities and equipment would normally be subject to the government's approval process and treasury rules and may compete with other claims for government funds.

2.10 If the government accounting system is inadequate to provide the necessary accounting information, separate accounts following commercial accounting standards and practices will be necessary. The format of air navigation services accounts and their possible itemization is addressed in Chapter 5.

## GOVERNMENT-OWNED AUTONOMOUS ENTITIES

### Definition

2.11 An autonomous air navigation services entity (hereafter called autonomous ANSP) is essentially an independent entity established for the purpose of operating and managing air navigation services, which is empowered to manage and use the revenues it generates to cover its costs. Creating legal entities outside the government is usually called “corporatization”. In some circumstances, a single autonomous entity may operate both airports and air navigation services. The autonomous ANSP may also be responsible for the safety regulation of its services (and for aviation safety in general).

2.12 The government-owned autonomous ANSP normally has the following key features:

- a) the government, as owner of the organization, is responsible for setting the autonomous ANSP’s objectives and monitoring its performance;
- b) a board of directors appointed by the government oversees the activities of the ANSP;
- c) the autonomous ANSP is self-financing, charges for its services, uses revenues from these charges to fund operating expenses and to finance capital expenditure, applies commercial accounting standards and practices, and may be required to achieve a financial return; and
- d) the autonomous ANSP may be subject to normal business taxes, and the employees are not likely to be civil servants and may therefore not have public sector pay and conditions of service.

2.13 The extent to which the government-owned autonomous ANSP can function like a private sector company depends on the degree of autonomy conferred to the entity. On the one hand, the autonomous ANSP can still be subject to government’s directions or pressure to take account of wider public issues, as well as its approval process for major capital investment. On the other hand, the autonomous ANSP can be allowed to commercialize some of its activities. Commercialization refers to an approach to management of facilities and services in which business principles are applied or emphasis is placed on development of commercial activities.

### Development and advantages

2.14 In the past two decades, the number of autonomous ANSPs has grown in all regions. While the establishment of an autonomous ANSP would not necessarily result in an unprofitable ANSP becoming profitable, experience gained worldwide from these developments indicates that the autonomous ANSPs may have the following advantages:

- a) ensure revenues generated through the use of air navigation resources are transparently reinvested in operating and developing the facilities;
- b) ensure that the users of air navigation services contribute directly to the upkeep and development of the facilities that they use (user pays principle);

- c) reduce the financing burden on governments;
- d) encourage the growth of a business culture (for example, closer control over revenues and expenses, quicker decisions and more responsive actions, and good governance), thereby increasing efficiency and improving the quality of services;
- e) enable access to private capital markets, which may become possible only with a change in organizational format because of public sector borrowing restrictions; and
- f) establish a clear separation of the regulatory and operational functions.

In light of these advantages, ICAO's policies on charges in Doc 9082, Section I, paragraph 5, recommend that, where it is economically viable and in the best interest of ANSPs and users, States consider establishing autonomous entities to operate their air navigation services.

2.15 In certain circumstances, assigning the operation and provision of air navigation services to an autonomous entity may not be a good approach to improving operating efficiency. For example, in a small State with limited aviation activity and where the operation of air navigation services is the dominant function of the civil aviation administration, little, if anything, may be gained by separating the air navigation services operation from the civil aviation administration and assigning it to an autonomous entity established exclusively for that purpose. In fact, costly duplication and rivalry between the two bodies could result in each of the two bodies carrying out functions previously performed more efficiently and at a lower cost by the civil aviation administration. This applies particularly to administrative costs and overheads.

### **Responsibility and financial independence**

2.16 Before an autonomous ANSP becomes operational, its charter, or a document of a similar character, needs to be drawn up. The charter clearly describes the scope of the services and areas for which the autonomous ANSP is to be responsible. Because of different national practices, these tend to differ between ANSPs (see paragraphs 2.29 to 2.32).

2.17 Where air navigation services facilities already exist, the charter makes clear whether or not they are to become the property of the entity and, if so, what value is to be placed on these assets and whether or not a corresponding debt is to be charged to the entity. The charter also states how the autonomous ANSP is to be governed (see Part E — Corporate governance, paragraphs 2.33 to 2.36).

2.18 On the financial side, the charter needs to make clear that the autonomous ANSP will be empowered to retain the revenues it generates for the purpose of defraying air navigation services expenses and building up possible capital reserves. This means that the civil aviation administration would no longer have the financial benefit of the common use of premises and equipment, the costs of which were, at least in part, financed by revenues from the provision of air navigation services. Where it is foreseen to be unlikely that the autonomous ANSP will be profitable in the short term, the charter may need to specify how shortfalls in revenues are to be covered (such as through direct loans from and loan guarantees by the government), preferably by the drawing up of an annual financial plan to be agreed by the government (in this context, reference should also be made to the guidance material in Chapter 4).

2.19 If ANSPs lack the necessary financial autonomy, all the revenues they generate from charges (and commercial activities, if any) are deposited direct to the account of the national treasury, a ministry or the civil aviation administration, resulting in the ANSPs then having to apply for all funds required to cover air navigation services expenses. The ANSPs concerned nevertheless remain responsible for the levying and collection of charges on air traffic as well as for the promotion and development of commercial activities. However, such kinds of arrangements tend to significantly reduce the incentive of an ANSP management to develop new revenue sources or increase income from existing sources because it cannot make use of revenues it generates to defray expenses for which it is held responsible.

## AUTONOMOUS CIVIL AVIATION AUTHORITY

2.20 Even in circumstances where the establishment of an autonomous ANSP may not be desirable (see paragraph 2.15), it may be often beneficial to establish an autonomous civil aviation authority to take over the functions, including the operation of air navigation services, previously performed by a civil aviation administration. The establishment of an autonomous civil aviation authority could permit the State to obtain benefits such as increased efficiency and a significant reduction of the contribution from public funds previously required for the civil aviation administration, which the civil aviation authority would replace.

2.21 As in the case of autonomous ANSPs, granting financial independence to the civil aviation authority would usually be an important prerequisite for realizing such benefits. However, experience in some States has shown that achieving complete financial autonomy remains a distant goal and that continuation of government financial support through grants sometimes remains necessary, at least in the early stages.

## PART C — PRIVATE OWNERSHIP AND PARTICIPATION/INVOLVEMENT

2.22 In recent years, many government-owned autonomous ANSPs have been commercialized and are expected to operate as a financially independent business entity and to be as competitive, efficient and cost-effective as any other commercial business. There are, however, few cases where the ownership of such commercialized ANSPs has been transferred partly or fully to the private sector.

### MOTIVATIONS

2.23 The opening of the door to private interests may be driven by diverse motives, ranging from improving operational efficiency and reducing costs to a more pragmatic desire to relieve the State of the responsibility for financing infrastructure development. The government may also expect to gain a one-time cash windfall from the sale of shares, as well as regular tax revenue from privatized ANSPs. Public financing of ANSPs is becoming more difficult because of budgetary constraints or other national spending priorities and pressure to move away from non-core public utilities. Governments also confront the growing expectations of the users in regard to the quality of service of ANSPs.

### PRIVATIZATION

2.24 Privatization is the term most commonly used in connection with the changes taking place in the ownership and control of ANSPs. While the term privatization is often loosely interpreted as any move away from government ownership and control of ANSPs, ICAO's policies on charges define privatization as a transfer of full or majority ownership of air navigation facilities and services to the private sector. Privatization can be achieved through outright sale of shares to a strategic partner or an initial public offer (IPO) on the stock exchange. In the event that a State would wish to regain full or majority ownership, it would have to buy back the shares, with the risk that their price may be higher than the original sale price.

2.25 Key features of a privatized ANSP are likely to include the following:

- a) a board of directors for the corporation is appointed according to its charter;
- b) the privatized ANSP is self-financing, charges for its services, obtains funds from the capital market, applies commercial accounting standards and practices, and needs to achieve a financial return as a commercial entity; and

c) the privatized ANSP is subject to normal business taxes.

2.26 While the privatized ANSP charges for its services and uses revenues from these charges to fund operating expenses and to finance capital expenditure, some prescribed operations (e.g. military) may be exempted from charges, and the costs for these prescribed services may be borne by government. Arrangements for the coordination of civil/military traffic, including common use of facilities and services, and associated financial issues would need to be formalized and agreed with the ministries concerned.

2.27 Privatization of an ANSP requires careful consideration of a number of factors listed in paragraph 2.2. These include an assessment of market conditions and the degree of competition to minimize the risk of ANSPs, on the one hand, engaging in anti-competitive practices or abusing their dominant position or, on the other hand, the possibility of being subject to market pressure by users. In addition, the objectives of change of ownership structures may need to be clearly defined through appropriate consultations with existing ANSP management, users and other interested parties. It is also noted that privatization should not in any way diminish the State's requirement to fulfil its international obligations, notably those contained in the Chicago Convention, its Annexes and in air services agreements, and to observe ICAO's policies on charges in Doc 9082.

#### PRIVATE PARTICIPATION AND PRIVATE INVOLVEMENT

2.28 Private participation and private involvement, which are synonyms, mean that the private sector has a role in the ownership, control and/or management of an ANSP while majority or ultimate ownership remains with the government. To date private participation/involvement in ANSPs is minimal, and there have been only a few cases of a public-private partnership (PPP). The advantage of a PPP is that the management skills and financial acumen of private businesses could create better value for money for taxpayers when proper cooperative arrangements between the public and private sectors are used.

#### PART D — ORGANIZATIONAL CHARACTERISTICS OF AIR NAVIGATION SERVICES PROVISION

2.29 Air navigation services have traditionally been classified into the following five major categories: air traffic management (ATM); communications, navigation and surveillance systems (CNS); meteorological services for air navigation (MET); search and rescue (SAR); and aeronautical information services (AIS),<sup>2</sup> details of which are described in Chapter 5. In most States, a single entity does not provide all or most of such air navigation services. Instead, several entities may be involved.

2.30 ATM is often provided by the civil aviation administration, although in a growing number of States autonomous entities have been assigned this function. In such instances, the same entity may also be responsible for providing certain CNS services. MET is usually provided by a separate meteorological entity, which in many States reports to another branch of government than does the civil aviation administration or the telecommunication services branch. While aeronautical SAR activities are often coordinated by the civil aviation administration, in most States the aircraft, vehicles, vessels and personnel utilized in the actual SAR operations are provided by the military, civil defence or other similar forces. AIS, on the other hand, tends to be provided by the civil aviation administration, although certain services may be provided by third parties on a commercial basis.

2.31 From an organizational viewpoint, it is important that where air navigation services costs are to be recovered, the State concerned should assign to one entity the duty for ensuring that the costs attributable to the provision of air navigation services by the different entities in the State all be included in the cost basis for any cost-

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2. Under transition to aeronautical information management (AIM).

recovery mechanism. The absence of such an approach has had the effect of, for example, MET costs not being taken into account at all in some instances, thereby resulting in the States concerned not even partially recovering these costs. Also of importance is that the costs attributable to the provision of air navigation services be accurately and properly determined and that transparency be maintained in financial presentations.

2.32 As to the selection of the entity to collate the costs of the different air navigation services, the entity providing ATM does, apart from providing a major air navigation service, also possess the information required to identify the flights to be charged. It would, therefore, in most circumstances be best for that entity or branch of government to be assigned the collating function. With that would go the responsibility of ensuring that the revenues from charges be shared among the different entities providing air navigation services. Such sharing of revenues among the different entities concerned would normally be in proportion to the costs incurred by each in providing air navigation services. In the large majority of States this coordinating function would, in light of the above, best be assigned to the civil aviation administration.

## PART E — CORPORATE GOVERNANCE

2.33 The change of ownership, control and/or management of an ANSP can have implications on its governance and performance. A number of recent studies and experiences indicate that commercialization of ANSPs have generally improved cost control, productivity through modernization, and financial viability, without compromising safety. The studies also indicate that commercialized ANSPs can take timely decisions and are more responsive to users' needs. In addition, there is a common observation among the studies that better performance is achieved as a result of good corporate governance. The term corporate governance refers to overseeing the running of a company or an entity by its management and its accountability to shareholders and other interested parties.

2.34 Corporate governance becomes even more important where the control and management of an ANSP is separated from the ownership and in situations where an ANSP is more dependent on external capital for the financing of its activities and investments. For example, a sound corporate governance system could provide effective assurance for all interested parties, including shareholders and creditors, that management acts in the best interest of the ANSP and uses funds in an efficient way, thereby making it easier to raise capital. Conversely, without good corporate governance, management may seek to maximize its own interests at the expense of those of other interested parties, and there may be less transparency in the use of available funds.

2.35 Corporate governance principles and codes have been developed worldwide. Some of the most influential guidelines are the *OECD Principles of Corporate Governance* (2004) by the Organization for Economic Co-operation and Development. The application of the OECD principles and the results of recent studies on the commercialization and privatization of ANSPs may serve as the basis for the establishment of the best practices needed to ensure good corporate governance of commercialized ANSPs. These include:

- a) clearly defined objectives and responsibilities as set out in a legislation or licence;
- b) an equitable treatment of shareholders and protection of shareholders' rights (where all or a part of the capital is held by private shareholders);
- c) an independent, professional supervisory board to provide overall direction to the management;
- d) empowered and accountable management to make timely decisions regarding finances, operations, technology, human resources, investments and services in line with corporate objectives and board directions;
- e) good relationship with all interested parties through consultation; and
- f) timely and accurate disclosure of information to enhance transparency.

2.36 The best practice of good corporate governance could equally apply to ANSPs fully owned and directly controlled by government because the performance of ANSPs is more related to good governance than to the ownership and control structure. In many instances, however, a State authority does have inherent limitations that must be overcome (for example, cumbersome approval and lengthy procurement processes, and competition with other State priorities for investments).

#### **PART F — PROVISION OF CERTAIN AIR NAVIGATION SERVICES BY THIRD-PARTY OPERATORS**

2.37 As noted in paragraph 2.4 above, States are responsible for ensuring compliance with the provisions of the Chicago Convention, its Annexes, and Standards and Recommended Practices (SARPs). With regard to airports and air navigation services, they alone remain responsible for the commitments they have assumed under Article 28 of the Convention, regardless of what entity or entities operate the airports or air navigation services concerned.

2.38 Over the past two decades, States have been assigning the operation of airports and air navigation services to autonomous, commercialized and even privatized entities that may have less awareness and knowledge of States' obligations under the Chicago Convention. Also, States are increasingly using multinational facilities and services to meet their commitments. In this respect, it should be noted that States are ultimately responsible for safety, security and economic oversight of commercialized/privatized airports and ANSPs (Doc 9082, Section I, paragraph 6).

2.39 The fundamental challenge is to ensure that commercialized/privatized ANSPs perform in line with recognized safety and performance requirements and that, where ANSPs outsource or subcontract certain services (e.g. satellite communication services) to third-party operators, these also deliver the agreed services as per recognized safety and performance requirements. The provision of air-ground satellite communication services by third-party operators presents a unique set of challenges, in particular with respect to the availability and continuity of such services:

- a) The supply chain for satellite communication services involves numerous providers (e.g. satellite operator, ground station operator, network providers). A State or an ANSP would typically enter into an agreement with one entity who acts as a re-seller of all services in the supply chain. The loss of one entity in the supply chain can disable the service.
- b) The volume of communications for air traffic services (ATS) is typically low compared to other communications traffic. In difficult economic times, a communications operator may consider the ATS business no longer viable and discontinue this activity to focus on the more profitable sectors of the communications business. This raises business continuity issues.
- c) Air-ground mobile satellite communication systems, being complex, use unique technology often custom-built by operators. These systems can therefore be difficult to maintain over the lifetime of the satellite service and may over time result in degraded service and restraints on expansion. In such situations, business continuity may again be jeopardized.
- d) States and ANSPs are also affected by the fact that the various air-ground satellite communication systems each use unique technology, which is not interoperable. Airspace users typically choose a system which meets their needs. Each system features different characteristics and hence service monitoring becomes more complex.

2.40 A service level agreement (SLA) template for possible use by States or ANSPs to ensure that third-party operators deliver the agreed services as per recognized safety and performance requirements is provided in Appendix 1.

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## CHAPTER 3

### International Cooperation

This chapter addresses the various forms of international cooperation existing in the air navigation services field.

Part A identifies the different forms of international cooperation.

Part B focuses on various aspects related to international operating agencies.

Part C deals with the scope, functions and financial aspects of joint charges collection agencies.

Part D discusses multinational facilities and services, including provisions to be addressed in an agreement covering their establishment.

Part E describes joint financing arrangements administered by ICAO.

Part F describes a practical case of political cooperation, the Single European Sky.

Part G considers organizational aspects in the context of major CNS/ATM components.

#### PART A — GENERAL

3.1 International cooperative ventures in the provision of air navigation services have normally proven to be highly cost-effective for provider States as well as users and in some instances constitute the only means for implementing costly facilities and services which offer capacity that exceeds the requirements of individual States. By cooperating in such facility or service provision, the States concerned are able to provide more efficient services and at lower cost than if they had to finance the facilities concerned themselves.

3.2 ICAO's policies on charges (Doc 9082, Section I, paragraph 8) encourage international cooperation through a regional approach in the provision and operation of air navigation services where this is beneficial for the providers and users concerned, and with a view to facilitating the efficient and cost-effective implementation of the ICAO *Global Air Traffic Management Operational Concept* (Doc 9854) on the basis of the guidance provided in the *Global Air Navigation Plan* (GANP, Doc 9750).

3.3 According to Assembly Resolution A37-15, Appendix W, States are expected to give consideration to cooperative efforts for introducing more efficient airspace management, in particular, in the upper airspace, taking into account the need for the cost-effective introduction and operation of communications, navigation and surveillance (CNS) and ATM systems. In this context Contracting States should consider, as necessary, establishing jointly a single air traffic services authority to be responsible for the provision of air traffic services within ATS airspace extending over the

territories of two or more States or over the high seas. Also, operating agencies are referred to in Assembly Resolutions A22-19 “Assistance and advice in the implementation of Regional Plans” and A16-10 “Economic, financial and joint support aspects of implementation”.

3.4 International cooperation may take different forms. In its simplest form a coordination and harmonization process is initiated as a subregional activity between a limited number of States. There are significant synergies to be created and savings to be made by coordinating the planning, implementation and operation of air navigation facilities and services across borders with neighbouring States. Examples of such subregional activities are Roberts FIR in Africa and Piarco FIR in the Eastern Caribbean. An example of a regional activity is the initiative to cooperate in search and rescue (SAR) services in Africa (see text box below). A more formal machinery for cooperation may be established as an international operating agency, a joint charges collection agency, a multinational facility/service, or an ICAO joint financing arrangement. These forms of cooperation are described in Parts B through E below.

#### **REGIONAL COOPERATION IN SEARCH AND RESCUE**

The concept of regionalized, cooperative service provision can, to a certain extent, compensate for the shortage of funds allocated to SAR systems in some States. Where there is a shortage of funds, the allocation of suitable local search units to life-saving tasks may not be possible. In such situations an infrastructure of trained personnel, appropriate accommodations, shared communication facilities and multilateral memoranda of agreement in place could facilitate search units volunteered from other places to be effectively and efficiently allocated by regional SAR coordinators. Such a base of human and material resources can be more easily established on a regional basis.

### **PART B — INTERNATIONAL OPERATING AGENCIES**

#### **SCOPE AND FUNCTIONS**

3.5 An international operating agency in this context is a separate entity assigned the task of providing air navigation services, principally route facilities and services, within a defined area on behalf of two or more sovereign States. The services they provide are usually in the categories of ATS (ATM), COM (CNS), SAR (essentially rescue coordinating centres) and AIS, but can extend to MET as well. These agencies are also responsible for the operation of charges collection systems for services provided.

3.6 Examples of international operating agencies are the Agence pour la Sécurité de la Navigation Aérienne en Afrique et à Madagascar (ASECNA) in Africa (which, in addition to air navigation services provision, participates in airport management), Corporación Centroamericana de Servicios de Navegación Aérea (COCESNA) in Central America, and the European Organisation for the Safety of Air Navigation (EUROCONTROL). A brief description of these three agencies follows.

**AGENCE POUR LA SÉCURITÉ DE LA NAVIGATION AÉRIENNE  
EN AFRIQUE ET À MADAGASCAR (ASECNA)**

ASECNA, a public entity with financial autonomy, founded in 1959, is operated by 18 States in Africa and France, which is also a member. Its mission, on their behalf, includes the provision and operation of air traffic control, meteorological services and communication facilities for en route and approach, in Member States, as well as aerodrome control and landing on the main airports listed in the Convention. The Agency may enter, under a separate individual contract, into agreement with each of these States for the management of its airports or the maintenance of any facility serving an aeronautical purpose. The Agency may also be authorized to establish special equipment programmes for any State, especially with regard to the operation of terminal nav aids, or any other tasks that could be entrusted to it.

The Agency is governed by a Ministerial Committee, composed of the ministers responsible for civil aviation in the signatory States, which defines general policy. It is administered by an Administrative Council, composed of one representative from each signatory State, assisted by a Director General. The Agency employs its own staff but it can also have staff from signatory States seconded to it. ASECNA headquarters are located in Dakar (Senegal).

In accordance with the provisions of Article 15 of the Chicago Convention, the Agency may not extend to any user, directly or indirectly, or in any form whatsoever, benefits not offered to other users availing themselves, under the same conditions, of the facilities under its management.

**Methods of financing**

The Agency is financed from its own operating income. It is authorized to levy charges to offset the financial obligations it assumes in the performance of the tasks entrusted to it and in return for services rendered to users. The Agency is also authorized to collect all income that the property under its management generates in the course of serving aeronautical purposes.

**ADVANTAGES**

3.7 Experience indicates that international operating agencies contribute, often significantly, to improved efficiency in the provision of facilities and services at a lower cost to both providers and users. Among the advantages offered are more efficient use of personnel, facilities and equipment, as well as savings in research and development, given the avoidance of duplication at the national level, and through achievement of economies of scale. This has special relevance for States with less advanced economies where trained personnel and financial resources are scarce and where aviation must compete with other sectors of the economy. Operating agencies levying route facility charges may usually be more successful in the collection of amounts due for overflights owing to the larger geographical areas usually covered by their activities. Moreover, since such agencies represent a number of States, they tend to be in a stronger negotiating position in their financial and commercial dealings and may therefore be able to secure more advantageous terms.

### **CORPORACIÓN CENTROAMERICANA DE SERVICIOS DE NAVEGACIÓN AÉREA (COCESNA)**

COCESNA, founded in February 1960, has six Member States, namely Belize, Costa Rica, El Salvador, Guatemala, Honduras and Nicaragua. The Corporation is an integrated, international, Central American autonomous organization.

According to its Charter, the Corporation has exclusive rights to provide air traffic services, aeronautical telecommunications and radio navigation aids for international civil aviation in the territories of the contracting parties. In practice, however, it provides services in the upper airspace (above flight level 200) and cooperates only partially with contracting governments in the provision of air traffic services in the lower airspace. It may also provide to other States, through agreements, the above-mentioned services and aids specified in the ICAO regional air navigation plan. Furthermore, it may also provide services and radio aids of the type mentioned above that are not specified in the ICAO regional plan within the territories of the contracting parties, by means of contracts with public or private entities.

#### **Methods of financing**

In addition to working capital, the contracting parties also agree to acquire, when necessary, and concede the use and possession of, at no cost to the Corporation, certain equipment listed in the Charter, as well as to provide the land on which the equipment is situated, as well as all other property or furnishings directly related to the discharge of its functions. In order to maintain financial equilibrium and provide for the development and expansion of its aeronautical services, the Corporation is authorized to levy charges on facility users. By this means COCESNA is at present wholly financed from its own operating income.

### **ESTABLISHING THE AGENCY**

3.8 The size and composition of an agency's membership, and hence its geographical scope of operation, will primarily depend on political, economic, demographic and geographic considerations. The scope of its activities will also be influenced by these factors and the extent to which new and improved facilities may be required in some States to serve present and future traffic.

### **ORGANIZATIONAL ARRANGEMENTS**

3.9 The circumstances that lead to the creation of an international operating agency, as well as many other factors, will influence its structure. Since these will differ significantly from case to case, it is not practicable to prescribe any specific pattern of organizational arrangements for such agencies in general. Certain basic common features, however, have normally emerged. For example, the overall policies governing the agency's functions, operations and financial affairs, as well as decisions on fundamental matters such as capital investments and the appointment of key staff, are likely to be the responsibility of a board of management composed of representatives of the Member States. Similarly, the chief executive will usually be responsible to the board, which is ultimately responsible for the general administration of the agency. From the outset, sound and well-defined financial and economic policies and practices need to be established relating to cost-recovery and financial control, including accounting and budgeting procedures. Recruitment of agency personnel will also require careful consideration. Reference should also be made to the text on agreement(s) between States and related contractual aspects in Part D of this chapter.

### **EUROPEAN ORGANISATION FOR THE SAFETY OF AIR NAVIGATION (EUROCONTROL)**

EUROCONTROL, which currently numbers 39 Member States and the European Community (September 2011), is a civil-military organisation committed to building, together with its partners, a Single European Sky (SES) that will deliver the air traffic management performance required for the twenty-first century and beyond.

EUROCONTROL develops, coordinates and plans for implementation of short-, medium- and long-term pan-European air traffic management strategies and their associated action plans in a collective effort involving national authorities, air navigation services providers, civil and military airspace users, airports, industry, professional organizations and relevant European institutions.

EUROCONTROL's core activities span the entire range of gate-to-gate air navigation service operations — from strategic and tactical flow management to controller training; from regional control of airspace to development of leading-edge, safety-proofed technologies and procedures, and the collection of air navigation charges.

EUROCONTROL is actively involved in the support and the implementation of the SES. In particular, EUROCONTROL has been designated to be the Performance Review Body as well as the Network Manager of the SES. It is also a founding member of the SESAR joint undertaking.

The governing bodies of the Organisation are the General Assembly (Commission during the transitional period), and the Council (Provisional Council during the transitional period) assisted by an Agency led by the Director General. The Commission and the Council are composed of Member States' representatives, with voting strength weighted according to each State's annual contribution to the Organisation.

EUROCONTROL recruits its own staff and owns the buildings and equipment that it requires to carry out its functions. To avoid duplication, use is also made of Member States' national technical services and installations where possible.

#### **Methods of financing**

The Organisation is financed by contributions from its Member States, except for the costs of its route charges collection scheme, which are recovered from airspace users through a supplement included in the charges.

#### **Collection of air navigation charges**

The EUROCONTROL Central Route Charges Office (CRCO) operates a harmonized, regional en-route charges system on behalf of the Member States. It also calculates, bills and collects terminal air navigation charges on the basis of bilateral agreements (ten were in operation at 1 January 2010). Finally, it collects air navigation charges for some non-Member States, under bilateral agreements. The system contributes to the funding of the European air traffic management (ATM) system while at the same time facilitating consultations with airspace users.

## PART C — JOINT CHARGES COLLECTION AGENCIES

### SCOPE AND FUNCTIONS

3.10 Another effective but less encompassing means for States to benefit from international cooperation in their provision of air navigation services is to participate in the operation of a charges collection agency. This is because States individually operating route facilities and charging for the services rendered will be involved in considerable accounting work and may also encounter collection difficulties where there is a substantial volume of overflying traffic. In such circumstances, a group of adjoining States might benefit significantly from the formation of a joint charges collection agency. This agency would collect route air navigation services charges on behalf of all of the participating States, including those that are overflown. Since the majority of aircraft are likely to land in the territory of at least one of the participating States, this would tend to ease the collection of air navigation services charges. The agency would then transfer to each participating State the charges revenue collected on its behalf. Added to each charge levied for each participating State would be a small fee or percentage to cover the State's share of the agency's costs. A joint charges collection agency should also benefit the aircraft operators because the collection costs attributable to each participating State should be lower than the State would otherwise have to face and need to recover from the users. There will also be noticeable savings for users in terms of administrative costs by receiving one invoice and in one currency compared to separate invoices from all the States involved. Another factor to be considered is the additional prospect of further economies resulting from the employment of better trained staff and improved procedures.

3.11 In view of their potential benefits, regional collection agencies may have particular appeal to States wishing to carry out technical functions (i.e. air traffic control) themselves. Such agencies are also much less complex to establish in terms of equipment, staff and other requirements than an international operating agency. As to personnel, the agency would be staffed by nationals from States contracting to the agency thus allowing them to develop new expertise and employment.

3.12 The need for States to recover the costs of their air navigation services has increased the emphasis on the efficient and effective billing and collection of air navigation services charges and has led to growing cooperation or joint ventures in their billing and collection efforts. Also, the increased usage of multinational facilities and services, notably ATM and CNS systems components, has given added impetus to joint efforts in cost-recovery. The employment of collection service agencies should be predicated on greater efficiency and lower cost than the collection of charges by individual States or ANSPs and that the cost of the collection services should be transparent to air navigation services users. It is recommended in ICAO's policies on charges (Doc 9082, Section I, paragraph 11) that States or their delegated service providers consider participating in joint charges collection when it is advantageous.

### FINANCING ASPECTS

3.13 The costs involved for participating States should be minimal. In fact, start-up funds required for the acquisition of premises and data-processing and other necessary equipment as well as pre-operational training, coordination and administration should normally not pose a major problem since they could be obtained through a financing institution, including commercial banks. The loan would be repaid over a few years, with instalments and interest being included in the agency cost element that would be added to and recovered through the route air navigation services charges billed and collected by the agency on behalf of Contracting States.

### IMPORTANCE OF STATES CONTROLLING COLLECTION OF THEIR CHARGES

3.14 Considering that route air navigation services charges are an essential source of revenue, it is important that the States concerned remain fully in control of the charges collection function and be in a position to immediately

dispose of the funds collected as they deem necessary. Such control is exercised not only when a State bills and collects the charges itself but also when it joins forces with other States to establish a collection agency serving all the participating States. Also to be considered is that some of the data collected are a valuable asset, to be treated as confidential and which only the States concerned should dispose of or have control over. Similarly, confidentiality should apply to amounts billed to individual operators or amounts outstanding.

3.15 The situation may arise where a State would consider contracting the collection of route charges to an agent or organization that is not government-controlled or operated. In such circumstances the State would need first to study carefully the terms under which the collection service is to be provided and to insist on identification and description of the costs of the services for which it is being charged. This would become even more relevant in cases where the collection scheme would be expanded to cover the collection of airport charges as well.

3.16 It is also advisable that the administrative fee for collection be included in the charges. The State should ensure that the contract with the agent stipulates that the agent's fees and costs not be deducted from the charge collected on behalf of the State but added to each charge levied on the users (aircraft operators concerned). This ensures that the State receives the revenue from charges collected without any deduction, instead of an amount reduced by the agent's fees and costs, which cannot be quantified in advance and which thereby impedes proper financial planning and budgeting by the State. The collecting agent or organization is reimbursed not by the State concerned, but by the users who are the essential beneficiaries of the air navigation services being charged for. This is also the practice recommended with regard to covering the costs of joint charges collection agencies and is in fact the practice applied in the case of existing State-owned and controlled joint collection activities. The costs attributable should be transparent.

#### OPTIONS FOR STATES

3.17 The most prominent examples of charges collection services are those operated by EUROCONTROL, the United Kingdom (for traffic in the North Atlantic) and the International Air Transport Association (IATA). EUROCONTROL operates a separately organized and financed collection agency or office, which serves both EUROCONTROL and other States. Similarly, the office in the United Kingdom that collects route charges levied by the United Kingdom has been contracted to collect the route charges levied by Denmark and Iceland for the services they provide on the North Atlantic under the ICAO Joint Financing Agreements, as well as the charges levied to recover the costs of the Height Monitoring System Programme operated jointly by six States and administered by ICAO. IATA collects en-route charges on behalf of around thirty, mainly developing, States through the IATA Enhancement and Financing Services.

3.18 In the case of the EUROCONTROL and United Kingdom schemes, on the basis of information identifying each flight and provided to the collection office by the Contracting State concerned, the collection office calculates the applicable charges levied by that State and bills the aircraft operators involved, collects the payments and then transfers the amounts received, less an administrative fee, to the Contracting State. Under the IATA scheme, the State (or the ANSP) calculates the en-route charges to be levied on each flight and forwards the information to IATA.

3.19 Two other international governmental operating agencies, ASECNA in Africa and COCESNA in Central America, levy and collect charges to recover the costs of the services they provide on behalf of their Member States. Unlike EUROCONTROL, however, they do not at present operate a charges collection service or office for their Member (or other) States for recovery of costs incurred by those States.

3.20 Without establishing or joining a charges collection service, States may still cooperate in the collection of air navigation services charges. An example of this is the International Organization Information Coordinating Council on Air Navigation Charges (IKSANO), which was established by air navigation services providers in eight States in the European Region in 2000. Other States have since joined IKSANO as members or participate with observer status. The objectives of this cooperation are:

- a) to protect the interests of the ANSPs and those users who duly pay the air navigation services charges levied; and
- b) through improved transparency, to draw attention to those users who fail to pay the charges due.

To achieve these objectives, Member States have pooled and expanded their databases to include a general database on aircraft operators, a specific database on debtors, and an archive of users that have gone bankrupt or ceased to operate for other reasons. IKSANO has advised the bad debtors, on behalf of all IKSANO Members, of the information it possesses and that their debt situation is now closely monitored in all the States concerned, which has made it more difficult for these users to change their routing to avoid payment of charges, or to overfly without payment of charges being secured in advance. Consequently, IKSANO can serve as a model for States seeking to acquire more data about the users of their air navigation services, including their financial situation and creditworthiness.

### CURRENCY ASPECTS

3.21 With a joint collection agency the funds collected can be transferred immediately to an account of the participating State, which it can hold either at a bank (or another similar financial institution) in its own territory or in any other State it may designate. This collection approach may also ease access by the participating State to convertible currency. Although it is recommended in Doc 9082, Section I, paragraph 24 i), that under normal circumstances user charges should be expressed and payable in the local currency of the State concerned, it is at the same time recognized that when route charges are billed on a regional basis (i.e. on behalf of several States or by a jointly operated agency), it may be advantageous to both users and providers to denominate and pay charges in a single convertible currency (Doc 9082, Section I, paragraph 24 iv), refers).

## PART D — MULTINATIONAL FACILITIES AND SERVICES

### BACKGROUND

3.22 Over the years, States have provided one another with various services such as air traffic control, communications and meteorological information. As regards charging for these services, States have usually not charged one another because the service flow has essentially been bilateral and generally considered to be in balance. Even where there were imbalances, the effort involved in determining the cost share to be charged to a neighbouring State was considered disproportionate to the costs involved. Instead, the provider State concerned would normally include that cost share in its cost base for route facility or other similar charges levied on the users (aircraft operators) flying within the airspace for which it is responsible.

3.23 This approach continues to be the general practice, but technological developments and the high levels of investments involved are bringing about a fundamental change reflected in a growing interest in and need for multinational facilities and services. These are being introduced where certain functions that States now carry out themselves can be provided more efficiently and at a lower cost by a single multinational unit operated by one or several States. Indeed, in certain situations, such as in the implementation of the communications, navigation and surveillance/air traffic management (CNS/ATM) systems, a multinational facility may largely be the only feasible alternative. With regard to multinational facilities and services in general, it remains important, however, to avoid the duplication of services and associated higher charges on users that would occur if a State participated in the provision of a multinational service while also duplicating that service at the national level.



## DEFINITION AND EXAMPLES

3.24 A multinational ICAO air navigation facility/service can be defined as a facility or service included in an ICAO regional air navigation plan for the purpose of serving international air navigation in airspace extending beyond the airspace serviced by a single State in accordance with that regional air navigation plan.

3.25 CNS/ATM systems or individual elements of these systems are probably the most significant multinational facilities or services the aviation community will have access to in the immediate future. This applies to both the service potential of the systems and the costs involved. The satellite-based ground-ground data and voice communications networks (VSAT) in Southern Africa, South America, Central and Eastern Caribbean and Eastern Europe are practical examples in that respect. Another example is the European Geostationary Navigation Overlay System (EGNOS), which is a satellite-based augmentation system (SBAS) for GNSS providing integrity and differential correction through geostationary satellites.

## EQUITY ASPECTS

3.26 Equity in the sharing of the costs of a multinational facility or service and in the recovery of the costs through user charges is important. A multinational facility operated by one State, but providing services used by two or more States at costs considerably over and above those that would be incurred solely to meet the requirements of the State operating that facility, may give rise to inequity in two areas if some form of cost sharing is not arranged. First, to the State providing and operating the facility, there is inequity from having to defray capital and running costs in excess of those that State would otherwise incur to meet its own requirements. Second, where that State would seek to recover its costs through user charges, users within the airspace for which that State is responsible would be asked to pay for costs of services not properly attributable to them. These users would, in effect, be required to subsidize services provided for other traffic by another State. This would be contrary to the principle expressed in ICAO's policies on charges (Doc 9082, Section III, paragraph 5) that the allocation of the costs of air navigation services among aeronautical users should be carried out in a manner equitable to all users.

3.27 It should be added that any State sharing in the costs of operating a multinational air navigation facility or service can include the relevant costs involved in the cost base for charges, such as air navigation services charges, that it levies on the final users of these services, namely the aircraft operators. The right of any Contracting State to proceed in this manner is confirmed in Article 15 of the Chicago Convention, with supporting policy guidance provided in ICAO's policies on charges in Doc 9082.

IMPLICATIONS FOR STATES AND  
ICAO TECHNICAL PLANNING BODIES

3.28 Because of the financial and managerial implications involved, the approach by technical planning bodies to the possible implementation of multinational facilities and services may be expected to differ from that applied to facilities or services to be implemented by a single State. Regarding the latter, technical planning bodies essentially focus on the technical aspects of the facilities and services the State concerned must implement to meet its obligations under the respective regional air navigation plan, to serve international civil traffic within the airspace for which it alone is responsible. Provided these facilities or services meet international standards, aspects relating to their financing and management remain an internal matter for that State.

3.29 A different approach is required in the case of multinational facilities and services because the primary reason for their establishment is to enable two or more States to carry out the services each has accepted responsibility for under the regional plan more efficiently and in a more cost-effective manner than each of them could achieve on their own. Consequently it is to be expected that the States concerned will wish to evaluate, at least in broad terms, the financial aspects of such facilities before agreeing to their incorporation in the regional plan and before committing themselves to using them.

3.30 For this reason, basic financial implications will need to be considered by technical planning groups at the stage in their deliberations when it is believed that the best or even only solution to a problem involves recommending the establishment of a multinational facility or service. To leave aside basic financial implications until after these groups have finalized their recommendations could lead to delays if one or more of the States expected to participate in the operation of the multinational facility concerned raises objections (for example, to the financial share it would be expected to pay for). Such delays in implementing technical solutions while new financial solutions acceptable to all the States involved are being sought could possibly compromise safety or efficiency in the area concerned.

#### GUIDANCE MATERIAL

3.31 General guidelines on the establishment and provision of a multinational ICAO air navigation facility/service were first developed and endorsed by the European Air Navigation Planning Group (EANPG) in 1986 and subsequently incorporated into the introduction to the European Regional Air Navigation Plan. The ICAO Council approved in 1995 that guidelines on multinational facilities and services should be incorporated into the introduction to all regional air navigation plans. The reason was that such guidelines were considered to be particularly relevant in the context of implementing various components of CNS/ATM systems. The guidelines have now also been included in the regional plans for the Middle East Region, Africa-Indian Ocean Region, Caribbean and South American Regions and Asia and Pacific Regions. (In the regional plans for the Caribbean and South American Regions, Asia and Pacific Regions and in the revised regional plan for the European Region, the guidelines have been incorporated into Volume II, FASID.)

3.32 The guidelines in the various regional air navigation plans are similar and include, after the introduction, a definition of a multinational facility or service and information concerning the development and processing of a proposal for a multinational facility or service. Following that are detailed guidelines on the financial, managerial and other contractual aspects that should normally be considered in respect of the operation of a potential multinational facility or service, including the basic provisions that would need to be considered for inclusion in an agreement between the States participating in the establishment and operation of a multinational facility or service. While reference should be made to the European Regional Air Navigation Plan, Volume II, FASID (Doc 7754, paragraphs 4 to 59 refer) for a complete description of these particular guidelines, relevant portions addressing issues related to the agreement, as well as an outline of the basic provisions involved, are reproduced in the following paragraphs.

#### AGREEMENT

3.33 The participation of States in the provision of a multinational facility/service is based on the assumption that any State, having supported and agreed to the implementation of such a facility/service and making use of it, should also shoulder its share of the costs involved. Having done this, participating States would need to formalize, in an agreement, the terms under which the multinational facility/service is to be provided. A primary aim of the agreement should be to ensure that the costs involved are shared among participating States in a fair and equitable manner.

3.34 An agreement covering the development, implementation, operation and maintenance of a multinational facility/service could either take the form of a formal international treaty or an "administrative agreement". Both forms establish an international obligation but a treaty requires the signature of the head of State or government and will also require the ratification or approval of the national legislative assembly, which, as a rule, is a time-consuming process. An "administrative agreement", on the other hand, is at a lower level of requirement in respect of formalities and procedures than a treaty, can be signed by a minister or director of civil aviation or some other authorized person, and can be concluded by an exchange of letters or notes.

3.35 It is recommended that, whenever possible, the agreement be established in the form of an "administrative agreement" rather than a formal international treaty because this would allow the agreement to come into force with

minimum delay and also permit greater flexibility in incorporating any subsequent modification required. It is recognized, however, that in some States constitutional or legal circumstances may require the approval of the legislative assembly for financial obligations to be accepted by the State, particularly if these are of a substantial magnitude and/or extend over a period of time. The approval of the legislative assembly may also be required for the actual provision of services. Whatever form is used, the agreement(s) should be structured to provide for easy subsequent amendments as developments may require. To this end, material of detail which is more likely to require modifications, and which will not affect the basic provisions of the agreement, should be contained in annexes or appendices.

3.36 It is further recommended that whenever possible only one general agreement (be that a treaty or an administrative agreement) be adopted covering all aspects of the facility/service concerned through all its phases. However, this may not always be possible. In certain circumstances it might be necessary or preferable to have more than one agreement differing in scope and content. In those circumstances the aim should be to cover as many aspects as possible in the administrative agreement and limit the use of the treaty to those aspects for which this form of agreement is essential for the States concerned. For example, one agreement might cover the activities, including pre-funding, to be undertaken by those States that accept the responsibility for bringing the facility/service up to operational status, with another agreement to be concluded between all the States (including the first group of States mentioned above), which would use or be served by the facility/service once it becomes operational. In such circumstances the former agreement would be important because the first group of States would have to ensure the implementation of the facility/service, since no inflow of revenues from charges on users would take place until the multinational facility/service becomes operational.

3.37 Another possible approach, if required by circumstances, would be for all the participating States to conclude an agreement covering, in general terms, their commitment to participate in the provision of the multinational facility/service, and then developing a separate agreement covering all aspects relating to the financing and operation of the multinational facility/service.

#### BASIC PROVISIONS

3.38 The various basic provisions that would normally have to be covered in an agreement for the provision and operation of a multinational facility/service include the following: objective of the agreement; obligations of States party to the agreement; definition and description of the facility/service; establishment and operation of the facility/service; legal responsibility; liability aspects; managerial aspects (including governing bodies and decision-making arrangements, organization, staffing and consultation); financial aspects (including cost determination, cost sharing, budgeting, authority to approve the budget, and financial auditing); taxation and other government levies; procedures for settlement of disputes; and accessions, withdrawals, amendments to and termination of the agreement.

3.39 With regard to the provision addressing the establishment and operation of the facility/service, it should be added that the agreement should specify the territorial scope and who will establish and operate the facility/service concerned, namely whether this is to be done by one State, two or more States, an existing international organization, an existing national or international agency, or a new agency to be established specifically for this purpose. The decision as to who should provide the facility/service could be influenced, in particular, by the anticipated capital investment and annual costs involved, as well as the extent to which the alternative providers (i.e. a participating State or States, international organization or agency) have been engaged in the function(s) concerned.

#### A GLOBAL APPROACH TO COST-RECOVERY OF REGIONAL MONITORING AGENCIES

3.40 A practical application of the multinational facility/service concept is the approach developed by ICAO for cost-recovery of the required regional monitoring agency (RMA) infrastructure for reduced vertical separation minima

(RVSM). In directives to ICAO's regional offices and the planning and implementation regional groups (PIRGs), it is recommended that RMAs be implemented as "multinational (ICAO) air navigation facilities/services" as and when appropriate, using the following steps:

- a) define, at a PIRG meeting, the RVSM monitoring function as a multinational (ICAO) air navigation facility/service in accordance with the existing guidelines on the establishment and provision of multinational ICAO air navigation facilities/services, included in the regional air navigation plan concerned;
- b) agree to a cost-sharing arrangement based on, for example, distance flown or number of flights within the airspace for which each of the respective States has assumed responsibility, it being understood that distance flown may offer more precision while allocation based on the number of flights is simpler to administer;
- c) find and assign a State or an existing organization or agency to establish and operate the RMA (the PIRG's responsibility);
- d) develop and establish an administrative agreement to regulate the establishment and operation of the RMA, including the cost-sharing arrangement and procedures for collection of contributions from the participating States (the PIRG, assisted by the ICAO regional office);
- e) sign the administrative agreement (director general of civil aviation or some other authorized person in the participating States);
- f) establish and operate the RMA as a multinational (ICAO) air navigation facility/service in accordance with the administrative agreement (the assigned operator); and
- g) recover the contributions to the financing of the RMA through additions to the cost bases for route charges and transfer the amounts to the RMA operator (each State).

#### PROVISION AND COST-RECOVERY OF METEOROLOGICAL SERVICES FOR AIR NAVIGATION AT A REGIONAL OR SUBREGIONAL LEVEL

3.41 Another possible application of the multinational facility/service concept could be the recovery of costs for the required provision of MET, to comply with Annex 3, on a regional or subregional basis. In regions or subregions that have a limited volume of air traffic, yet for which the existence of meteorological facilities and services is essential for flight planning activities of airspace users, cost-recovery may result in charges levels that are not in line with the service level provided. In such instances, the States concerned may arrange a multinational agreement at the regional or subregional level, which would establish a larger airspace block that maintains the necessary MET required by Annex 3. The larger volume of air traffic in the collective airspace so established could be sufficient for the charging authorities to achieve full cost-recovery at a reasonable charges level for the MET rendered for the purposes of air navigation.<sup>1</sup> ICAO's regional offices and the planning and implementation regional groups (PIRGs) should work toward the development and implementation of such multinational agreements for meteorological facilities and services as and when appropriate, observing the guidance provided in paragraphs 3.22 to 3.40 above and as contained in *ICAO's Policies on Charges for Airports and Air Navigation Services* (Doc 9082, paragraphs 10 and 11 of Section III, in

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1. Policies on MET for civil aviation are included in Doc 9082, Section III, paragraph 3 iv) and Appendix 2, and detailed guidance on meteorological facilities for air navigation, determination and allocation of costs for aeronautical MET and related cost-recovery/charges is provided in paragraphs 5.70 to 5.72 and Appendix 2 of this manual.

particular). The steps to be followed for the implementation of the multinational agreement for the provision of MET at the regional or subregional level, and the related cost-recovery, would be similar to those applied to RMAs (see paragraph 3.40 above):

- a) define, at a PIRG meeting, the provision of MET as a multinational (ICAO) air navigation facility/service in accordance with the existing guidelines on the establishment and provision of multinational ICAO air navigation facilities/services, included in the regional air navigation plan concerned;
- b) agree to a cost allocation arrangement based on, for example, distance flown or number of flights within the collective airspace block, it being understood that distance flown may offer more precision while allocation based on the number of flights is simpler to administer;
- c) find and assign a State, or States, or an existing organization or agency, to provide the required MET (the “operator”, the PIRG’s responsibility);
- d) develop and establish an administrative agreement to regulate the provision of the required MET within the region or the subregion, including cost-sharing arrangements if there is more than one operator, and the procedures for the collection of MET charges (the PIRG, assisted by the ICAO regional office) from service users and for the redistribution of revenues to those who have roles in service provision;
- e) sign the administrative agreement (by the appropriately authorized person(s) in each of the participating States);
- f) provide the required MET as a multinational (ICAO) air navigation facility/service in accordance with the administrative agreement (the assigned operator(s)); and
- g) recover from users, through Member States’ (or Member ANSPs’) air navigation charges, the costs incurred by the operator(s) for the provision of the required MET.

3.42 The examples for the application of the multinational facility/service concept in paragraphs 3.40 and 3.41 above are specific to RMAs for RVSM and for the provision of MET in regions or subregions with limited air traffic activity, respectively. However, similar issues may be encountered in respect of other areas of air navigation services provision, where the guidance described above may also be suitable. It is understood that a regional approach to the provision of air navigation services and related cost-recovery also applies to regions and subregions of the world that enjoy high volumes of air traffic (e.g. the functional airspace blocks in Europe).

#### STATUS OF GUIDELINES

3.43 It should be stressed that the guidelines in Volume II, FASID, under the heading “Financial, Managerial and other Contractual Aspects” (Doc 7754, paragraphs 23 to 59 refer) do not constitute a draft model agreement or clauses since circumstances related to the planning, implementation and operation of individual multinational facilities/services may vary considerably. It should be added, however, that this part of the guidelines has been given careful review by legal experts within and outside ICAO. Consensus of legal opinion is that there are no insurmountable legal obstacles to the implementation of multinational air navigation facilities and services as defined in the guidelines.

## PART E — JOINT FINANCING ARRANGEMENTS

### GENERAL

3.44 ICAO's policy on this subject is based on Chapter XV of the Chicago Convention, Assembly Resolutions A1-65, A14-37 and A16-10, as well as recommendations and conclusions of recent ICAO meetings. Assembly Resolution A16-10 (1968) requested Contracting States to consider joint support as a last resort after all methods for obtaining financing of air navigation facilities and services have failed. However, recent ICAO meetings have recommended that planning and implementation regional groups (PIRGs) take into account the experience gained in the North Atlantic Region, where it has been agreed over the years that the total costs of the facilities and services allocable to civil aviation provided under the existing joint financing agreements are recovered from the users. Care is taken to ensure that the cost determination procedures under joint financing arrangements are consistent with ICAO's policies on charges in Doc 9082.

### THE DANISH AND ICELANDIC JOINT FINANCING AGREEMENTS

#### Basic aspects

3.45 Joint financing of air navigation services is provided for under Chapter XV of the Chicago Convention. Two such agreements, with Denmark and Iceland, are presently in existence and they are administered by ICAO on behalf of the States concerned.

3.46 These agreements, which are linked, provide certain air navigation services (ATS, COM and MET) in Greenland and Iceland for the safe operation of flights by civil aircraft across the North Atlantic north of 45°N latitude.

3.47 The required services are reviewed from time to time, amended as necessary, and specified in detail in Annex I to each of the two agreements. All requests for capital expenditures have to be approved by the Council of ICAO, in accordance with the agreements, and inventories of the various items of equipment, buildings, etc., are updated annually and shown in Annex II to the agreements. Annex III to the agreements contains details on certain financial matters, such as authorized staffing levels for the different services and stations, how operational and maintenance expenses are to be treated, and limits on depreciation and interest.

3.48 The agreements themselves basically set forth how the services are to be financed. Because of special benefits derived from operation of the services, Denmark and Iceland bear 5 per cent of the costs of the services under the respective agreements. The remaining 95 per cent is financed by user charges and assessments on all the contracting governments, including Denmark and Iceland (see also below).

3.49 The Council of ICAO established a special body, the "Committee on Joint Support of Air Navigation Services" to assist it in carrying out its responsibilities under the agreements. A section in the ICAO Secretariat serves that committee and the Council and carries out the day-to-day administrative functions.

3.50 The methods of financing the operation of the services and cost-sharing between participating governments are set forth in the agreements. They are basically the same for both agreements and are briefly described in the following paragraphs.

### **Estimates of the costs of providing the services**

3.51 Each year, Denmark and Iceland provide detailed estimates of the costs of providing the services during the following year. These estimates are thoroughly scrutinized by the Secretariat. The estimates, with necessary explanations, particularly concerning requests for authorization to incur new capital expenditures, are then presented to the Committee on Joint Support of Air Navigation Services. If the committee is satisfied with the estimates, it recommends their approval to the Council. If the committee has some reservations and requires further clarification, it may recommend provisional approval to Council, subject to further investigation and report.

3.52 When the Council approves the estimates, it subsequently authorizes advance payments to Denmark and Iceland of amounts up to 95 per cent of the estimates, provided they do not exceed the cost limit provided for under Article V of the agreements. The advance payments come from two sources:

- a) user charges revenues; and
- b) assessments on contracting governments, as described below.

### **User charges**

3.53 The methodology for determining user (en-route) charges under the two joint financing agreements was laid down by joint financing conferences of the contracting governments to these agreements. The calculations are done by the Secretariat and presented to the Committee on Joint Support of Air Navigation Services. If the committee is satisfied that the calculations are correct, it recommends their approval by the Council. These user charges are separately calculated under each agreement and are levied on all civil flights across the North Atlantic, north of 45°N latitude.

3.54 The user charges are based on the estimated costs approved by the Council and include only those costs which are necessary for international civil aviation purposes. Such costs are then divided by the forecast number of crossings for the year considered to determine a single user charge under each agreement. An ICAO administrative fee covering the costs incurred by ICAO for the administration of the agreements is added to the user charges. When the actual costs and revenues (as opposed to the estimates) allocable to international civil aviation are subsequently audited, the under or over recovery is included in the calculation of the user charges for the subsequent year. By agreement, the user charges are collected by the United Kingdom (for a small administrative fee), and the revenues collected are remitted monthly to Denmark, Iceland and ICAO.

### **Assessments on contracting governments**

3.55 Assessments on contracting governments are also based on 95 per cent of the estimates and apportioned among those governments in proportion to the number of their aircraft operators' actual flights for the previous year. When the actual costs (audited under ICAO auspices) and flights for the year are known, the necessary adjustments, upwards or downwards, are made in subsequent assessments. Also in the assessments, contracting governments are credited with their share, based on flights, of the estimated user charges revenues, and again, when the actual revenues and flights are known, the necessary adjustments are made in subsequent assessments. It should be noted, however, that under both agreements the major share of the costs involved are recovered through user charges.

### **Payments to the provider States**

3.56 As indicated above, advance payments, based on estimates, are made to Denmark and Iceland through monthly user charges revenues and quarterly payments by ICAO from funds received from contracting governments in the form of assessments on those governments. When the actual costs of the services for the particular year are known

and audited, an adjustment is made by ICAO in future payments to Denmark and Iceland to take account of any difference between the total amount of money paid to them (by user charges revenues and advance payments by ICAO) and what they are actually entitled to receive, i.e. 95 per cent of the audited actual costs.

### **Supervision of the services**

3.57 Denmark and Iceland are responsible for operating and maintaining the services without interruption and in a cost-effective manner. These States also provide ICAO annually with reports on the operation of the services. These reports are analysed by the pertinent technical experts of ICAO and explanations sought, as necessary, before the reports are published for the information of all concerned. The Secretary General of ICAO is responsible for generally supervising the operation of the services and, in addition to the annual reports mentioned above, he also sends from time to time technical experts of the ICAO Secretariat to Greenland and Iceland to make "on-the-spot" inspection of the services and their operation.

### **OTHER APPLICATIONS OF THE JOINT FINANCING CONCEPT**

3.58 Six States providing air navigation services for the North Atlantic (Canada, Iceland, Ireland, Portugal, the United Kingdom and the United States) requested ICAO to assume the responsibilities associated with administering a height-monitoring system programme. This programme was designed to monitor 1 000 ft reduced vertical separation minima (RVSM). The joint financing concept used for the Danish and Icelandic agreements was adapted to take into account the modalities inherent to this programme, bearing in mind that the participating provider States requested an effective and flexible joint financing arrangement.

3.59 Another joint financing arrangement governs the administration of the Satellite Distribution System (SADIS), which provides meteorological information and other aeronautical information indispensable to civil aviation. SADIS services are received by more than 80 States in Europe, Africa, the Middle East and Asia. The United Kingdom provides, operates and maintains SADIS, in accordance with ICAO requirements. For cost-recovery purposes, ICAO has developed the SADIS Cost Allocation and Recovery (SCAR) scheme, which is administered by a group, the SADIS Cost-Recovery Administrative Group (SCRAG). The group assesses the annual contribution to be made by participating States and audits the costs of SADIS provision incurred by the provider State. Support services for SCRAG are performed by the ICAO Secretariat on the basis that the costs involved are included in the costs to be shared among the States participating in the scheme. Each party is assessed a share of the total costs in proportion to the total number of available tonne-kilometres (ATKs) in scheduled services (international and domestic) performed by air carriers based on the territory of the State of that party. It is the prerogative of each party to decide whether or not to recover the assessment it has paid from users, in conformity with the principles and practices recommended by ICAO.

### **POSSIBLE APPLICATION OF THE JOINT FINANCING CONCEPT TO CNS/ATM SYSTEMS IMPLEMENTATION**

3.60 Joint financing-type arrangements would lend themselves well to the implementation of a number of CNS/ATM systems components in situations where it is, for example, very costly for a State to act alone or where an existing regional organization (ASECNA, COCESNA, EUROCONTROL, etc.) does not act on its behalf. Possible candidates for the application of the joint financing concept include projects related to homogeneous air traffic areas and major traffic routes, development of cross-polar routes and calibration of ground aids.

3.61 The level of ICAO's involvement might vary considerably from case to case. Under a joint financing-type arrangement actual provision and operation of the CNS/ATM components concerned could be carried out by one State on behalf of other participating States or contracted to a commercial operator or service provider. Alternatively a group of



States could jointly operate and provide the facilities and services concerned. In the first two instances, ICAO's role in joint financing would be similar to that under the Danish and Icelandic Joint Financing Agreements described above. Where a group of States would operate the facility jointly, ICAO's role could, however, be expanded, particularly during the implementation phase, for example to include organizing the recruitment of staff, such construction as may be required, and various associated activities. Regardless of who actually provides and operates the facilities or services concerned, in all instances the participating States under each scheme would exercise full control through a governing joint support-type committee to whom the ICAO joint financing Secretariat would report.

3.62 For the implementation of CNS/ATM systems, as is the case for conventional air navigation systems, it is up to Contracting States, together with planning and implementation regional groups (PIRGs), to decide which equipment and facilities are necessary for providing air navigation services in the airspace under their responsibility, as well as which type of organization and financing is appropriate, taking into account the prevailing technical, economic and possibly political considerations. It is the responsibility of PIRGs to develop the architecture of the systems in a given region and then to examine the best way to finance them, joint financing being one means among others. In this process, the Secretariat can provide Contracting States and PIRGs with necessary information and guidance and can give them assistance in making a qualified choice.

3.63 The three existing applications of the joint financing concept, as discussed above, reveal substantial differences in the methods of administration by and involvement of ICAO. This corresponds to variances in the facilities or services concerned and circumstances involved. Requests for assistance with joint financing programmes are considered by ICAO on a case-by-case basis. Such requests and subsequent arrangements should include a clear description of the project and its objectives, a clear identification of the facilities and services to be jointly financed, a clear definition of the responsibilities of the different partners who would agree to participate, simple and flexible arrangements which should be adapted to the circumstances of interested States and allow efficient implementation, and equitable recovery of costs, including administrative costs, through user charges consistent with ICAO's policies on charges in Doc 9082.

## **PART F — POLITICAL COOPERATION**

### **GENERAL**

3.64 In areas where air traffic is extremely dense, where a large number of States are involved, or where the size of the areas controlled by individual centres varies significantly, political cooperation can make it possible to restructure the regional airspace on the basis of traffic instead of national frontiers. While air transport services in Europe operate in a single market, air traffic services (ATS) are still largely organized and provided on the basis of national boundaries, which do not bear any relation to traffic flows. The Single European Sky (SES) initiative, which was launched in 1999, adopted in 2004 and revised in 2009, is an example of political cooperation within the framework of the European Union that seeks to promote a more rational organization of the European airspace, increasing capacity while ensuring uniformly high safety standards throughout Europe.

3.65 The SES legislation meets two key objectives. First, it establishes a decision-making and regulatory framework with the view to improving air safety standards and, at the same time, remedy the structural problems afflicting ATS. Within this framework, the European Commission acts with the technical support of EUROCONTROL. Second, it mobilizes all concerned in a comprehensive reform of air traffic management by reorganizing the provision and supervision of ATS and speeding up the development and introduction of new technologies. All the organizational, operational, economic, financial, social and technical aspects are covered by a wide-ranging action programme designed to ensure that the airspace is organized and used in a way that meets the needs of civil and military air traffic.

3.66 Compliance with the SES legislation and all of its additional implementing rules are ensured by the strong existing mechanisms provided by the European Union. The main features covered by the SES are described in paragraphs 3.67 to 3.88.

## COMMON EUROPEAN CERTIFICATION OF AIR NAVIGATION SERVICES PROVIDERS

3.67 One of the fundamental principles of the European Union is the freedom to provide services anywhere in the European Union. In other words, individuals or organizations cannot be excluded from a given task purely on the basis of their nationality or the location of their base. A key component of the SES concept is the creation of a common certification system for air navigation services providers. Once a service provider receives a certificate from the authorities of one Member State, that certificate is valid throughout Europe. This then facilitates cross-border provision of services.

3.68 A set of common requirements for certification has been developed for the European Union, covering technical and operational competence and suitability, systems and processes for safety and quality management, reporting systems, service quality, financial strength, liability and insurance coverage, ownership and organizational structure (in particular regarding the prevention of conflicts of interest), human resources, and security.

3.69 Certificates are required for all providers of services for general air traffic. As well as ATM, this includes CNS, MET and AIS/AIM. Certificates may be issued in respect of single services or for a bundle of services.

3.70 States are responsible to ensure the provision of ATS services on an exclusive basis within specific airspace blocks in respect of the airspace under their responsibility. The States have therefore to designate an ATS provider holding a valid certificate in the European Union.

3.71 In order to separate regulatory and supervisory functions from actual service provision, each Member State has been required to create (where it did not already exist) an independent national supervisory authority (or authorities). Such authorities must be independent, at least at the functional level, from all providers of air navigation services. They must exercise their powers impartially and transparently.

3.72 These national supervisory authorities are responsible for the supervision of the proper application of all binding requirements of the SES. In particular, they organize regular inspections and surveys to ensure that all service providers comply with these requirements. It is therefore crucial that their independence must not be in question. Where a functional airspace block includes the airspace of more than one Member State, the respective national supervisory authorities should agree on a procedure for supervision of that block.

3.73 In addition, the national supervisory authorities have a key role in managing the performance scheme of the SES (see more details in 3.81) as they are in charge of preparing performance plans at the national or functional airspace block level, as well as monitoring the performance of each ANSP.

## COMMON EUROPEAN AIR TRAFFIC CONTROLLER LICENCE

3.74 A European licence for air traffic controllers has been created within the SES. Taking the existing standards of international and Member States as a starting point, this new licence aims at raising safety standards across Europe. It introduces common rules for the training and qualifications of controllers and establishes common entry conditions for a career as a controller. It covers all aspects of licensing, from training institutes to the requirements of the individual controller, in particular, age, medical, linguistic and competence standards.

3.75 Once an air traffic controller receives a licence from the authorities of one Member State, that licence is valid throughout Europe. This facilitates mobility of air traffic controllers in Europe.

## REORGANIZATION OF THE EUROPEAN AIRSPACE

3.76 The European Union and its Member States plan to establish a single upper flight information region (EUIR) covering all European UIRs above FL 285,<sup>2</sup> possibly including the UIRs of some non-Member States. This will require recognition by ICAO and the publication of a single aeronautical information publication (AIP).

3.77 European airspace is being divided into functional airspace blocks based on operational requirements, in particular traffic flows, rather than existing territorial boundaries. Where two or more Member States agree on the creation of a functional airspace block in their upper airspace, they will have to designate the service provider(s) to be in charge of providing air navigation services in that block.

3.78 The application of ICAO's airspace classification is being harmonized in Europe in order to ensure seamless provision of services to airspace users. Mandatory rules and standards for the implementation of the flexible use of airspace concept have also been developed to address civil-military cooperation frameworks both within Member States and among two or more Member States.

## MANAGEMENT OF EUROPEAN NETWORK FUNCTIONS

3.79 In areas where air traffic is extremely dense, where a large number of States are involved or where the size of the areas controlled by individual centres varies significantly, it is crucial to ensure proper management of the network on a regional basis. Network management function helps service providers and users find optimal gate-to-gate solutions from a regional network perspective complementing performance regulation (see 3.81). It comprises a range of tasks exercised by different actors including:

- a) European route network design: design an optimum European route network and ensure that local design solutions are consistent with European network efficiency requirements and that airspace users can fly optimal trajectories;
- b) management of scarce resources (such as aviation radio frequencies and radar transponder codes): optimize the use of scarce resources through a centralized inventory of these resources, with a view to overcoming sometimes conflicting local solutions;
- c) air traffic flow management: optimize available capacity in the use of airspace in a flexible and timely manner and enhance air traffic flow management processes, slot coordination and slot allocation.

3.80 To carry out these network functions, the SES provides for the designation by the European Commission and by States of a European body working closely with ANSPs and States.

## EUROPEAN PERFORMANCE SCHEME

3.81 The SES introduces a performance scheme that aims at driving performance improvements in Europe's airspace. This performance scheme represents a practical implementation of paragraph 5 of Section 1 of Doc 9082, as well as of the detailed provisions of Chapter 4, Part B, of the present manual. The performance scheme consists of several key steps:

- a) selection by the European Commission of a fixed reference period of three to five years during which the performance scheme will be applied;

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2. Flight level (FL) 285 equals 28 500 ft (related to a specific atmospheric pressure datum, 1 013.2 hPa).

- b) selection by the European Commission of key performance areas and associated key performance indicators to be used for target setting;
- c) adoption by the European Commission of performance targets at a European-wide level for each of the selected key performance indicators;
- d) preparation by national supervisory authorities and adoption by States of performance plans at the national or functional airspace block level after consultation with stakeholders. These plans must contain binding local targets with associated incentive schemes designed to ensure that the binding targets can be reached;
- e) assessment by the European Commission of States' performance plans against the performance targets adopted at the European-wide level. The European Commission may require revision of the plans if they are deemed not to be consistent;
- f) monitoring by the European Commission of performance improvements during the fixed reference period and possibility to require a particular State to take appropriate measures in the case of a significant and persistent drop in performance.

3.82 For all these functions, the European Commission relies on the assistance of the independent Performance Review Commission (PRC), which is designated for five years. This body provides technical advice to the European Commission and brings substantial expertise in all key domains: safety, environment, quality of service and economics.

#### COMMON CHARGING SCHEME

3.83 The SES introduces a common charging scheme for both en-route and terminal air navigation charges. It covers air navigation services provided during approach/terminal navigation and en-route phases of flight and is based on the following common principles, fully consistent with ICAO's policies, which have to be applied consistently and fairly:

- a) charges shall represent the costs of providing the services (including, on an optional basis, the costs of Member States and/or their national supervisory authorities);
- b) the cost of different air navigation services have to be identified separately;
- c) cross-subsidies between en-route and approach/aerodrome control services are not permitted;
- d) the transparency of the cost base and of the calculation of charges is guaranteed through the use of common detailed templates;
- e) charges shall be set for the availability of air navigation services under non-discriminatory conditions. No distinction can be made in relation to the nationality or category of the users;
- f) exemption of certain users, especially light and State aircraft, is permitted provided that the cost of such exemption is not passed on to other users;
- g) charges may produce sufficient revenues to provide for a reasonable return on assets and shall take account of the relative productive capacities of the different aircraft types concerned;
- h) charges can be modulated under strict conditions to support maximizing system-wide capacity such as rewarding high performance, generating environmental benefits or accelerating the introduction of ground-based or airborne equipment that increases capacity;

- i) charges shall be calculated using a uniform formula for en-route services ( $\text{distance}^*(\text{weight})^{0,5}$ ) and a uniform formula for terminal navigation services ( $\text{weight}^{0,7}$ );
- j) charges shall be calculated using traffic-risk and cost-risk sharing mechanisms between ANSPs and airspace users (see 3.84).

3.84 While unit rates are established on an annual basis, the key components for their calculation are defined ex-ante for each year of the reference period of the performance scheme (see 3.81). These key components comprise cost forecasts that cannot be exceeded ("determined" costs) and traffic forecasts. Each year, the difference between actual and forecast traffic is shared between the ANSP and airspace users in the calculation of the following unit rate using predefined sharing keys. At the end of the period, the uncontrollable part of the difference between the actual and "determined" costs over the period can be carried over the following reference period. The calculation of unit rates can also include incentives linked to the achievement of the performance targets defined in the State's performance plan.

3.85 To facilitate transparency, all service providers must follow common rules for the provision of information on their actual costs and revenues and their forecasts. Mechanisms for regular exchange of information among Member States, national supervisory authorities, service providers, users, the European Commission and EUROCONTROL have been set up, facilitating comparison.

3.86 The establishment of a common charging scheme aims at encouraging the most efficient use of airspace and allowing benchmarking of service providers. Comparisons between different service providers are a powerful tool to foster improvements and promote best practice.

3.87 Specific shares of revenue may be set aside to assist categories of users or service providers, in order to improve the air navigation infrastructure, service provision or the use of airspace. In particular, this could allow a specific source of funding to be established for systems covering the airspace of more than one State, where attracting financing may prove difficult.

## INTEROPERABILITY OF THE ATM NETWORK

3.88 The SES provides the means to ensure that harmonized procedures and systems are implemented consistently and synchronously, both on the ground and on board, in order for national ATM systems to make the ideal of seamless operation of air traffic throughout Europe more achievable. In view of the creation of functional airspace blocks, the harmonization of systems and procedures will facilitate this process. Moreover, in the longer term, with a high degree of commonality across Europe, it will become much simpler to reorganize airspace to reflect future traffic patterns. It can be seen as the regulatory arm of the technological pillar of the SES: the SESAR (Single European Air Traffic Management Research) programme.

## PART G — SPECIFIC ORGANIZATIONAL ASPECTS PERTAINING TO THE GLOBAL ATM OPERATIONAL CONCEPT

### BACKGROUND

3.89 The *Global Air Traffic Management Operational Concept* (Doc 9854) presents ICAO's vision of an integrated, harmonized and globally interoperable air traffic management (ATM) system.<sup>3</sup> With a planning horizon of up

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3. The United States NextGen (Next Generation Air Transportation System) and the European SESAR (Single European Sky ATM Research) programmes are aligned with ICAO's Global ATM Operational Concept and the Global Air Navigation Plan.

to and beyond 2025, the operational concept envisages a globally organized airspace free of operational discontinuities and inconsistencies. The expected economic benefits derived from the new CNS/ATM systems under the operational concept include, for example, passenger time savings, productivity improvements, stimulation of related industries, and transfer of high-technology skills.

3.90 The infrastructure required for the implementation of the operational concept will, in many instances, need the capacity to serve a large number of States and considerable investments beyond the reach of a single State. This has organizational implications in that enhanced cooperation and collaboration of all the ATM community members<sup>4</sup> are required in order to obtain benefits from the efficiency that CNS/ATM systems offer. Each State, region and homogeneous area will therefore have to plan the investments that will need to be made to implement the operational concept, and the time frame for those investments, in a collaborative decision-making environment.

3.91 The structure of the international cooperative effort required will differ depending on the implementation option chosen for a specific systems component and the States involved. At the national level, implementation of CNS/ATM systems will be facilitated where financially autonomous bodies have been established to operate air navigation services. Such entities may also operate airports or be in the form of an autonomous civil aviation entity (see Chapter 2, Part B). Whether at the national or international level, financing of CNS/ATM systems components as well as other air navigation services infrastructure will be enhanced where such autonomous bodies are responsible for infrastructure provision and operation. Where appropriate, a regional approach should be adopted in order to enhance transparency, efficiency, fairness, comparability and predictability of the costs of air transport infrastructure.

3.92 It has to be noted that the global implementation of a seamless ATM system shall neither infringe nor impose restrictions upon States' sovereignty, authority or responsibility in the supervision and oversight of air navigation services and the promulgation and enforcement of safety regulations. Furthermore, in pursuing the global ATM operational concept vision, States should make optimum use of existing organizational structures, wherever possible, and ATM services should be delivered in accordance with existing institutional arrangements and regulations. Where modifications become necessary, this will be accomplished through the international mechanisms already established.

3.93 When the new CNS/ATM systems under the operational concept are implemented and a "seamless" airspace is developed on a regional and/or global scale, the need for States to provide and operate conventional CNS systems will be significantly reduced. Regional air navigation plans (ANPs) should provide a schedule for the phase-out of facilities made redundant by the provision of CNS/ATM systems services. From an organizational point of view, this will mean that some staff now required to operate conventional systems will become redundant, although some could be redirected towards work associated with the provision of the new CNS/ATM-related services. The extent of the redundancy will also be influenced by the technical solutions and implementation options chosen, as described below. Because of the centralization inherent in satellite operations, redundancies will occur in most States in staff and facilities previously devoted to serving the conventional systems, if the economies of CNS/ATM systems application are to be fully realized.

#### COMMUNICATION SATELLITE SERVICES — IMPLEMENTATION AND OPTION SELECTION

3.94 The satellite-based system serving CNS/ATM systems communication needs will require an extensive network of ground-based facilities, including ground earth stations (GES) and associated communication links to ATS facilities. Because there are different means of system access, States will have different implementation options. Depending on requirements and circumstances, a State or a group of States may choose various options. Relevant to the selection of an implementation option and the resulting organizational structure are such economic factors as

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4. The aggregate of organizations, agencies or entities that may participate, collaborate and cooperate in the planning, development, use, regulation, operation and maintenance of the ATM system (Doc 9854 refers).

achievable economies of scale, scope for competition and requirements for economic regulation. It should be stressed, however, that the specific framework a State or group of States selects cannot be established, nor can the appropriate legal instrument covering its establishment be written, until the States concerned have themselves determined which approach best meets their requirements.

3.95 While some States may operate some elements of the ground-based facilities themselves (e.g. GES), access to satellite services will be primarily through service providers that will provide satellite access either directly or by acting as coordinators for satellite operators. From an organizational point of view, however, a State has a number of implementation options to choose from, or it can choose a combination of options. These cover a wide range within which a State can:

- a) contract with certified service providers;
- b) commission existing multilateral State organizations such as ASECNA, COCESNA and EUROCONTROL to act on its behalf in dealing with service providers;
- c) join other States to form an ad hoc group of States or a new international organization that would negotiate for service; and/or
- d) use a mechanism within ICAO (e.g. joint financing agreement) to act on behalf of States in dealing with service providers.

3.96 Autonomous civil aviation entities may prefer to establish direct technical and commercial relationships with satellite service providers where this is possible and feasible.

3.97 Further to the above, the selection of the implementation option a State applies is likely to be strongly influenced by at least two factors, namely, the cost-effectiveness of the alternatives and the extent to which the State concerned continues to maintain control over the provision of services to civil aviation. The latter also includes the extent to which existing facilities and personnel continue to be utilized in the provision of CNS/ATM system services, as opposed to being made redundant by the implementation option(s) selected.

## GNSS

3.98 GNSS will initially be composed of satellite systems that provide standard positioning service and system augmentations, which may have wide area or local area coverage. System augmentation is required for meeting certain performance requirements. Positioning signals are being offered free of charge by the two provider States concerned — the Russian Federation (the GLONASS system), and for the foreseeable future with six years' advance notice of any change to that policy, the United States (GPS). Both these systems were originally military systems, which are being made available for civilian use. Unless these systems are replaced by (civilian) systems requiring financial commitments from the civil establishment worldwide, the provision, as opposed to the use, of the standard positioning service does not appear to be dependent on organizational issues needing to be addressed by States other than the provider States. The GALILEO core satellite constellation, being developed by Member States of the European Union, is intended to be a civil controlled and operated system designed to fulfil the requirements of a variety of users including civil aviation. Similar to GPS and GLONASS, GALILEO open service will provide a positioning service to aviation free of direct user charges.

3.99 System augmentation gives rise to somewhat different considerations. For example, a satellite-based augmentation system (SBAS) could be provided by the same State(s) or entity that operates a core satellite constellation providing global standard positioning service. However, a group of States or a regional organization might also undertake to operate the augmentation satellite service required, either by themselves or by contracting a commercial or government organization to do so on their behalf. Thus, the same type of options as outlined for communication satellite services above would apply. In each instance, costs would be incurred that would presumably need to be recovered.

From an organizational point of view, such augmentation would in fact be a multinational facility or service to which the guidance material on the provision and operation of multinational facilities and services, which is addressed earlier in this chapter, could apply, as long as the augmentation is primarily to serve civil aviation. On the other hand, if civil aviation were going to be only a minority user of the augmentation services provided, and the entity were to provide augmentation services worldwide, a joint concerted approach through, for example, ICAO, a regional air navigation services provider association or an international aviation user association, for dealing with the service provider, may be the most appropriate.

3.100 Augmentation with local coverage would most likely not require international involvement provided that the facility meets the specifications and standards required for it to be listed as an international civil aviation facility. The facility itself could be provided by the national or local government or under contract by a commercial entity.

#### AIR TRAFFIC MANAGEMENT

3.101 With regard to organizational aspects, implementation of the ICAO CNS/ATM systems concept is perhaps of special relevance to air traffic management. This is because the advanced communications, navigation and surveillance technology involved offers the possibility to expand the capacity of individual area control centres (ACCs) in many parts of the world and particularly over the high seas, both in terms of geographical coverage and the more efficient technical means by which control functions could be carried out. As a result it would be possible and technically and economically feasible to merge many flight information regions (FIRs) into what could be termed a (single) air traffic management region and correspondingly reduce the number of ACCs. It should be assumed that the decision made by individual States as to whether or not to proceed in this manner would not so much be taken principally on technical or economic grounds, but would instead depend on the situation in the State concerned and would often be strongly influenced by government policy.

3.102 It should be added that even without an ACC a State may still incur costs associated with providing CNS/ATM systems services as well as other air navigation services for overflying traffic and during the en-route phase of traffic landing on or departing from its territory (e.g. participation in GNSS augmentation schemes, COM fixed links with one or more ACCs, and MET costs). Such costs together with the costs of closing an ACC would continue to be recoverable by the State(s) concerned. This would call for cooperation or agreement between that State and the entity operating the ACC serving the air traffic management region covering the State concerned. The entity could be an international or regional body, a joint operation by a few States, or another State. In essence the agreement or scheme would call for all costs attributable to the provision of air navigation services to air traffic during the en-route phase of flight, which would be borne by the State that has closed its ACC, to be included in the cost base for, and recovered through, the charges levied through the ACC serving the air traffic management region (i.e. the expanded FIR). CNS/ATM costs attributable to services provided during the approach and/or departure phase of flight would, like the costs of other air navigation services attributable to this phase of operations, be recoverable through approach and aerodrome control charges. These cost-recovery issues are discussed further in Chapters 6 and 7.

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## CHAPTER 4

### Air Navigation Services Economic and Financial Management

This chapter describes some of the most important functions and tools in the economic and financial management of an air navigation services entity.

Part A addresses the application of best practices in corporate governance and certain functional aspects of accounting and financial control, including business plan, budget, financing and cash management, and auditing.

Part B gives a broad description of economic performance management through, *inter alia*, the identification of key performance areas (KPA) and objectives, selection of indicators and their targets, assessment of performance results, and publication of reports on results achieved.

#### PART A — BASIC ASPECTS

##### GENERAL

4.1 One basic characteristic of air navigation services referred to in Chapter 2, under Part D, is that they are usually not all provided by one entity alone. Thus, the three major components, i.e. ATS (or ATM), COM (or CNS) and MET, are usually provided by two or three different entities. Consequently, all the costs to a State attributable to all the air navigation services it provides may not be fully accounted for together because the costs incurred by every entity involved may not be included. This tends to apply in particular to the MET component. Also to be noted is that there are circumstances where major air navigation services such as meteorological services are provided on a contractual basis. (The remaining two categories of air navigation services, i.e. SAR and AIS/AIM, usually account only for a minor share of total air navigation services costs.) Because of these organizational characteristics, the exercise of proper financial control over the provision of air navigation services is essential.

4.2 Where the operation of air navigation services is only one of many functions performed by a civil aviation administration, or another branch of government, a separate or supplementary system of accounts should be established for the air navigation services involved, which may be based on an itemization such as that described in Chapter 5, Part A. This is because the accounts of the civil aviation administration or government branch concerned may not be kept in a format that is responsive to the requirements of air navigation services management and the transparency of consultation with users. Further reference should also be made to the text on the implications of organizational structure on financial control and accounting in Chapter 5, Part C.

## APPLICATION OF PRINCIPLES OF BEST PRACTICES

4.3 The application of principles of best practices of good corporate governance<sup>1</sup> for air navigation services providers has been endorsed by the ICAO Council in *ICAO's Policies on Charges for Airports and Air Navigation Services* (Doc 9082, Section I, paragraphs 9 and 10). With the aim to promote transparency, efficiency and cost-effectiveness, best practices in the operation and management should be applied in all areas of air navigation services regardless of whether the entity is owned and operated by the public or private sectors and whether or not it is profitable in itself.

4.4 Paragraph 9 of Section I of Doc 9082 recommends that, to ensure the use of best practices of good corporate governance, consideration be given to:

- a) objectives and responsibilities of the entities;
- b) shareholders' rights;
- c) responsibilities of the board;
- d) role and accountability of management;
- e) relationship with interested parties; and
- f) disclosure of information.

4.5 In that respect, this would involve, for example, the recognition, by ANSPs, of aircraft operators as customers who want to be satisfied that services are provided to an appropriate standard of quality, in a timely and cost-effective manner. It would also imply responsiveness to changing customer requirements and demands. A two-way exchange of information and an in-depth consultation process with users should be established in the air navigation services development plans and the relationship between quality of service, the level of investment and the level of charges.

4.6 Transparent accounts, published on a regular basis, should enable costs, revenues and (where appropriate) subsidies and cross-subsidies to be clearly identified (see also paragraph 4.10 and the reference to international accounting principles in Chapter 5 under paragraph 5.8). Subsidization of user charges should not be regarded as a substitute for bearing down on operating costs. Where it is necessary, for reasons of wider public interest, to subsidize the provision of air navigation services from public funds, this should be clearly shown in the accounting system.

4.7 Proposals for investments should be objectively assessed through financial and wider cost-benefit analyses. Safety and security requirements are of paramount potential importance. The mitigation of the adverse environmental impact of aviation may also be a benefit. To the extent that air navigation services projects are publicly funded, the analyses may include evaluation of social needs and impacts on the national and/or local economy (see Chapter 6).

4.8 In addition to the areas recommended in paragraph 4.4, principles of best practices could also be applied in many other areas, such as budgeting, bank and cash management, presentation of financial statements, benchmarking, measuring performance and productivity, service level agreements, economic pricing, collection of charges and management of ancillary activities.

4.9 A service level agreement (SLA) is a tool by which ANSPs and aircraft operators define the level of service and the terms of engagement or rules that will govern the ANSP/user relationship concerning the agreed services. Guidance material describing the objectives, characteristics, implementation aspects and the various possible forms of an SLA is included in Appendix 1.

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1. Refer to Chapter 2, Part E – Corporate governance.

## PURPOSES OF ACCOUNTING AND FINANCIAL CONTROL

4.10 Financial accounting refers to the system according to which revenues and expenses are recorded and summarized so as to present an aggregate financial picture of the provision of air navigation services. How elaborate and detailed the financial accounts are depends on the extent of detail required and the scope of the air navigation services concerned. It is, however, essential to ensure from the outset that all accounting procedures are applied in accordance with generally accepted accounting rules, standards or conventions. The importance of good internal as well as external auditing must also be emphasized.

4.11 Financial accounts may usefully also be supplemented by management accounts that apply accounting techniques for the purpose of assisting all levels of management in planning and controlling the provision of air navigation services.

4.12 The basic purpose of financial control is to ensure that the resources used to provide air navigation services are spent in an effective, timely, reliable and accountable manner. This involves the monitoring of service provision in financial terms to ensure that the magnitude of expenses and revenues incurred in a particular year are in accordance with a previously approved budget.

4.13 Financial control and accounting are of course interrelated, since management cannot exercise financial control effectively without having at its disposal the data provided by a sound financial accounting system. It is therefore essential that any procedure being established to provide financial control be accompanied by a thorough examination of the accounting system to ensure that the latter can adequately provide the financial data necessary for this purpose.

## SCOPE OF ACCOUNTING AND FINANCIAL CONTROL

4.14 Financial control essentially involves three steps: first, a comparison of actual revenues and expenses with those planned; second, where the two differ significantly, a determination as to whether the cause lies within the budget itself or in the management of the air navigation services or is the result of external factors outside management's control; and third, what corrective measures need to, or can be taken.

4.15 Any substantial divergence from the original budget for a major specific revenue or expense item may also call for a review of the forecast outcome, to determine the extent to which any other items and the overall financial situation of the entity or entities providing the air navigation services concerned are likely to be affected. This will be particularly beneficial in cases where the shortfall could ultimately affect the operating efficiency of the air navigation services.

4.16 At the end of an accounting period, which as a rule covers twelve months, the entries in all individual financial accounts are totalled for presentation in two complementary forms or tables, namely the income statement (also referred to as the revenue and expense statement or profit and loss statement) and the balance sheet. The former summarizes all revenues and expenses arising during a specified period, with the difference between the two totals being either a profit or a loss. The balance sheet, on the other hand, summarizes assets and liabilities at a point in time. The change in the net worth depends on whether a profit or loss was made during the accounting period, in which case the balancing item on both the income statement and the balance sheet will be identical.

4.17 An income statement or a balance sheet, in isolation, does not identify the movements in assets, liabilities and capital which have taken place during the accounting period. A statement of cash flows can be prepared to highlight movements in cash flows for the period concerned. This statement also provides information on the entity's liquidity position. This is further explained in Chapter 5, Part A. It should be noted that a statement of cash flows, when provided for a number of years, is of particular relevance and assistance when financing is being sought because it shows the changes in the cash position of the entity providing the air navigation services concerned, and can thereby influence the size and terms of the loan or financing being sought.

## THE BUSINESS PLAN AND BUDGET

### General

4.18 The quality of planning has a considerable influence on the successful outcome of an organization's management. Efficient and effective planning procedures, which will involve preparation of a business plan and a budget, will also help meet the needs of users and the supervisory authority or regulator. The effectiveness of planning depends not only on the active participation of senior management but of staff at all levels in the organization.

4.19 The business plan and the budget have different timescales but should relate to each other within the following framework:

- a) a *strategy* should outline the long-term objectives that underlie the business plan;
- b) a *business plan* is normally set for a period of three to five years; it identifies the projects to be carried out during this period and sets the business environment for the budget; and
- c) a *budget* is normally set for one year and represents the first year of the business plan in financial and operational detail.

4.20 Setting a business plan and a budget is an important part of the planning process and makes possible the following objectives regardless of organizational structure:

- a) planning to ensure that future requirements are anticipated and provided in time;
- b) coordination of the components of the provision of air navigation services to provide an effective service;
- c) efficient management of the factors of production involved in providing air navigation services; and
- d) financial control over the provision of air navigation services to ensure that the cost of provision is efficiently and effectively incurred.

### The business plan

4.21 The purpose of the business plan is to specify infrastructure requirements and the actions to be followed over the plan period by the organization to achieve its long-term strategies. The plan should therefore prescribe specific objectives through which the goals will be achieved. In so doing the plan should outline the business environment in which the organization is forecast to operate and its implications. Consideration will need to be given to political, legal, economic, social and technical factors as well as regional and global developments that may affect the organization, and in addition the plan will need to highlight assumptions made that will particularly affect the forecast plan outcome. Specific objectives can be broken down into the level and costs of services and the recovery of costs associated therewith, highlighting who is responsible and accountable for carrying them out. The plan will also identify key objectives against which performance will be monitored. Such planning will not only be financially orientated but will include goals concerning safety, security, the nature and level of services, the forecast demand for such services and the requirements of users.

4.22 The plan should identify the capital investment projects to be carried out together with their financial implications. It is important that new projects included in the business plan should meet an operational requirement and be accompanied by an appraisal setting out the economic and financial justification of the project. (This is covered in more detail in Chapter 6.) A compromise between the cost of technical solutions to meet operational requirements and

the financial implications for users may need to be made. Forecast changes in the number and type of staff over the plan period should also be included. The business plan should demonstrate that the organization is well managed by reference to relevant performance metrics, including safety, quality of service, productivity and cost-effectiveness (as described in Part B). These should cover the recent past and show future projections based on the outcomes in the plan being achieved.

4.23 The plan should take account of the following parameters:

- a) forecast air traffic;
- b) external economic assumptions (e.g. exchange rates, inflation, GNP and interest rates);
- c) the number of staff and the changing qualifications, training, and work skills required of staff;
- d) limits on expenditure and/or air navigation services charges;
- e) changing institutional arrangements;
- f) changes in costs (salaries, operating expenses);
- g) income; and
- h) operating result (as measured by the difference between forecast revenues and costs).

4.24 Planning is a continuous process and the business plan needs to be updated annually to reflect substantial amendments. In order that plans maintain continuity and do not become simply a series of “wish statements” it is recommended that a review of the progress forecast in the previous year’s plan be made and that changes from it be identified and explained. Some flexibility should, however, be provided in order that the plan is not easily blown off course by being too rigid. The main uncertainties affecting the results, particularly in the later years, should be discussed (e.g. the effects on capital investment of lower than forecast traffic) and contingencies in the event of different outcomes could be indicated (e.g. prioritizing investment projects in the event of a constraint on borrowing for capital investment). The effect of different cost assumptions (e.g. higher staff costs) might also be assessed.

### **The budget**

4.25 The budget should be based on the first year of the business plan and should cover the period corresponding to the annual financial year. It should be revised only exceptionally when unusual and unforeseeable circumstances arise during the budget year. The expected actual income and expenditure, however, should be regularly forecast during the year.

4.26 A budget is composed of two parts:

- a) a budget that forecasts revenues and expenses including depreciation and interest; and
- b) a capital budget that forecasts capital expenditure, detailing proposed investments to upgrade existing assets or acquire new assets during the year.

4.27 The budget should be organized in line with the accounting system used to record revenues and expenses. For a budget to be a useful control device, it must provide guidance to the operating units expending resources to produce service. Budget items should be consistent with various sub-accounts in the accounting system. The budget should be formatted so that it is easy to compare the actual results with the budgeted results on a quarterly or monthly basis as well as for the year as a whole. For this purpose, very detailed comparison (e.g. item by item in the various sub-accounts) may not be necessary.

## FINANCING AND CASH MANAGEMENT

4.28 Financing and cash management refer to those practices that aim to maximize the return on the invested funds and the efficient procurement of funds. These tasks can be undertaken internally or externally, and sometimes by State treasuries. Cash management needs to be complemented by the management of foreign currency and interest rate exposure. The latter comprises minimization of the risks associated with movements in market rates of interest to control the return on financial investment and the cost of debt.

4.29 Cash management usually involves forecasting cash needs and balancing these needs against expected cash inflows and outflows, i.e. receipts and payments. Typically, a ninety-day forecast of these factors is maintained for this purpose. Decisions on when to borrow cash to cover expected cash deficits and when to invest surplus cash, and the time periods relative to each of these circumstances, completes the cycle of cash management events. The effective management of cash resources can make an important contribution to the overall financial performance of an air navigation services entity.

4.30 Policies, procedures and systems for cash management should be based on clear descriptions of authority. Reviews or audits at unscheduled times should be undertaken to guard against possible misuse of authority or abuse of trust implicit in the relationship necessary between the provider of air navigation services and the banking institutions concerned.

## INTERNAL AND EXTERNAL AUDITING

4.31 Internal audit can be defined as an independent appraisal function within an organization, for the review of activities, as a service to all levels of management. It is a control that measures, evaluates and reports upon the effectiveness of the whole system of internal controls, financial and otherwise, which has been established by management to safeguard its assets, ensure reliability of records, promote operational efficiency and monitor adherence to policies and directives. Internal audit is most effective when independence is maintained, i.e. when the auditor is not engaged in any system which that auditor would normally review and appraise. The internal audit function is itself an integral part of the system of internal control, and an internal audit should not only report, for example, on the effectiveness of the system of internal controls but also make recommendations.

4.32 External audit is an independent appraisal function performed by an outside entity that, for a State organization, could be done by the State auditor. The external auditor may have a statutory responsibility to report on the financial statements giving an account of management's stewardship. This independence will vary in relation to the method by which external audit is selected. Another factor to be recalled is that external audit provides a valuable service not only to the controlling body to which it reports but also to users and others being served by the entity being audited. Care should be taken in the selection process of an auditor.

4.33 External audit differs from internal audit more in respect of emphasis than objectives. For instance, the internal auditor concentrates attention upon internal controls within the air navigation services entity concerned; the external auditor, while interested in internal control, will also want to ensure that the entity acts only within its powers (which may be statutory) and that its accounts present a true and fair view of its activities. External audit powers generally stem from statute but the responsibilities arising from these powers are often extended and amplified, for example by standards and guidelines issued by professional accountancy bodies. An important difference between internal and external audit lies in the line of reporting. The internal auditor reports to management; the external auditor, while also submitting reports to management, has an external reporting line to the body ultimately controlling the provision of air navigation services. This reporting aspect manifests itself at the end of the external audit, when an external auditor will be required to provide a certificate for the accounts.

4.34 Both internal and external audit have roles to play with respect to the air navigation services charges that may be collected for an air navigation services organization by another entity. Both audits will need to be satisfied with the control measures in place in the entity collecting the charges and in the entity providing the air navigation services, to ensure that all revenues due to the latter are collected and paid over to it promptly.

## PART B — ECONOMIC PERFORMANCE MANAGEMENT

### FRAMEWORK

4.35 The purpose of an ANSP is to provide air navigation services that contribute to the safety of flights in an efficient and cost-effective way. Since ANSPs employ considerable resources in their day-to-day operations, performance shortfalls can result in significant additional costs to their users and society as a whole. Furthermore, bad performance of individual ANSPs can have a negative impact on other members of the aviation community including airports and regional planning entities.

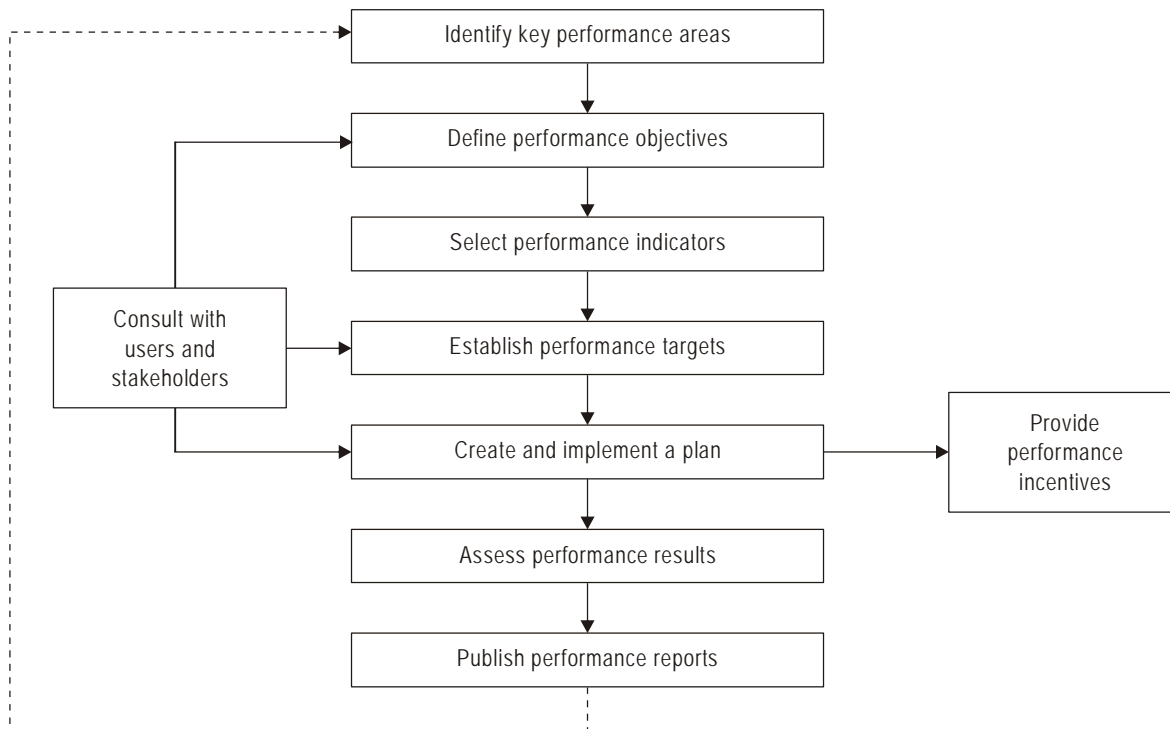
4.36 ICAO's policies on charges in Doc 9082 (Section I, paragraphs 13 and 16) recommend that States should ensure, within their economic oversight responsibilities, that ANSPs develop and implement appropriate performance management systems.<sup>2</sup> The need for an appropriate performance management system is independent from the organizational format of the ANSPs. This is because the performance of an ANSP is more related to its governance than to its ownership and control structure (see Chapter 2, paragraph 2.36).

4.37 Performance management is a systematic and iterative approach to improvement within an organization that consists of defining a strategy and executing it through the alignment of resources and behaviours, so that the performance of the ANSP improves over time. It is an effective way of helping an entity understand how it can improve, to promote a culture of cooperation and collaboration, and to help communicate a unified vision of the entity's general strategy. Performance management should be a part of the business plan of an ANSP. The process of performance management for economic and managerial aspects of ANSPs may consist of several steps, as described in Figure 4-1:

- a) identify key performance areas (KPA's);
- b) define performance objectives through consultation with users and other interested parties;
- c) select performance indicators (and supporting metrics);
- d) establish performance targets through consultation with users and other interested parties;
- e) create and implement a plan in cooperation with other members of the aviation community to achieve performance targets;
- f) consider and, where appropriate, provide performance incentives;
- g) periodically assess actual performance results by using benchmarking as appropriate; and
- h) publish performance reports on results achieved.

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2. Although performance management can be applied to all aspects of an ANSP's performance including economic, managerial, operational and technical performance, this chapter focuses exclusively on economic and managerial performance. Operational and technical performance is covered in the *Manual on Global Performance of the Air Navigation System* (Doc 9883).



**Figure 4-1. Performance management process flow diagram for economic and managerial aspects of ANSPs**

4.38 The performance management process uses the results of assessments of actual performance to periodically adjust KPAs, performance objectives, targets and plans to achieve results, as appropriate.

4.39 Consultation with other members of the aviation community (such as States, regulatory authorities, airports and aircraft operators) is an integral part of the performance management process of an ANSP. As individual parties tend to have different expectations, opinions and priorities, the ANSP needs to adopt a process that seeks to reconcile these differences. The process should allow input to the consultation exercise from technical and economics specialists representing the various interested parties. In the event that the initial consultation process fails to result in common understanding, there needs to be a predesigned process that outlines who takes final decisions and how. Such processes may differ between States, depending on the regulations and governance systems pertinent to individual ANSPs.

4.40 There is not just one global, all-encompassing application of the performance management process, but many simultaneous — and often interrelated — applications at more specialized and localized levels. In order to assist States and their ANSPs, it might be useful to establish an independent regional performance review process with the objective of developing performance targets at a regional level and producing regular reports on performance and benchmarking. This would require a commonly-agreed specific set of minimum reporting requirements and would have the merit of producing independent analyses for the various interested parties.



## KEY PERFORMANCE AREAS AND PERFORMANCE OBJECTIVES

### Identification of key performance areas

4.41 The starting point for developing a successful performance management process is the identification of KPAs. KPAs are a way of categorizing performance subjects related to high-level expectations (i.e. desired results from an external initiative) from the aviation community as well as strategic ambitions of ANSPs.

4.42 For economic and managerial performance of ANSPs, as recommended in ICAO's policies on charges in Doc 9082 (Section I, paragraph 16 i)), focus should be placed on at least four KPAs, namely: safety, quality of service (such as capacity, delay and flight efficiency), productivity and cost-effectiveness. States may choose additional KPAs, as identified in the *ICAO Global Air Traffic Management Operational Concept* (Doc 9854), according to their objectives and particular circumstances. In more general terms, eleven standard KPAs have been identified in Doc 9854, which are, in alphabetical order: access and equity, capacity, cost-effectiveness, efficiency, environment, flexibility, global interoperability, participation by the ATM community, predictability, safety and security.

4.43 Within each KPA, there may be a number of more specific areas (focus areas) where a present or anticipated need for action and improvement has been identified. For example, the list of focus areas in the safety KPA might include: accidents, mid-air collisions, runway incursions and excursions, etc.

### Definition of performance objectives

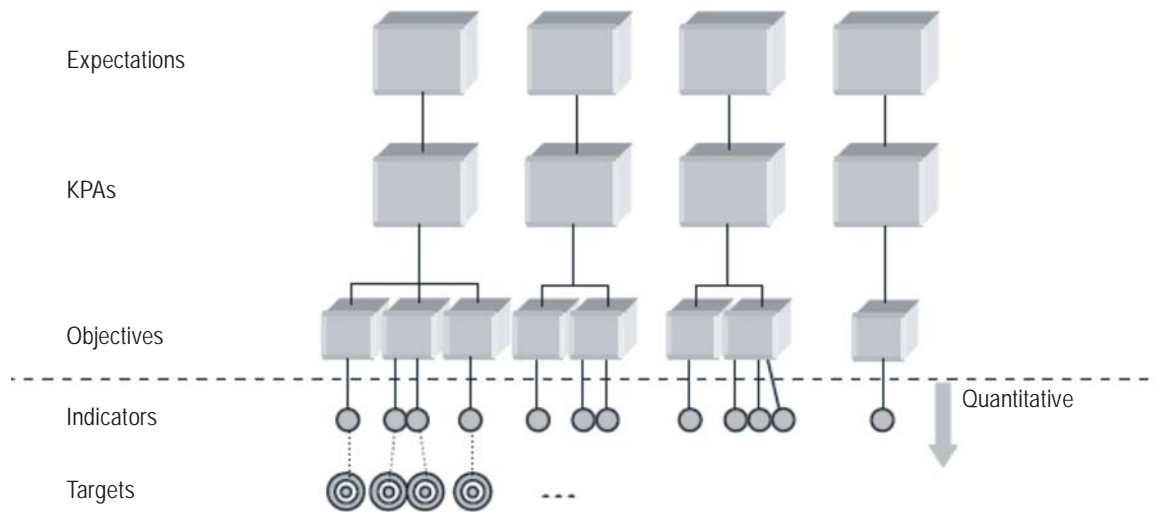
4.44 Performance objectives state a desired trend from today's performance in a qualitative and focused way (for example, reduce the total number of accidents).

4.45 The potential intention to establish performance management is activated by defining at least one performance objective for each of the selected KPAs (more specifically focus areas) through consultation with users and other parties concerned (see Figure 4-2). It should be kept in mind that if too many performance objectives are pursued, efforts will be spread too widely with the likely result that not all objectives will be achieved. Therefore, selecting a few key, high-level, achievable objectives is a good rule to follow. When the ANSP has little prior experience, it would be wise to start from a limited set of low-risk objectives.

4.46 Performance objectives should be measurable while not yet expressed in quantitative terms (quantification of objectives is done as part of performance target-setting). Some objectives lend themselves more easily to measurement than others. Policy-related objectives (for example, develop an adequate level of service) are more difficult to quantify than those related to operations (for example, reduce delays) or costs (for example, reduce costs).

4.47 Objectives that focus on outcomes rather than on outputs, activities or inputs are more likely to improve performance. "Increase runway safety" is an objective focusing on an outcome rather than required inputs (for example, the number of air traffic controllers) or outputs (for example, the number of aircraft contacts). The potential associated objective "reduce runway incursions" also is an outcome.

4.48 Performance objectives are often interrelated and therefore there might be some trade-offs among them. When interrelationships are identified, priorities should be established to resolve conflicts between objectives. In this regard, objectives related to safety should always be the highest priority. Prioritization is supported by risk management, which helps to identify the risks that are most urgent or must be avoided, those that should be transferred or reduced, and those that are reasonable to retain. Also, the objectives at the different levels of the organization need to be linked to ensure overall coherence and focus on priorities throughout the ANSP. This will foster teamwork and facilitate effective communication.



**Figure 4-2. Key performance areas, objectives, indicators and targets**

## PERFORMANCE INDICATORS

### Selection of performance indicators

4.49 The performance indicators are a tool for quantitatively measuring past, current and expected future performance (estimated as part of forecasting and performance modelling), as well as the degree to which performance objectives are being and should be met. The performance indicators, which represent the high-level knowledge about the performance of the ANSP, are often called key performance indicators (KPIs). To be relevant, the indicators need to correctly reflect the intention of the associated performance objectives, and thus should not be developed without having specific performance objectives in mind.

4.50 The number of performance indicators within each performance objective should be limited so as to ease the burden on monitoring (collecting and processing statistical data), but should be relevant and sufficient to allow for a comprehensive assessment of performance. Adopting too many indicators has the potential to overload both the ANSPs and the regulators, while too few may not allow for an adequate assessment to be made of performance. ICAO's policies on charges in Doc 9082 (Section I, paragraph 16 ii)) recommend that at least one performance indicator is selected and reported for each of the KPAs.

### Suggested indicators

4.51 When performance indicators are not directly measured, they should be calculated from supporting metrics according to clearly defined formulas such as  $\text{cost per flight} = \frac{\text{Sum}(\text{cost})}{\text{Sum}(\text{flights})}$ . Supporting metrics determine which data need to be collected to calculate values for the performance indicators. For example, for the performance objective "improve on-time arrival ..." (within the "quality of service" KPA), the performance indicator could be "average delay per flight". To calculate this performance indicator, one must obtain data on the scheduled and actual arrival times of all flights in the specific planning area. From this, one can determine the total arrival delay (a supporting metric), and divide that value by the number of arrivals (another supporting metric) to calculate the desired performance indicator.

### Safety

4.52 From a managerial viewpoint, safety performance indicators generally focus on actual or potential safety events, risk categories and event causality. Potential indicators include:

- a) ICAO Category A and B incidents (risk bearing) per million flights;
- b) separation minima violations per million flights; and
- c) runway incursions per million operations.

4.53 Alternative or additional indicators may include:

- a) ATC-related accidents per million flights;
- b) ATC-related fatal accidents per million flights;
- c) mid-air collisions per million flights;
- d) occurrences of controlled flight into terrain (CFIT) per million flights;
- e) ICAO Category C and D incidents (non-risk bearing) per million flights;
- f) MET forecast accuracy (per cent of forecasts verified as accurate); and
- g) aeronautical information services (AIS) chart accuracy (average number of reported errors per chart).

### Quality of service

4.54 There are wide varieties of quality of service performance indicators corresponding to five focus areas, namely: capacity, flight efficiency, predictability, availability and accessibility.

- a) *Capacity* needs to meet airspace user demand at peak times and locations while minimizing restrictions on traffic flow. Potential indicators are:
  - volume of system operations (effective capacity) that can be accommodated with minimal delay (for example one minute per flight or per flight hour);
  - volume of sector operations per period of time (hour) that can be accommodated under different weather conditions and procedures;
  - volume of airport operations per period of time (hour) that can be accommodated under different runway configurations, weather conditions and procedures;
  - sector (or airport) capacity/demand ratio (per cent);
  - duration (hours per year) when demand exceeds capacity (capacity shortage);
  - magnitude of capacity shortage (aircraft movements per hour);
  - number of congested facilities (number of facilities);
  - number of years that capacity profile leads demand profile (years);
  - unaccommodated demand (flights per annum);
  - airport average daily capacity (aircraft movements per day); and
  - airport annual service volume (aircraft movements per year).

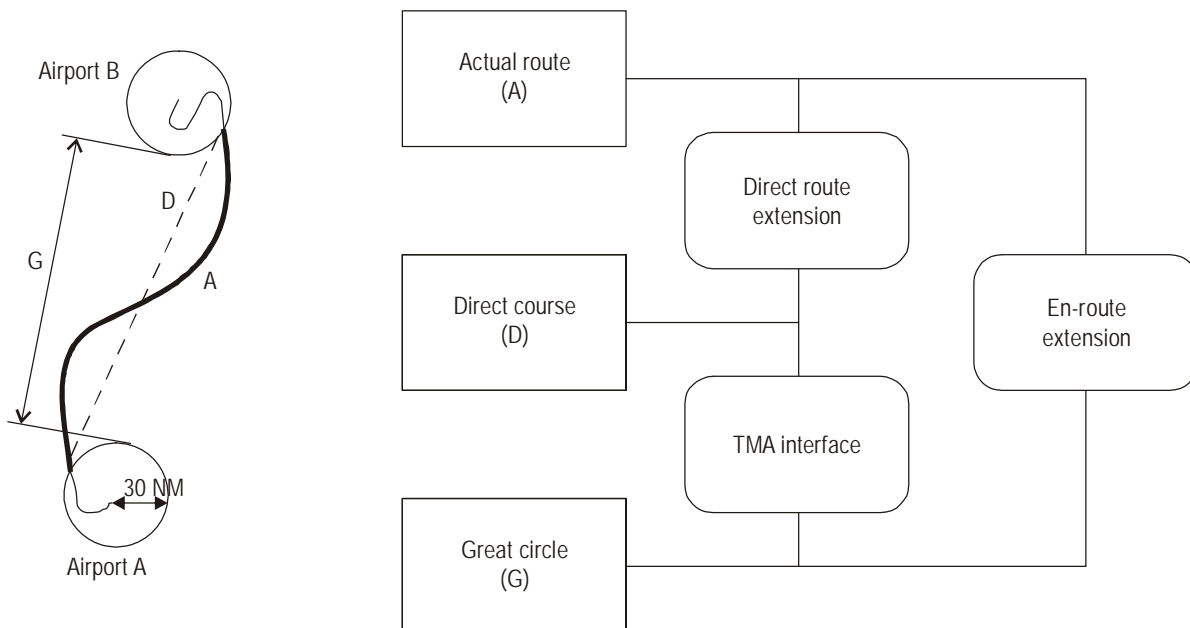
- b) *Flight efficiency* may be considered in terms of the frequency and duration of deviations from optimum routes. Flight efficiency should be compared against a baseline of individual user-preferred 4-D trajectories because it is up to individual users to define the criteria that determine their optimum (most efficient) solution.

Flight efficiency can be divided into two main categories: horizontal efficiency and vertical efficiency. Figure 4-3 describes a high-level framework that can be used to measure and compute en-route horizontal flight efficiency outside a certain distance around departure and arrival airports compared to the great circle distance. This framework allows en-route extension to be broken down into a number of performance ratios:

- en-route extension means the ratio between actual route distance to the great circle distance. *All other things being equal, lower en-route extension will improve flight efficiency;*
- direct route extension means the ratio between actual route distance to direct route distance. *All other things being equal, lower direct route extension will describe a straighter en-route path and will improve flight efficiency;*
- TMA interface means the ratio between direct route distance to great circle distance. *All other things being equal, lower TMA interface will highlight a good TMA configuration which allows flights to rapidly take an optimum route and will improve flight efficiency.*

In addition, other potential indicators of flight efficiency include:

- vertical deviations from the requested/optimum flight level;
- horizontal deviations from the requested/optimum route.



**Figure 4-3. Horizontal flight efficiency framework**

- c) *Predictability* refers to the ability of the airspace users and the ANSPs to provide consistent and dependable levels of performance and is measured by delay variance. Predictability is essential to airspace users as they develop and operate their schedules. Examples of potential delay indicators include:
- average delay per flight, per flight hour, per delayed flight (in en route or in terminal);
  - percentage of flights with or without attributable delays;
  - number of delays by cause or per region (sector, ACC, ...);
  - number of days with average ATM-related delays of more than one minute;
  - number and/or average duration of delays attributable to ATC;
  - number and/or average duration of departure, en-route and arrival delays;
  - time in stack that could be analysed into per time of day and per airport; and
  - difference between actual aircraft block time compared to the theoretical time associated with published service or requested plans.
- d) *Availability* means the ability of a system to perform its required function at the initiation of the intended operation. It can be described, for example, by the incidence of air navigation equipment outages affecting customers. Incidence may be measured by number of outages, average duration of an outage, and mean time between equipment failures.
- e) *Accessibility* of services provided to different user groups, for example, for regional and local services, and for general aviation.

### *Productivity*

4.55 Productivity performance indicators measure the quantity of output produced by a unit of input. The outputs of ANSPs are generally the quantity of traffic controlled in a given airspace. Typical indicators include:

- a) number of aircraft per centre, per sector or per air traffic control officer (ATCO);
- b) flight hours per centre, per sector or per ATCO;
- c) instrument flight rules (IFR) flight hours per centre, per sector or per ATCO; and
- d) IFR kilometres per centre, per sector or per ATCO.

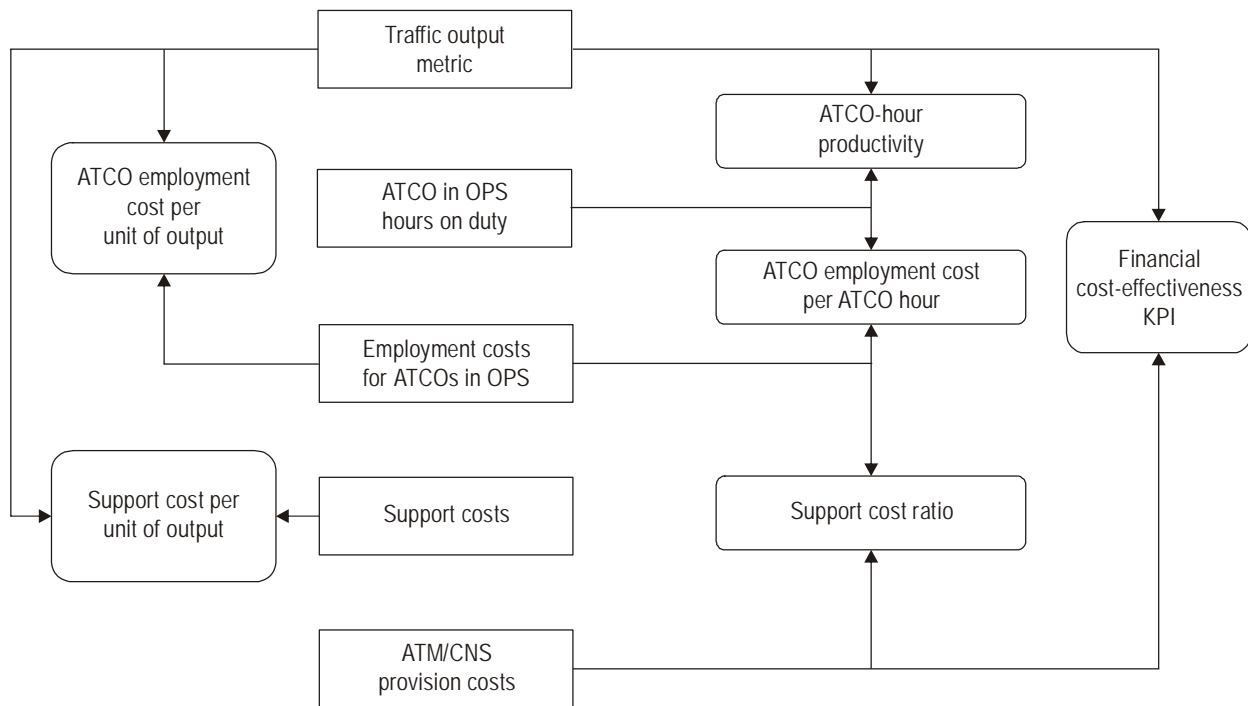
4.56 Alternative or additional indicators may include:

- a) IFR aircraft movements per terminal ATCO;
- b) total support staff per ATCO; and
- c) flight hours (or kilometres controlled) per unit of capital employed.

In all the previous indicators, ATCO can cover ATCO in operations (OPS) only or the total number of ATCOs in the entity.

### *Cost-effectiveness*

4.57 Cost-effectiveness is generally measured as the cost per unit of output and can be largely divided into two types: financial cost-effectiveness and economic cost-effectiveness. To measure financial cost-effectiveness, the high-level framework depicted in Figure 4-4 may be used.



**Figure 4-4. Financial cost-effectiveness framework**

4.58 The framework illustrated in Figure 4-4 allows financial cost-effectiveness to be broken down into a number of cost-driver performance ratios:

- a) ATCO-hour productivity means the ratio of the traffic output metric to the hours spent by ATCOs in OPS on operational duty. *All other things being equal, a higher ATCO-hour productivity will improve cost-effectiveness.*
- b) ATCO employment cost per ATCO hour means the ratio of ATCO employment costs to the number of hours on duty. It represents therefore the average employment cost per hour on duty. *All other things being equal, a lower employment cost per ATCO hour will improve cost-effectiveness.*
- c) Support cost ratio means the ratio of total ATM/CNS provision costs to the costs for employing ATCOs. In other words, it indicates for each dollar (or any other currency) spent on employing ATCOs what the additional amount of dollars spent on other costs (comprising other staff costs, non-staff operating costs, and capital-related costs) is. *All other things being equal, a lower support cost ratio will improve cost-effectiveness.*
- d) ATCO employment cost per unit of output means the ratio of the employment costs for the ATCOs in OPS to the traffic output metric (measured in composite flight hours). *All other things being equal, lower ATCOs in OPS employment costs per unit of output will improve financial cost-effectiveness.*

- e) Support cost per unit of output means the ratio of support costs (defined as the sum of non-ATCO employment costs, non-staff operating costs and capital-related costs) to the traffic output metric. *All other things being equal, lower support costs per unit of output will improve financial cost-effectiveness.*

4.59 Furthermore, ATCO employment cost per ATCO hour (described in 4.58 b)) can be further broken down into the following two elements:

- a) "Average hours on duty per ATCO in OPS" means the contractual working hours, plus the average overtime worked in OPS, minus the average time an ATCO is not on duty in OPS. *All other things being equal, more hours on duty per ATCO improve cost-effectiveness.*
- b) "Employment cost per ATCO" means the total employment cost for an ATCO in OPS comprising the gross wages and salaries, overtime payments, employers' contributions to social security schemes and taxes directly levied on employment, employers' pension contributions and the cost of other benefits. *All other things being equal, lower ATCO employment costs lead to lower ATM/CNS provision costs and so to higher cost-effectiveness.*

4.60 In addition, other potential indicators may include:

- a) ATC cost per flight, per IFR flight hour, per kilometre of IFR flight, per sector or per centre;
- b) operating cost per IFR flight hour, per kilometre of IFR flight, per sector or per centre;
- c) employment cost per ATCO in OPS hours;
- d) non-staff related operating costs per ATCO in OPS hours; and
- e) METAR cost per flight or per airport.

4.61 Economic cost-effectiveness looks at opportunity costs to be incurred when the services provided by an ANSP do not reach an acceptable or desirable level of quality (for example, ATM capacity-related delays and degradation of flight-efficiency). Opportunity costs are often produced due to external cost drivers such as airspace complexity. Airspace complexity may affect the number of sectors required for a given level of traffic. Three generally recognized measures of airspace complexity are vertical distance, number of proximate pairs per kilometre flown, and density adjusted to reflect the concentration of traffic that takes into account airspace congestion.

4.62 Given that the performance objective is to minimize the overall costs, these opportunity costs need to be taken into consideration for a full economic assessment of an ANSP's performance. To this end, a performance indicator of economic cost-effectiveness could comprise, besides the costs for service provision, the cost of delay and the cost of flight inefficiency per unit of output.

4.63 Cost-effectiveness and productivity are related through the unit cost of input. A productivity indicator can be converted into the related cost-effectiveness indicator by multiplying the inverse of the productivity indicator by the unit cost of the input.

### **Data collection and processing**

4.64 Good quality information is a most valuable asset to the whole performance management process and hence information systems must provide all the relevant data. However, data collection and processing (as well as storage and analysis) are not cost-free and may require some investments. ANSPs should always take care that the benefits of data collection and processing justify the cost incurred and that the effort and money spent on the collection

and processing of data are actually used to improve the effectiveness of decision making. It should be noted that ANSPs do not require sophisticated information systems in order to start performance measurement. Management can subsequently add refinements as required.

4.65 For performance management to be effective and credible, it is important to adhere to certain guidelines on data collection and processing. First, the data used must be obtained from relatively accurate sources. Second, the compilation of data should be thorough with clear definitions of services and units of measurement, and if estimation procedures such as sampling are used, they should be free from bias as much as possible. Third, consistent, transparent methodologies should be used to compile or estimate results. Without consistency, changes in performance cannot be meaningfully interpreted (for example, is the observed change caused by a difference in measurement method or by a real difference in performance?).

## PERFORMANCE TARGETS

### Establishment of performance targets

4.66 Each performance indicator should have a unique target value that needs to be reached or exceeded over a predetermined period in order to consider whether a performance objective has been achieved. Performance targets can be set as a function of time (i.e. the required speed to achieve the targets) and at different aggregation levels (i.e. local, regional or even global). They can also vary by geographic area.

4.67 Realistic and achievable performance targets should be developed in consultation with users and other interested parties. The determination of a baseline performance (i.e. an initial performance level) is a prerequisite to setting performance targets. The baseline performance should be established, taking into account the past year's performance, industry standards (benchmarks), the State's (or an economic oversight entity's) expectations for performance, and analytic work on potential performance improvements and trade-offs. Knowledge gained through the baseline performance and modelling of future scenarios can provide guidance as to achievable target values for performance indicators.

4.68 Target-setting depends on the nature of the objectives and other circumstances. In some cases, the performance targets may be dictated by external circumstances such as a cost reduction of a specified amount or per cent in response to an industry downturn, or a budget cut imposed on a government-owned ANSP. More typically though, the targets should relate to the ANSP's ongoing efforts to improve over time. In this case, they may be more nuanced (for example, established as "meeting", "exceeding" or "far exceeding").

### Creation of a plan to achieve the targets

4.69 Achievement of performance targets may require new initiatives, while ANSPs typically have limited resources. Prioritizing staff, financial and infrastructure resources and efforts is important to ensure achievement of the targets. In this respect, decision makers need to gain a good understanding of the strategic fit, the benefits, cost and feasibility of each initiative for performance improvement. To plan how to achieve the targets, it is suggested that an ANSP:

- a) determine what initiatives need to be taken to close current performance gaps, i.e. the shortfall between the baseline performance and its performance target;
- b) estimate the budget, staff, and management time required for each initiative;



- c) prioritize each initiative to most efficiently close performance gaps;
- d) if there are a significant number of new initiatives, determine what non-critical work can be stopped or deferred to free up the resources required to achieve the targets;
- e) establish internal commitment to each initiative and collaboration with users and other interested parties through consultation; and
- f) make public the relevant parts of the plan, in particular targets to be achieved and the performance incentives that the ANSP may be subject to (see paragraphs 4.70 to 4.75).

### Performance incentives

4.70 Incentives may be incorporated in the performance management process to help the achievement of the performance targets. Although incentives may apply to both ANSPs and users, the following paragraphs focus on financial incentives for ANSPs (incentives for users are described in Chapter 5, Part G).

4.71 There are a variety of potential incentives that ANSPs can initiate on their own. Such incentives include, but are not limited to, the following:

- a) compensation of ANSP employees tied to meeting performance targets;
- b) share in cost savings/profits amongst ANSP staff for meeting performance targets;
- c) service level agreements with users; and
- d) mechanisms to share traffic and cost risks between ANSPs and users.

4.72 There are also potential incentives that States can establish for ANSPs through some forms of economic oversight. The archetypal example is price cap regulation (see Chapter 1, Part C) under which performance targets for productivity and cost-effectiveness can be set through the introduction of an incentive “x” factor. This means that all traffic and cost risks are for the ANSP. Some other forms of price cap regulations also exist, which introduce a sharing mechanism of traffic and cost risk between ANSPs and users.

4.73 States can also decide to incentivise ANSPs by creating an independent body that will be in charge of reviewing and reporting on a regular basis the performance of ANSPs over time and compared to each other (sometimes defined as sunshine regulation).

4.74 When introducing incentives for cost reduction, States should ensure that safety will not be affected and that quality of service will be maintained at a satisfactory level.

4.75 It should be noted that financial incentives are not necessarily compatible with the full cost-recovery principle, which means by definition that the ANSP should recover all its costs through charges. Within the full cost-recovery principle, any penalty applied to the ANSP would have to be considered an extra cost, which would then have to be charged back to the users. As a consequence, any incentive effect would be lost. Conversely, any reward granted to the ANSP would have to be considered as surplus income, which would then have to be passed back to the users through a decrease in charges if an adjustment mechanism is in place.

## PERFORMANCE ASSESSMENT AND REPORT

### Assessment and applying results

4.76 A performance assessment continuously keeps track of performance and monitors whether progress is being made in achieving performance objectives and targets. Performance assessment or measurement can start once the required data on performance indicators and targets, as well as actual performance results, are available and should be performed at regular time intervals, at least annually.

4.77 The critical step in a performance assessment is to develop a factual understanding of the reasons for (good/bad) performance and to explain these reasons to high-level decision makers. To this effect, managers in charge should compare actual performance results with performance targets and analyse historical trends of performance results. They should look at the big picture (annual totals and averages, performance results) and also drill down to very detailed levels. If an organization is getting better-than-expected results, managers should determine what factors are causing improved performance and analyse whether those factors could be applied in other areas. If there are deficiencies, cases where performance is not as expected despite the implementation of initiatives designed to achieve targets, managers should determine the root cause of the problem and how it can be improved. It is important to note that the purpose of assessment is not punitive but to assist in the achievement of planned performance improvements.

4.78 An integral part of the performance assessment is the formulation of recommendations, which will fall typically into the following categories (not exhaustive):

- a) recommendations related to the need to improve performance data collection;
- b) suggested initiatives aimed at closing identified performance gaps;
- c) suggestions to accelerate or delay performance improvements, based on the anticipated evolution of traffic demand and predicted performance indicator trends; and
- d) recommendations of an organizational nature (set up a task force, define an action plan, etc.) with a view to actually starting the implementation of the above recommendations.

4.79 Recommendations should also focus on how to meet aviation community expectations through agreed performance objectives and targets. When inconsistencies between expectations and performance objectives and targets are found, recommendations may include the need to (re-)define performance objectives and/or the need to set or change performance indicators and targets.

### Benchmarking

4.80 Performance assessment can be used to define a benchmark from which to compare the quantity and/or the quality of different services provided. There are two types of benchmarking, internal and external.

4.81 Internal benchmarking or self-benchmarking within an individual ANSP might be the average performance of facilities of a given type or the performance of a specific facility at a point in time. In the former case, individual facilities are compared to the average level of performance, while in the latter case changes in performance of a single facility over time are compared to its benchmark period. Establishing a benchmark provides an individual ANSP with the opportunity to assess performance levels against its own standards.

4.82 External benchmarking compares performance of an individual ANSP with the performance of other ANSPs at a single point in time and through time. Great care should be taken when making such external benchmarking. The definition and specification of performance objectives and indicators, the methodology of data compilation, and

accounting practices need to be identical between the ANSPs compared. Also, it is important to compare ANSPs that have similar characteristics, such as airspace complexity, traffic volumes, weather patterns and physical geography, as these characteristics greatly affect performance and resource requirements.

4.83 The results of benchmarking must be readily understandable at a decision maker's level and provide a basis for discussion and awareness for all stakeholders including users. Benchmarking can:

- a) improve transparency of a performance management process;
- b) provide insight into opportunities for improvements in the performance (learning opportunities, setting performance targets) of individual ANSPs;
- c) highlight best practices for delivering improvements in performance through the identification of highly efficient or high-quality service facilities and/or processes;
- d) support more effective regional coordination and planning, thereby rationalizing and avoiding duplication of efforts;
- e) support constructive dialogue with users and other interested parties; and
- f) provide global reach to expand the knowledge base.

#### **Investment analysis**

4.84 Performance assessment can help support and justify investment decisions. As the investment decisions regarding changes to the provision of air traffic services become more complex, the need for a thorough assessment of performance increases. The identification of best practices and associated levels of output and quality can help estimate the potential benefit or return that could be produced by investment in facilities and equipment, as well as the optimum size of investment.

#### **Forecasting**

4.85 Performance assessment results can be used to forecast needed capital and staff investments to meet short-term and long-term demands. Forecasts are an important input to cost-benefit analyses associated with infrastructure development. They can also be used to plan for air traffic controller staffing requirements.

#### **Information disclosure and performance report**

4.86 While information disclosure is often an obligation imposed on a statutory monopoly as the counterpart of its monopoly rights and on a public company whose registered securities are traded in the market, it is also an essential component of a performance management process for all ANSPs. Periodic dissemination of appropriate performance information can build public confidence in the ANSP and enable an effective dialogue between all interested parties. It can also support setting objectives/targets and encourage ongoing thinking about what works to improve performance and what improvement opportunities can be pursued by offering a measurable means by which to ascertain how an ANSP is performing against its stated objectives and targets.

4.87 Performance reports normally describe the performance indicators established, the targets selected and the actual results achieved. ICAO's policies on charges in Doc 9082 (Section I, paragraph 16 ii) recommend that, as minimum reporting requirements, at least one relevant performance indicator and its target, for each of the KPAs selected, should be reported. To assist readers with interpreting the report's findings, the derivation of the performance

assessments used, along with a discussion of how these assessments were applied, is also incorporated either directly within the report or by reference to a public document. The level of detail to be provided depends on the circumstances. For example, the information disclosure can be quite comprehensive if it has to be used for the purpose of a price cap regulation.

4.88 Performance reports need not be limited to a review of the ANSP's past performance, but can, to the extent practicable, look forward, anticipating the future needs of the aviation industry. To this end, at the discretion of the individual ANSP, it may be appropriate that the reports include recommendations (see paragraphs 4.78 and 4.77).

4.89 A diverse audience with varied interests will likely read the performance report. Therefore, to ensure that the report addresses the needs of all the stakeholders, including users and regulators, ANSPs should consult with them during the development phase of the report and periodically solicit feedback once the report is published. Performance reports prepared by third parties may be valuable complements to those produced by ANSPs and may assure that stakeholders' needs are addressed; however, such reports should not be a substitute for reports prepared by ANSPs.

4.90 Subject to the limitations mentioned in paragraph 4.82, performance reports could be used as a means of benchmarking an ANSP's performance against other similar ANSPs, in particular on a regional or global basis. By addressing both regional and global issues, the report can facilitate cooperation to improve air traffic control on international routes, provide examples and incentives regarding alternate or new ATM techniques and equipment, and ensure that international obligations are addressed.

4.91 For transparency, performance reports should be readily obtainable and made available to users and other interested parties on a timely basis (for example, placing performance information in the public domain wherever it is possible or practicable to do so). Whether performance reports are subject to an independent audit is left to the discretion of the State.

4.92 In view of the interdependencies of ANSPs, a group of States may also entrust an independent body to undertake regular performance reports in order to obtain an independent assessment of the situation at a regional level, ensuring a homogeneous data definition, collection and analysis, as well as proposed recommendations that could serve as a reference for decisions to be taken at a regional level.

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## CHAPTER 5

### The Process of Setting Air Navigation Services Charges

Divided into ten parts, this chapter offers guidance on how to determine the cost basis for air navigation services charges and the various aspects of levying air navigation services charges.

Part A gives broad descriptions of accounting systems designed to meet requirements for certain specific management functions.

Part B focuses on the inventory that needs to be drawn up of all the air navigation facilities and services that directly provide services for aircraft en route as well as approach and aerodrome control.

Part C provides guidelines on how to determine the cost basis for air navigation services charges.

Part D deals with the allocation of costs to non-aeronautical and various aeronautical functions, focusing in the case of the latter on such functions as airport and en-route utilization, service location, and categories of users.

Part E addresses the establishment of the cost basis for individual air navigation services charges.

Part F refers to special costing considerations pertaining to CNS/ATM systems.

Part G addresses various factors that need to be considered once costs attributable to air navigation services have been determined, before the charges are set.

Part H suggests systems to be applied with regard to individual types of charges, i.e. route charges, approach and aerodrome control charges, and how charges could or should be established in each instance.

Part I focuses on various factors related to the collection of charges, for example, when charges are to be paid, and collection problems.

Part J reflects on charges and cost-recovery aspects of CNS/ATM systems.

## PART A — ACCOUNTING

### GENERAL

5.1 A basic characteristic of air navigation services provision is that it may not be provided by one entity alone and, in so far as the three major components, ATS, COM and MET, are concerned, two or three different entities may be involved. This may add to the task of accounting for air navigation services costs since, where the above is the case, separate entities will need to maintain the accounting information required. It is incumbent on ATS, COM and MET providers in these circumstances to ensure that any charges reflect solely the costs attributable to the respective air navigation services they provide. As already noted, because of these organizational characteristics, exercise of proper financial control over the provision of air navigation services is essential.

5.2 Accounts need to be kept for the entity that provides the central function of ATS (and often limited or even extensive associated communications services as well as SAR coordination and AIS) because ATS is also the entity that as a rule imposes and collects such air navigation services charges as may exist in the State concerned. Moreover, the charges levied may not be set at the level required to recover the costs of only the entity providing ATS (and any other associated air navigation services) but may include an additional element or elements for recovering the costs of one or more other entities providing other such services. The guidance outlined in this part should primarily be considered in the context of the entity or body providing ATS and other associated air navigation services.

5.3 When designing/upgrading an accounting system, reporting flexibility should be a critical design component. In order to achieve such flexibility, it is essential to understand the accounting process leading to the production of financial statements as well as financial records for different activities, e.g. en-route services, and approach and aerodrome control services and/or locations, e.g. area control centre, approach control office and individual airports. While the accounting process behind financial statements is referred to as financial accounting, the process allocating financial data to activities and locations is often referred to as management accounting. Figure 5-1 illustrates how the accounting system may be organized for an air navigation services entity and the relationship between financial data and the cost basis for air navigation services charges, which is discussed below.

### FINANCIAL STATEMENTS

5.4 Air navigation services operated as autonomous entities, under public or private ownership, are normally required to provide the following financial statements: income statement (revenue and expense statement), balance sheet and cash-flow statement. However, where air navigation services are operated by a government department or agency, the preparation and provision of a formal balance sheet and a cash-flow statement are normally not required. In order to produce the financial statements, it is necessary to develop a system for identifying various types of financial outlays and receipts. This involves establishing individual accounts, each showing a specific type of revenue, expense, asset or liability and cash flow. While the income statement shows the revenues and expenses of the entity over a specific time period, the balance sheet is a snapshot of the financial status of the entity on a specific date, showing the value of assets and liabilities with the resulting net value of equity (including retained earnings). The number of accounts established for the accounting system of a specific provider will depend on the degree of detail sought, i.e. the more elaborate the system, the greater will be the subdivision of accounts established.

5.5 All accounting systems will need to meet the basic criteria required for stewardship, governance and financial control. Although the level of sophistication required will depend on the needs of the organization and its management and its decision-making processes, it should not be assumed that an elaborate and highly sophisticated accounting system is always the most desirable. In establishing or developing the system, primary emphasis should be on its ability to generate the information deemed essential.

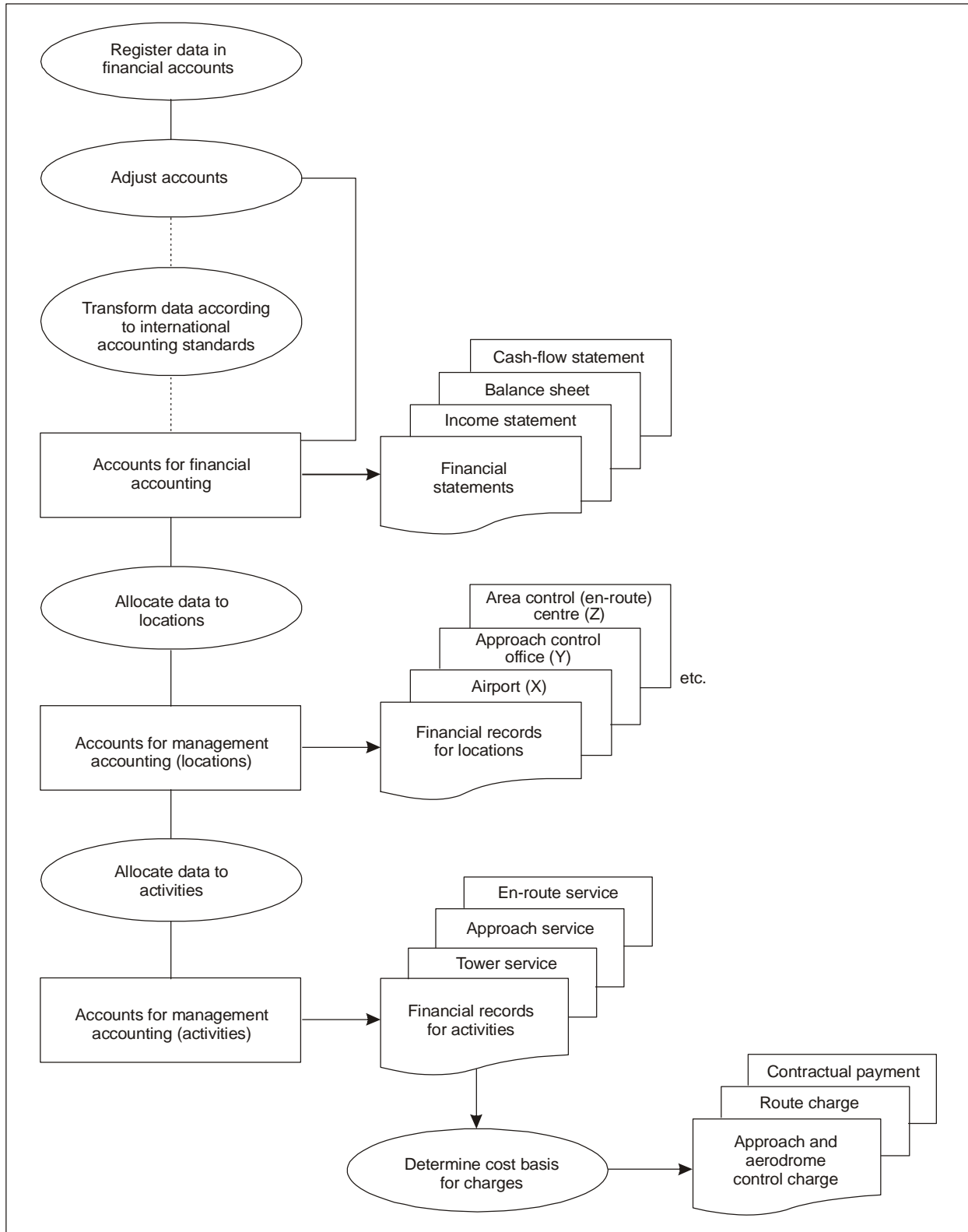


Figure 5-1. Accounting and cost determination process

5.6 Accounts recording income and expenses can be maintained on an accrual accounting basis or a cash accounting basis. Under accrual accounting, income is accredited to the period (usually the financial year) in which it is earned and expenses are charged to the period when they are incurred. On the other hand, under cash accounting, income is accredited to the period when it is received and expenses are recorded when paid. Accrual accounting systems better reflect the financial position of the entity concerned and reflect standard accounting practice.

5.7 Accounting data have two primary uses. The first, and generally the better known, is to present to interested parties pertinent financial data regarding the financial position of the air navigation services entity, i.e. to show the revenues and expenses and the profit or loss situation during a given period, as well as the status of the provider entity regarding its assets and liabilities. The second use is to provide a factual historical framework for financial control. In addition, the accounting system provides management with data to enable it to manage its operation and assess the performance of the entity over time as well as providing a source of data for determining the cost basis for air navigation services charges.

5.8 For various purposes, such as obtaining financing or for recovering costs, it may be necessary to convert the entity's financial statements into a format that is familiar to a lending institution or an international airline. International accounting principles, such as the United States Generally Accepted Accounting Principles (GAAP), or International Accounting Standards (IAS), or any other similar recognized standard would be commonly acceptable.

5.9 The identification and subsequent recording of items is usually more easily accomplished for revenues than for expenses. This is chiefly because revenue sources tend to be fewer in number than expense items and because each revenue item, with few exceptions, is often easily identifiable with only one type of source, whereas one expense item can frequently be identified with several major expense categories. The information required in an accounting system for air navigation services can vary considerably in detail and layout. The precise level of detail will depend on management requirements at the air navigation services entity concerned. However, there is a basic itemization of revenues and expenses that may perhaps be considered a minimum and this is described in the following sections.

## REVENUES

5.10 Revenue items that may be considered essential to meet the basic data needs of air navigation services management are outlined below as they might appear in an income statement (the items shown are not intended to present an exhaustive list of the different sources of revenue).

Air traffic operations	
Route charges.....	----
Approach and aerodrome control charges.....	----
Payments from airports for air navigation services provided.....	----
Revenues from airport charges allocated to air navigation services .....	----
Total air traffic operations without deductions .....	----
Less portion collected for other providers of air navigation services .....	----
Net revenue from air traffic operations .....	----
Revenues from ancillary activities .....	----
Bank and cash management revenues.....	----
Grants and subsidies .....	----
Other revenues .....	----
Total revenues .....	—

The following paragraphs indicate what should be included in the individual revenue items.



### **Air traffic operations**

- 5.11 *Route charges.* This includes charges and fees levied for the provision of en-route air navigation services.
- 5.12 *Approach and aerodrome control charges.* This includes charges and fees levied for the provision of approach and aerodrome control services.
- 5.13 *Payments from airports for air navigation services provided.* This includes payments received from airports for air navigation services provided (normally under contract).
- 5.14 *Revenues from airport charges allocated to air navigation services.* This includes any revenues from airport charges (e.g. landing charges) which are applied towards offsetting the cost of providing air navigation services.

### **Portion collected for other providers of air navigation services**

- 5.15 This is a deduction of any such portion of the charges collected which represents the amount collected on behalf of and transferred to one or more other providers of air navigation services and applied by them to defray their costs of service provision.

### **Revenues from ancillary activities**

- 5.16 This refers to all revenues that may be derived from activities ancillary to the provision of air navigation services such as the rental of premises, payments received for such services as heating, air conditioning, lighting, water, cleaning and telephone use provided they are not included in the rental fees, and for any services provided to non-aviation entities.

### **Bank and cash management revenues**

- 5.17 This includes any revenues derived from bank and cash management such as interest on bank accounts, treasury bills, short-term debentures and bonds, or from trading in discounted notes and other similar revenues. Interest received may be deducted from interest paid to arrive at a net interest cost which is then shown as an expense item.

### **Grants and subsidies**

- 5.18 This covers any payments received and not requiring the transfer of assets or provision of services in return. This may entail a payment by the State to cover services that are exempted from charges or to cover the full cost of providing services to some users.

## **EXPENSES**

### **General**

- 5.19 Accounting for air navigation services expenses is normally a two-step procedure: first, accounting by category of expense (salaries, supplies, etc.) and then accounting by activity (e.g. en-route services, and approach and aerodrome control services) and/or location (e.g. area control centre, approach control office and individual airports) to

which the expenses relate. Depending on the accounting system in use, it may be more appropriate to complete these two steps separately, recording expense items in a general accounting system and allocating expenses by activity and location in a separate costing system.

5.20 Accounting by category of expense is simpler since each expense incurred can as a rule be entered under one item, e.g. the purchase of paper can be entered under supplies. However, the shortcoming of this method is that it does not permit management to be aware of the costs incurred for each of the major activities (area control, and approach and aerodrome control) carried out by the entity providing the air navigation services, be that a civil aviation administration or an autonomous entity. This is even more important when considered in the context of cost-recovery for air navigation services (for example through route charges, approach and aerodrome control charges and/or charges to an airport).

5.21 Accounting for expense by activity and location is more complex where each expense is allocated to the activity and location concerned, e.g. the cost allocation of an air traffic controller's salary would depend on where the individual worked and/or the nature of the activity performed (such as in an area control centre, an approach and departure control office or at a specific airport).

### **Accounting by category of expense**

5.22 Basic financial accounting is performed by category of expense and usually follows generally accepted accounting standards and statutory requirements. The detail will vary according to local practice but the following are likely to be the minimum required for published accounts.

Staff expenses	----
Other operating expenses	----
Depreciation	----
Interest	----
Extraordinary/abnormal expenses	----
Taxes	----
 Total expenses after tax	 —

Further particulars on what should be included in individual expense categories are contained in the following paragraphs.

#### *Staff expenses*

5.23 This includes all categories of direct remuneration (including overtime and allowances). In addition it includes social-security costs, pension contributions and other staff-related expenses. Depending on the practice in individual States, training may be included in this category or as part of the "other operating expenses" category.

#### *Other operating expenses*

5.24 This includes general and administrative expenses such as the cost of utilities (e.g. electricity, water); legal fees and insurance; rent and rates; telecommunications services; contracts for purchased services including, where applicable, meteorological services as well as repairs and maintenance; research and development; leasing charges; other third-party services and contributions to relevant international organizations which may also need to be recorded. Depending on the practice in individual States, major items of expense in this category may be separately identified in published accounts.

### *Depreciation*

5.25 Depreciation is the decrease in the value of an asset due to wear and tear through use, action of the elements, inadequacy or obsolescence, normally over a predetermined period of time (depreciation period/book life of the asset).

5.26 The term “depreciation” is often used interchangeably with the term “amortization”. The terms have the same meaning although depreciation is generally used in relation to tangible fixed assets while amortization is generally used in relation to intangible fixed assets, e.g. a patent or copyright.

### *Interest*

5.27 This refers to interest on all debt used for the funding of the entity’s working capital and investment programme. In some States accounting conventions may require the deduction of interest received from interest paid to arrive at a net interest expense.

### *Extraordinary/abnormal expenses*

5.28 Extraordinary expenses are attributable transactions or events of a type outside the ordinary operations of the entity and are not of a recurring nature. Abnormal (or exceptional) expenses are those considered abnormal by virtue of their size and effect on the operating result and are separately identified in order to give a “true and fair” view of the entity. Depending on the practice in individual States, abnormal expenses may be shown before or after tax.

### *Taxes*

5.29 This category generally includes direct taxes payable on operating profit. Indirect taxes such as property taxes, licence fees and stamp duties are normally included in the “other operating expenses” category.

## **Expenses by activity and location**

5.30 An advanced accounting system designed to allocate the costs of providing air navigation services requires that every category of expense (such as those just described) be reviewed and attributed to clearly defined activities and locations, taking account of the structure of the air navigation services organization and the way that the services are provided to users. Such activity-based costing may be undertaken within the general accounting system or may be done in a separate system which draws on (or is linked to) the recording of expense items in the general accounting system. A simpler accounting system allocates costs at a more aggregate level. (Such an approach is described in 5.35 and 5.36.) Cost allocation is undertaken to assist the management of the air navigation services organization to understand and monitor costs and to establish the costing of services for the purpose of recovering those costs from users. Care must be taken to define and maintain appropriate criteria for allocating costs to activities and locations. For example, the expense item for salaries paid to maintenance staff (as recorded in the general accounting system as part of staff expenses) needs to be allocated both by activity (e.g. maintenance of navigation aids, radar or communications facilities) and the location where the maintenance work is undertaken (e.g. an airport). Categories of expenses can relate to more than one activity or location (e.g. the salary for air traffic controllers serving more than one location or activity will need to be allocated between those locations and activities on a proportional basis using operational criteria such as staff hours or aircraft movements). Allocation criteria should be reviewed periodically to reflect changes in the way that air navigation services are provided. Cost allocation can be done at the same time that categories of expenses are recorded in the general accounting system or can be done periodically (e.g. monthly or every six months) as required. Further details on cost allocation are provided below.

5.31 An example of classifications that could be used for recording the costs by activity follows. This list is not intended to be exhaustive; the number and definition of categories should be determined with the needs of the air navigation services organization in mind.

- a) Air traffic services:
  - aerodrome control services;
  - approach control services;
  - en-route services;
  - flight planning and flight information services.
  
- b) Engineering and maintenance services:
  - communications facilities;
  - navigation aids;
  - radar;
  - flight calibration.
  
- c) Administrative services:
  - executive management;
  - finance management;
  - human resource management.

The initial allocation of costs by activity may be geared to internal management requirements. Some costs, such as administrative services costs, and even engineering and maintenance costs, may need to be further allocated to the broader categorization of activity which is used by the air navigation services entity to determine the revenue targets it will use for the purpose of recovering costs from the users. This higher level categorization of activity could be, for example, en-route, approach control or aerodrome control services.

5.32 Allocation of costs by location would depend upon the deployment of facilities and staff by the air navigation services organization and the way that the organization provides services to users. Location-based costs may need to reflect the location at which a service is provided and not always the location at which the costs are incurred.

5.33 Cost allocated by activity and location would need to capture the more significant elements of operation and maintenance, and administrative costs so that, in broad terms, they include all related costs, including, in particular, staff expenses, the expense of power and any spares consumed by radar, receiving and transmitting stations, precision approach and landing aids (not applicable with regard to ACCs or FICs), VORs, NDBs and other equipment and facilities employed to provide air navigation services. Also, any payment made to any other entity for providing such services, or other services, would need to be allocated.

5.34 Not mentioned in the preceding paragraph, but dealt with above under the heading "Accounting by category of expense", are depreciation, indirect taxes and possibly interest, and it should be understood that these costs will also need to be redistributed by activity and location. Moreover, an asset register should be kept. This would not only provide a link between the physical assets and accounts but would also facilitate the allocation of depreciation to activities and locations.

#### **Cost allocation by functional location**

5.35 For the purpose of cost allocation, an accounting system and supplementary financial information should, in line with ICAO's policies on charges in Doc 9082, Section III, paragraphs 1 and 2, record costs by the functional locations under which it is intended to redistribute the costs recorded in the main accounts, including those costs

mentioned in 5.33 and 5.34. Thus, for example, salaries paid to maintenance staff would be entered both in the main account for staff costs and in the subsidiary accounts for different functional locations, on a prorated basis, according to the hours of maintenance devoted to each. Entries in the main and subsidiary accounts would best be made at the same time in cases where any cost is of a non-recurring nature, but where particular costs are repetitive, such as salary payments, and are attributable to more than one functional location, the necessary cross-entries to subsidiary accounts may be made periodically, say monthly, to economize on the work of prorating.

5.36 A useful classification of subsidiary accounts for an accounting system recording costs by air navigation services functional location would be:

Area control centre (or flight information centre) A.....	----
Area control centre (or flight information centre) B.....	----
Approach control office A.....	----
Approach control office B.....	----
Airport A — Air traffic services .....	----
Airport B — Air traffic services .....	----
Airport C — Air traffic services .....	----
 Total expenses.....	 —

The area control centre costs would generally correspond with en-route services; the approach control unit costs generally with approach control services; and airport costs generally with aerodrome control services.

#### **Other aspects of expense accounting**

5.37 From the foregoing explanations it is clear that the two expense recording systems described may be regarded as complementary and progressive steps in the development of an accounting system, the accounting for expenses by functional location being in essence a regrouping of an accounting system recording expenses by category. In the case of the latter, the individual accounts referred to under “category of expense” above represent a basic minimum, and where greater accounting detail is called for, as will generally be the case, their further subdivision into sub-items will be necessary. Staff expenses, for example, may be subdivided into direct remuneration, social and medical insurance, pension fund payments, etc., and further subdivided by employee group or functional location, etc. Similarly other main items may be broken down into numerous other accounts.

5.38 Purchases give rise to special questions since they can be treated either as capital assets or as expenditures. The choice of treatment is normally found in national accounting standards or possibly in the guidelines and policy decisions of the entity providing the air navigation services. In reality there are two basic reasons for capitalizing expenditures: first, to enable a charge to be made against future income for the use of the asset and, second, to arrive at a reasonable value for assets with unexpired lives after one year. The policy decision is normally framed in terms of a statement to the effect that at a certain level of expenditure an item will be capitalized. It could state that it is a policy that expenditures on a durable item will be capitalized at a certain level of expenditure and where the asset life of the item concerned extends over a certain specified period of years. This is normally followed by a list of examples to guide administrators in the application of the policy statement. With this type of policy statement, all expenditures are predetermined as either asset account or expense account items.

#### **Monitoring financial performance**

5.39 If the entity providing air navigation services is an autonomous entity, it will not only prepare an income statement and balance sheet to meet statutory requirements but is also likely to analyse the financial results of the different parts of its activities represented by smaller self-contained operating units such as cost centres or profit centres.

For example, a provider of air navigation services may wish to analyse the extent to which its operating results are attributable to continental and/or oceanic en-route services, approach control and aerodrome control services. In addition, the entity concerned is likely to present its operating results on a regular basis throughout the year, e.g. monthly or quarterly, to enable managers to review the financial performance of their operations. As far as the income statement is concerned, the entity will probably need to show how an excess of income over expenditures (or expenditures over income) from the operations of the air navigation services provider is treated in its accounts.

## CAPITAL

5.40 Capital of an entity is normally made up of equity and debt. The long-term capital (i.e. the sum of the share capital, the reserves and the long-term debt) is equal to the sum of fixed assets (net of depreciation) and net current assets (current assets less current liabilities). Capital is therefore made up of equity and debt, each with a different financing cost to the entity.

### Value of assets

5.41 There are different ways of determining the value of assets: among others, historical cost, current replacement cost, or market value, and the value may differ from the balance sheet value. The asset may be valued from the ANSP's perspective or that of the regulators, and whether the assets base is regulated or not may also be a consideration. Asset values are also likely to be depreciated to reflect the wearing out of the assets. Each method will have a direct and different impact on the rate of return.

### Working capital

5.42 Working capital facilitates the working or running of an entity and is the difference between current assets and current liabilities (also known as net current assets), excluding cash in hand and in the bank, and/or an overdraft.

### Capital employed

5.43 In the case of an ANSP that has its own comprehensive balance sheet, it is possible to determine a value for capital employed. For an ANSP that does not have a comprehensive balance sheet, it will be necessary to create one from the underlying accounting records. There is no single generally accepted definition of capital employed because its composition depends on the use to which it is put. It may be defined in terms either of the capital invested in the ANSP or of its assets. The alternatives are shown in Table 5-1. In some cases, the total cost of fixed and current assets can be reduced by non-interest bearing liabilities.

5.44 Some ANSPs are required to achieve a financial return. This can be expressed as a percentage of capital employed and is sometimes referred to as the return on capital employed (ROCE) or return on assets (ROA). When used in this way, it is usual to measure the return as profit before interest and tax. As the return relates to a period of time (e.g. one year), it is also more appropriate to define capital employed as the average over this period rather than at a particular point of time (e.g. end of the year). For the calculation of the return on capital, it is usually adequate to use the average of the opening and closing figures of capital employed over the period concerned.

### Reasonable rate of return

5.45 When defining what costs should be considered in the cost basis for air navigation services charges, ICAO's policies in Section III, paragraph 3 i), of Doc 9082 mention "the full cost of providing the air navigation services

(...), including appropriate amounts for cost of capital”, and further in paragraph 3 vi) “air navigation services may produce sufficient revenues (...) and so provide for a reasonable return on assets”. However, difficulties have been encountered by charging authorities because of the lack of precision of these formulations, in particular, with reference to what should be considered as “reasonable” in terms of rate of return.

5.46 Irrespective of the different structures that can be found in air navigation services management, basic principles have generally been agreed. To arrive at the “cost of capital”, first the financing costs of each part of the capital (i.e. “equity” and “debt”) are calculated as required rates of return (in percentages). Then a “weighted average cost of capital” (WACC) rate is calculated depending on the proportion of equity and debt in the total capital of the organization. This rate is applied to the average capital employed to arrive at the cost of capital. Each component of an ANSP’s capital structure has a different cost rate.

5.47 For organizations in States with a developed economy (where equity and bond markets, sound commercial banks and access to wide capital markets are available), the “capital assets pricing model” (CAPM) provides a general model for calculation of cost of equity. The cost of debt is the actual interest rates applying to the debt capital, although the regulator may take a view on whether the debt has been efficiently incurred. To do otherwise would not incentivise the ANSP to put in place an efficient debt portfolio. However, since the structures of ANSPs vary widely, the CAPM model may need to be modified to meet the requirements of different ANSPs. According to national jurisdictions, taxation may also influence the calculation of WACC.

**Table 5-1. Capital employed**

<i>Liability-based definition</i>	<i>Equivalent asset definition</i>
Total capital share capital reserves long-term debt current liabilities	Fixed assets plus current assets
Long-term capital share capital reserves long-term debt	Fixed assets plus net current assets (i.e. current assets minus current liabilities)
Equity/shareholders’ capital share capital reserves	Fixed and net current assets minus long-term debt

5.48 The exposure to risk for investors in ANSPs can be relatively low when the ANSP enjoys a measure of government guarantee (which may enable it to borrow at sovereign borrowing rates) and/or is able to share traffic variation risk with airlines. In this situation risk exists, but it is borne by the government and/or airlines rather than exclusively by the providers of finance. In principle, there should be the prospect of a greater reward for equity to reflect the high risk that that bears compared to debt. Air navigation services that are in transition from a government service to a corporatized structure often may not have much equity (highly leveraged) but may still enjoy a measure of government guarantee. In these cases, a token return on equity based on borrowing rates may be sufficient. In contrast, for an ANSP with a highly leveraged structure, but without a government guarantee or traffic variation risk sharing, there may be quite

a significant chance of financial failure, and its cost of equity would be high to reflect these risks. For some ANSPs, returns are capped by independent regulators. In such cases the regulator would decide what an adequate cost of capital is. In other cases the State may have a high inflation rate. In these cases a margin on top of the inflation rate would provide the return on equity, and the market interest rates would in any case include an inflationary adjustment. Finally, in States where there is no developed equity or bond market or a robust competitive banking sector, calculating a beta<sup>1</sup> may prove difficult. However, in these cases the obtainable market interest rates should provide guidance on a reasonable cost of equity.

5.49 The CAPM formula states that an entity's cost of capital is equal to the risk-free rate of return (typically the yield on a short-term government bond), plus a premium to reflect the extra risk of the investment, or its beta. Details on the methodology are presented in Appendix 3 together with a practical example. The general guidance provided by CAPM can be adjusted to meet the particular economic environment of the provider.

## CASH FLOWS

5.50 The statement of cash flows helps to measure the financial performance of the air navigation services organization by showing its ability to provide services while generating sufficient funds or cash inflows to cover its cash outflows including payments for interest on borrowing and, when applicable, payments made to shareholders. This information is not provided by the income statement or the balance sheet on their own, since they are usually prepared on an accrual accounting basis which adopts the principle of matching income generated against the liability for expenditure in the period concerned. This is normally achieved through adjusting the cash flows.

5.51 There is a requirement for information on the liquidity, viability and financial adaptability of the air navigation services organization concerned. This can be measured by a statement of cash flows in conjunction with the balance sheet. The balance sheet provides information about an organization's financial position at a particular point in time including assets, liabilities and long-term debt and their relationship with each other at the balance sheet date. Information concerning the organization's liquidity is usually incomplete because the balance sheet is drawn up at a particular point in time. A statement of cash flows on the other hand shows information about the reporting organization's cash flows in the reporting period, the objective being to show the organization's cash generation and cash absorption for the period concerned. It is not a replacement for the income statement and balance sheet, and indeed when assessing future cash flows, it is prudent to use all three statements in order to ensure that likely cash flows generated from earlier transactions are accounted for.

5.52 The statement of cash flows analyses the cash flows under standard headings such as operating activities, returns on investments and servicing of finance, taxation, investing activities and financing. The objective is to ensure that cash flows are reported in a form that highlights the significant components of cash flows and facilitates comparison of the cash flow performance with other entities. A suggested layout for a statement of cash flows is shown in Table 5-2.

5.53 It is worth noting that the term "cash equivalent" includes financial instruments that are highly liquid and convertible into known amounts of cash without notice and do not have any significant risk of changes in value owing to changes in interest rates. Statements of cash flows have largely superseded working capital-based sources and application of funds statements. This is because cash flows are more widely understood and are more transparent in identifying movements relevant to the liquidity and viability of an entity. An example of this is that a decrease in cash available may be masked by an increase in stock or debts.

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1. Extra risk of an investment.



**Table 5-2. Suggested layout for a statement of cash flows**

ENTITY	YEAR:
<b>Statement of cash flows for the year ended:</b>	
Net cash inflows from operating activities .....	----
Returns on investments and servicing of finance	
Finance lease liabilities paid <sup>(a)</sup> .....	----
Interest received .....	----
Interest paid .....	----
Dividends paid <sup>(b)</sup> .....	----
Taxation	
Corporation tax paid <sup>(c)</sup> .....	----
Other tax paid .....	----
Investing activities	
Payments to acquire intangible fixed assets .....	----
Payments to acquire tangible fixed assets .....	----
Receipts from sale of tangible fixed assets .....	----
Net cash outflows from investing activities .....	----
Net cash outflows before financing .....	----
Financing	
Issue of ordinary share capital <sup>(d)</sup> .....	----
Repurchase of debenture loan <sup>(e)</sup> .....	----
Proceeds from long-term borrowing .....	----
Net cash inflows from financing .....	----
Increase/(decrease) in cash and cash equivalents .....	----
<p>(a) Rental payments over the term of a finance lease.                  (b) The payment, usually made at least annually, to the holders of equity in the organization.                  (c) As payable by an autonomous organization.                  (d) This will apply only to an organization that is a publicly incorporated company.                  (e) Relates to changes in the levels of equity by the owner of the organization.</p>	

## FINANCIAL ACCOUNTING FOR PRE-FUNDING OF PROJECTS THROUGH CHARGES

5.54 Specific considerations pertaining to the financial accounting for pre-funding of projects through charges are addressed in Appendix 4 (paragraphs 7 to 11 refer).

### **PART B — INVENTORYING THE FACILITIES AND SERVICES**

5.55 The first step in determining the costs of air navigation services is to draw up an inventory of all the facilities and services that directly provide services for aircraft en route as well as during the approach and aerodrome phases, whether exclusively, or in addition to, any service provided for non-aeronautical purposes. Some facilities may serve more than one function, that is aerodrome and/or approach and/or en-route control functions. If possible, a methodology should also be developed to classify or group sections of the inventory identifying them with the civil aviation units providing the services (area control centre, communications stations, etc.). Where any of the facilities and services being listed are provided for and implemented under the ICAO regional air navigation plans, supplemented where necessary pursuant to the recommendations of relevant ICAO regional air navigation meetings and as approved by the Council, these should be so identified as should any other facilities and services provided at the request of aircraft operators. This is because ICAO's policies on charges advise that when the cost basis for air navigation services charges is being established, the costs to be taken into account should be the costs assessed in relation to these facilities and services (Doc 9082, Section III, paragraph 3 ii) refers). The policies also recommend that "The costs of air navigation services provided during the en-route, approach and aerodrome phases of aircraft operations should be identified separately where possible" (Doc 9082, Section III, paragraph 3 iii)). It is also important, however, that when facilities cease to be provided for in the relevant ICAO regional air navigation plan, the costs of such facilities should no longer be included in the cost basis for charges.

5.56 The administrative and common services associated with the provision of air navigation services, although not suited for inclusion in the inventory, are also to be taken into account in the costing process, as indicated in Part C below.

5.57 The more important components to be included under each of the five broad categories of facilities and services, i.e. ATM, CNS, MET, SAR and AIS, are described below. With regard to the traditional ATS and COM categories, it should be noted that they are addressed within the framework of ATM and CNS, which are broader in scope than ATS and COM. With regard to the actual provision of facilities and services, it should be noted that the same authority or entity may often provide two or more major categories of facilities and services, e.g. ATM, CNS and AIS.

### AIR TRAFFIC MANAGEMENT (ATM)

5.58 ATM is divided into air traffic services (ATS), air traffic flow management (ATFM) and airspace management (ASM), with ATS being the primary component. The functional integration between airborne and ground-based ATM system elements is not relevant in the context of this manual and consequently is not further described.

5.59 ATS comprises air traffic control service (area control service, approach control service, and aerodrome control service), flight information service and alerting service. Air traffic advisory service is provided within advisory airspace to ensure separation, in so far as practical, between aircraft that are operating using instrument flight rules (IFR) flight plans.

5.60 ATS facilities for en-route operations consist primarily of area control centres (ACCs), including oceanic area control centres (OACs) and flight information centres (FICs) and their associated equipment and staff. Thus included are the premises of the centres, the equipment — including, where employed, flight and radar data-processing

equipment — and the air traffic services personnel used to carry out ATS functions. Communications equipment used by controllers for communication with centres located in adjacent FIRs, or with aircraft, should be listed under AFS and AMS, respectively (see 5.65).

5.61 ATS facilities for approach control consist either of working positions integrated in ACCs or aerodrome control towers, or of separate approach control units. ATS facilities for aerodrome control service consist exclusively of aerodrome control towers. Thus included in these facilities are their associated equipment, including any flight and radar data-processing equipment and surface movement guidance and control equipment.

5.62 Implementation of CNS/ATM systems will, with regard to ATS, principally require extensive use of modern technology, including data-processing equipment and data link facilities.

5.63 ATFM is typically organized with a centralized flow management unit (CFMU) serving an extensive geographical area covering a considerable number of flight information regions (FIRs). A flow management cell (or flow management position), with dedicated equipment and personnel resources, is established in each participating ACC to coordinate ATFM measures.

5.64 ASM comprises both strategic and tactical functions. The tactical function is at some places operated from a special working position at an ACC. In other cases it may be a part of a team-leader's job.

#### COMMUNICATIONS, NAVIGATION AND SURVEILLANCE (CNS)

5.65 Communications facilities may broadly be classified under two main categories: aeronautical fixed service (AFS) and aeronautical mobile service (AMS). The aeronautical telecommunication service (COM) category in the traditional classification differs in scope from the communications component of CNS in that navigation aids are included in COM.

5.66 AFS is a telecommunications service between two or more fixed points for the transmission of messages provided primarily for the safety of air navigation and the regular, efficient and economical operation of air services. It comprises all facilities and personnel employed to provide this service. Examples of AFS are AFTN, the ground part of ATN and ATS direct speech.

5.67 AMS provides a radio communications service between aircraft and ground, or between aircraft stations. For the purposes of determining the costs of providing air navigation services, AMS is assumed to comprise all ground-based facilities and personnel engaged in air-ground communications and radiotelephony broadcasts such as ATIS and VOLMET (i.e. VHF and HF transmitting and receiving stations). Implementation of AMSS, as well as other ATS air-ground links and other communication subnetworks of the future ATN, will add satellites or satellite transponders and associated ground earth stations and may in fact gradually replace some of the above-mentioned facilities.

5.68 Navigation services basically comprise ground-based radio navigation equipment (e.g. ILS, VOR, DME and NDB) and satellite-based systems (mainly GNSS). Implementation of GNSS will add the satellite constellations providing the standard signal positioning service and the associated augmentation systems required (e.g. satellite-based (wide-area) and ground-based (local area) augmentations), which will eventually replace most of the above-mentioned equipment.

5.69 The surveillance systems comprehend primary surveillance radar (PSR), secondary surveillance radar (SSR), surface movement radar (SMR) as well as systems that provide automatic dependent surveillance (ADS and ADS-B), including the supporting network and maintenance personnel.

## METEOROLOGICAL SERVICES FOR AIR NAVIGATION (MET)

5.70 Meteorological services for air navigation comprise the services provided in accordance with the ICAO provisions in Annexes, Procedures for Air Navigation Services (PANS), and Regional Air Navigation Plans/Facilities and Services Implementation Documents (ANPs/FASIDs). These include meteorological observations, reports and forecasts; briefing and flight documentation; SIGMET and AIRMET information; world area forecast system (WAFS) forecasts for computerized flight planning; meteorological information for inclusion in broadcasts (such as VOLMET) and data link services (such as D-VOLMET); aeronautical meteorological telecommunications (if not included in COM) and any other meteorological data required from States for aeronautical use. The facilities required to provide such services include world area forecast centres (WAFCs), volcanic ash advisory centres (VAACs), tropical cyclone advisory centres (TCACs), meteorological watch offices (MWOs), aerodrome meteorological offices, aeronautical meteorological stations (including observational and telecommunications equipment used for aeronautical meteorological purposes). Additionally, it may be appropriate to include in the inventory various supporting facilities and services that also serve meteorological requirements in general, among these being surface and upper-air observation networks, meteorological telecommunications systems, data-processing centres and supporting core research, training and administration. In the case of such general-purpose facilities and services, an appropriate allocation of the costs involved between the aeronautical and non-aeronautical needs served will have to be determined.

The 2000 Conference on the Economics of Airports and Air Navigation Services (ANSConf 2000) agreed that States should encourage a partnership involving ICAO, WMO and IATA to enhance transparency in the identification of the MET costs and to further encourage designated meteorological authorities and MET providers to cooperate more closely with IATA and the aviation industry in the establishment of MET costs to be recovered through charges.

5.71 Furthermore, there are additional services specified and agreed by the national aviation authorities, in consultation with the meteorological authority and users. Any additional special facilities or services provided at the request of a single or limited number of users are deemed to be outside these arrangements and should be charged to the user(s) concerned. Further guidance on the identification of facilities and services serving aeronautical meteorology is contained in Appendix 2.

5.72 Meteorological services are part of a State's responsibility to provide an air traffic infrastructure. This responsibility includes both the necessity to meet the meteorological requirements, especially under Annex 3 to the Convention — *Meteorological Service for International Air Navigation*, as well as adequate procedures for determining the costs of this service. In this respect cost allocation of MET is subject to a State's decision either to be financed partially or completely by its public budget. In the latter case, MET could be available for free (see also Doc 9082, Section III, paragraph 4). In the former case, the principle prevails that air traffic has to bear its own costs, and consequently a transparent and sound cost allocation is required. Since the aviation industry contributes to meteorological data as well as often finances parts of the meteorological costs, States should ensure accountability and consultation (see also Chapter 1, Part D).

## SEARCH AND RESCUE (SAR)

5.73 Search and rescue in the context of these guidelines refers to search and rescue services provided to aviation. Search and rescue fixed facilities comprise rescue coordination centres (RCCs) and rescue sub-centres (RSCs). Mobile facilities comprise, where available, long-, medium- and short-range aircraft, including helicopters (equipped, where possible, with droppable supplies and direction-finding equipment), rescue boats and vessels, mountain rescue units and any other units or forces that may be designated primarily or exclusively to perform aeronautical search and rescue functions or made available when required. Where possible, these facilities may be manned by specially trained staff. In preparing the inventory, it will be useful to clearly identify those SAR services and related costs which, in accordance with Doc 9082, Section III, paragraph 2, and Appendix 2, may be appropriately taken into account in arriving at the level of charges assessed against international civil aviation for the purposes of SAR. Appendix 2 of Doc 9082 identifies the appropriate costs as being those associated with "any permanent civil establishment of equipment and personnel maintained for the purposes of providing such services". Note should be

taken of paragraph 2 ii) in Section I of Doc 9082 where it is recommended that States should “refrain from imposing charges which discriminate against international civil aviation in relation to other modes of international transport”.

#### AERONAUTICAL INFORMATION SERVICES/ AERONAUTICAL INFORMATION MANAGEMENT (AIS/AIM)

5.74 AIS has the objective of ensuring the flow of information necessary for the safety, regularity and efficiency of air navigation. AIS comprises the staff, facilities and equipment employed to collect, collate, edit, publish and distribute aeronautical information concerning the entire territory of a State as well as any other areas for which it has undertaken to provide air navigation services. Included are the preparation and dissemination of aeronautical information publications (AIPs), notices to airmen (NOTAM), and aeronautical information circulars (AICs) and the provision of plain-language pre-flight information bulletins to flight crews as part of the pre-flight information service. It should be noted that these services are provided either in the form of the traditional product-centred and paper-based format of AIS or the new data-centred and systems-oriented information management approach of the aeronautical information management (AIM)<sup>2</sup> system, including the transition phase thereto.

### PART C — DETERMINING COSTS

#### INTRODUCTION

5.75 It is essential that all costs be determined in accordance with generally accepted accounting and costing principles (i.e. they must be based on recognized rules, standards or conventions) to permit the costs of service operations to be recorded and analysed in accordance with their nature and origin. It is recognized, of course, that practices and procedures will differ from State to State.

5.76 In order for civil aviation administrations, or the entities responsible for levying air navigation services charges, to establish the full costs of air navigation services, it will be necessary for them to include all the costs incurred. This includes not only the costs of such facilities and services that they provide themselves, but also the costs of those that may be provided, wholly or in part, by any other department or agency of the government or any other entity without any corresponding charge being made to the civil aviation administration or the charging entity.<sup>3</sup> The costs for safety, security and economic oversight provided by the State, or by an independent national oversight organization, or by a regional oversight organization, which are directly related to the provision of air navigation services, may be included in the ANSP cost basis for charges, provided that such costs are imposed on the providers of services.

5.77 The following guidelines are intended to apply equally to any facilities and services regardless which entity provides them, it being assumed that when they are not responsible for the provision of facilities and services, civil aviation administrations or the charging entities will take appropriate steps to ensure that the relevant cost data are made available to them for the costing task. Care will also be needed to ensure that the computation of total air navigation services costs attributable to en-route operations includes costs of any facilities and services located physically at an airport but serving en-route traffic (e.g. an ACC or radio navigation aid). Equally, it needs to be ensured

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2. Under AIM, there will be further provisions for quality management, clauses for the use of digital data exchange, revised provisions for automated preflight briefing, an improved NOTAM format, strengthened aeronautical information regulation and control (AIRAC) adherence, new provisions for eAIP and provisions for the use of the Internet for aeronautical information.
  3. When any facilities or services are provided by another government agency or department on a rental or fee basis, the rental or fee charged will appear as an expense item in the accounts of the civil aviation administration and be taken into account, as appropriate. In such cases, no separate additional calculation by that administration of the component costs (operation and maintenance, depreciation, etc.) will be involved since these costs will be included in the rental or fee charged.

that such costs are not counted doubly as an airport cost as well and, hence, improperly also included in the cost base for charges levied for the use of facilities required for airport operations. The reverse, of course, applies to any services utilized during the airport phase of aircraft operations but provided by facilities or services that primarily serve aircraft during the en-route phase of operations.

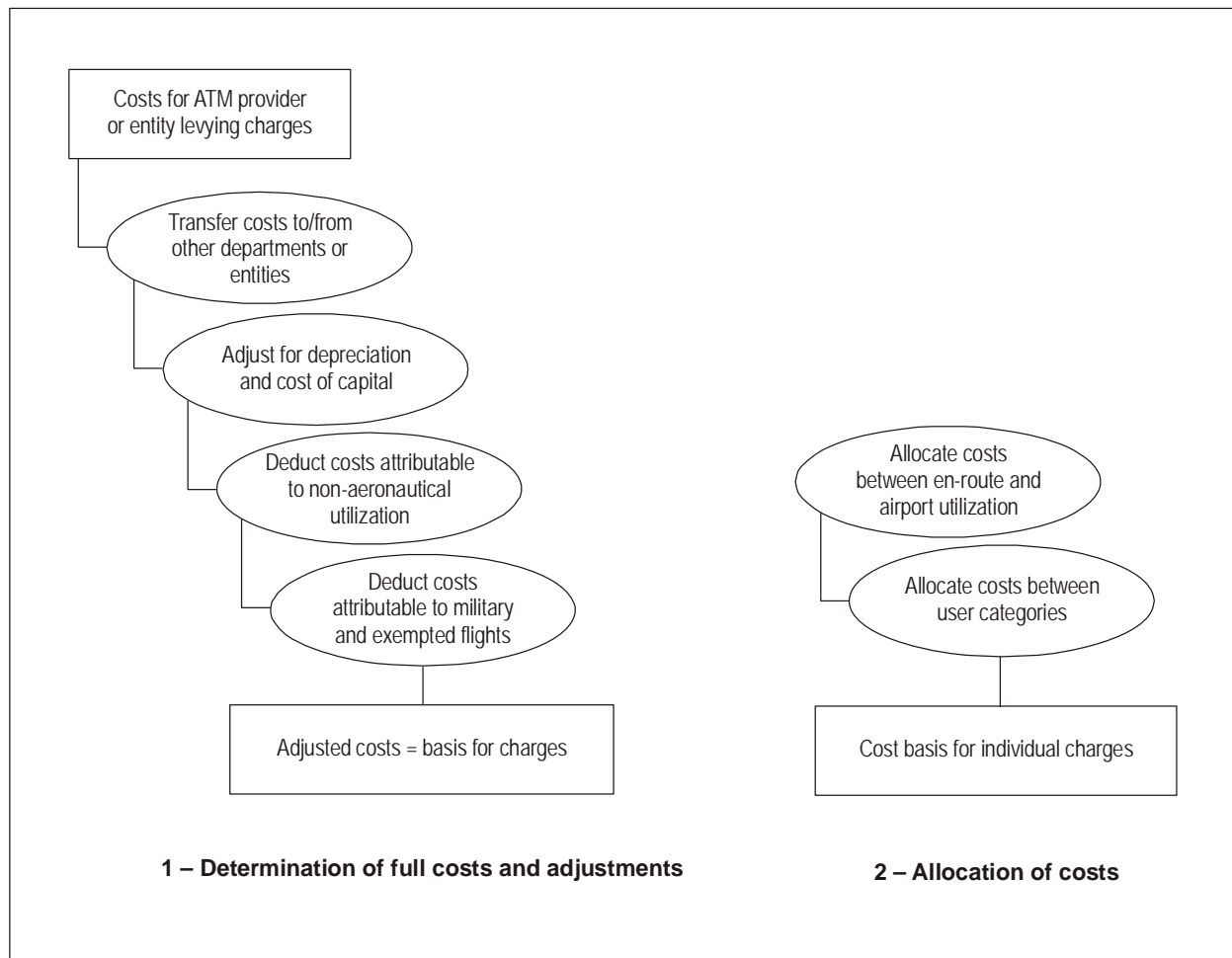
5.78 In arriving at the cost base for air navigation services charges, consideration will have to be taken of the differences between costs recorded in an entity's accounts and costs applied for determining the cost basis for charges (see 5.81) as well as costs attributable to non-aeronautical utilization (see 5.100 and 5.114 to 5.119). Furthermore, the costs of any air navigation services provided exclusively for military or other State functions should be excluded. Where civil or military facilities serve both civil and military functions, the cost share allocable to civil aviation should be determined to ensure that no costs which are allocable to military functions are included in the cost base for air navigation services charges.

5.79 Once the costs of all the air navigation services provided have been established, the portions attributable to en-route utilization and approach and aerodrome control utilization may need to be identified. This would apply, in the interest of equity, where more than one type of utilization is involved and the intent is to recover the costs of the air navigation services from users. Furthermore, if different route charges are involved (different charges in different FIRs), the share of the en-route costs attributable to each of the FIRs concerned would need to be established. Similarly the total approach and aerodrome control cost portion may need to be allocated to each airport served. This is particularly relevant where the approach and/or aerodrome control services are being provided under contract with the airport(s) concerned.

5.80 The costing approach outlined in the preceding paragraphs can also be summarized in a schematic manner such as that shown in Figure 5-2. Each of the stages shown is further discussed below, but it should be stressed that the identification of costs by each category of facilities and services (ATM, CNS, MET, etc.) may be a distant goal in many instances. For example, the entity providing ATM may also be providing certain CNS services, notably mobile services and radio navigation aids as well as AIS. Considering the workload involved in identifying costs by category of facility or service, priority should not be given to that task but, instead, to ensuring that all costs incurred by the State concerned in providing air navigation services are included.

DIFFERENCE BETWEEN COSTS RECORDED IN THE ACCOUNTS OF AN ENTITY  
PROVIDING AIR NAVIGATION SERVICES AND COSTS APPLIED  
FOR DETERMINING THE COST BASIS FOR CHARGES

5.81 The accounts of an entity providing air navigation services constitute the basic reference for determining the cost basis for air navigation services charges. Where the accounts are very complete and where they cover all relevant categories of facilities and services, they can serve that purpose well. It may not be advisable, however, to rely only on the accounts when determining the basis for charges even when the accounts are very complete. This is because, while the costs of operation and maintenance and administrative overhead would probably remain unchanged, the situation may be different with regard to depreciation and cost of capital. In the accounts, for example, assets may be depreciated according to government accounting standards, which may not reflect the true operating life of the assets concerned, or they may not be depreciated at all. When the cost basis for charges is determined, it is necessary to ensure that a depreciation element reflecting the reduction in the value of the assets during the period concerned (usually the financial year) is included. This may result in the application of depreciation rates for charging purposes which differ from those reflected in the accounts. Also, cost of capital imputed on the net capital value of the assets of an entity providing air navigation services would normally not be reflected in its accounts but should be included in the cost basis for charges. The same practice should apply in those few instances when equity capital is involved.



**Figure 5-2. Determination of the cost basis for air navigation services charges**

#### OTHER OPERATING EXPENSES

5.82 Further to what was noted in the preceding paragraph, the descriptions of the various items to be included in the published accounts (see 5.23 to 5.29) can also be used when the cost basis for charges is to be determined. Particularly where the entity providing air navigation services forms part of a civil aviation administration, however, it may be necessary to adjust these costs in circumstances such as those described in 5.96 to 5.99.

#### DEPRECIATION AND/OR AMORTIZATION AND COST OF CAPITAL

5.83 Further guidance on the inclusion of depreciation and/or amortization and cost of capital in the cost basis for charges on air traffic is presented in the following paragraphs. The text on depreciation is principally based on an asset being recorded at the historical cost.

### Depreciation and/or amortization

5.84 The term “depreciation” is often used interchangeably with the term “amortization”. The terms have the same meaning although depreciation is generally used in relation to tangible fixed assets while amortization is generally used in relation to intangible fixed assets, e.g. a patent or copyright. The original value of an asset should be depreciated over its estimated useful life and such depreciation included in the annual costs of the service concerned. Land is not depreciated since, unlike other fixed assets, it does not deteriorate and its useful life is not limited. Depreciation should not commence until a facility is placed in service. Examples of typical depreciation periods for various assets are provided in Table 5-3.

5.85 In calculating the costs chargeable for the depreciation of any item of equipment, it is appropriate to include in the figure established for this purpose the cost of installation and of any calibration and testing required to render the equipment operational. Similarly, the cost of capital incurred on capital invested in fixed assets during their pre-operational phase should also be included, as should any non-refundable duties or taxes paid in conjunction with their acquisition.

5.86 While practices vary in the calculation of depreciation, the most commonly used methods are the straight-line method and the reducing balance method. The most common method used by national administrations, and also the simplest, is the straight-line method whereby depreciation is charged as a constant amount year by year during the book life of the asset concerned, the amount being determined by dividing the historical cost of the asset (less its anticipated residual value, if any) by the expected number of years of its book life. The reducing balance method involves the application of a fixed percentage to the book value of the asset, i.e. the historical cost (see 5.87) less accumulated depreciation already charged, at the beginning of each accounting period. The actual amount of depreciation charged according to this method thus decreases each year. A third method used is the annuity method, where the depreciation charged to each year remains the same throughout the life of the asset concerned. It should be noted, however, that the amount charged when this method is applied includes the cost of capital in addition to depreciation. Whatever depreciation method is used, it should be consistently applied throughout the depreciation period of the asset.

**Table 5-3. Examples of typical depreciation periods**

<i>Assets</i>	<i>Depreciation period</i>
Buildings (freehold)	20–40 years
Buildings (leasehold)*	over the period of the lease
Furniture and fittings	10–15 years
Motor vehicles	4–10 years
Electronic equipment (including telecommunications equipment)	7–15 years
General equipment	7–10 years
Computer equipment	5–10 years
Computer software	3–8 years
*Buildings built on leased land.	



5.87 The historical cost mentioned in 5.86 refers to the cost of an asset at the time of its initial acquisition, to which should be added any subsequent improvements or additions thereto, less such proportion of this aggregate cost as is represented by any part of the asset disposed of since its acquisition. Sometimes a major improvement, involving significant investment costs, is made to a facility for such purposes as extending its operating life, increasing its capacity and/or widening its scope. When such an investment is made, particularly if it extends the operating life of the facility, it may be advisable to depreciate these costs separately. Alternatively, the costs could be added to the residual historical costs of the facility concerned and the new total depreciated over the new useful life of the facility concerned.

5.88 States experiencing high rates of inflation<sup>4</sup> may need to use alternative approaches to depreciation when, due to national legislation, such inflation cannot be compensated for by the application of the internal cost of capital rates reflecting inflation. Such approaches should be based on general accounting practices and/or generally applicable legislation in the State concerned. An approach that may be used involves adjusting the un-depreciated portion of the original book value of the asset concerned by increasing it by a percentage based on the rate of inflation, as measured by an official index, when calculating the annual depreciation charged.

5.89 If it becomes apparent, and only then, that the operating life of an asset being depreciated will be shorter than was anticipated when the original depreciation schedule was drawn up, an amount, in addition to the annual depreciation charge, may be added to compensate for such unexpected obsolescence or premature retirement. One of the following two methods may be adopted for this purpose:

- a) the net book value of the asset may be written off over the remaining years of the revised operating life; or
- b) the residual value of the asset (less any proceeds from its disposal if any) may be added, in full, to the depreciation charged in the last year of the revised operating life of the asset.

In the context of premature retirement of assets, reference should also be made to the guidance on treatment of costs and cost-recovery during GNSS implementation reproduced below in Part F.

### **Cost of capital**

5.90 The cost of capital should be taken into account in the costing of the provision of air navigation services. This falls into two basic categories. The first is the interest paid to the providers of debt capital (other than equity; for equity see 5.42), that is lenders for various financing purposes, usually in connection with the acquisition or provision of assets. The second is the appropriate cost of capital applied to equity. The cost of capital applied to equity to be used is a matter for the State (or other national economic regulator) to approve, taking into account the low financial risk of providing air navigation services. The government bond rate, or alternatively rates payable in financial markets by enterprises of comparable low risk, may be taken as a guide.

5.91 The cost of capital should be calculated annually on all capital invested in fixed assets, or other expenditures which should properly be written off over time, and on working capital. In the case of fixed assets, the cost of capital should be applied on net asset value. For other investments that are spread over a number of accounting periods, the cost of capital should be assessed annually on the net value and, in the case of working capital (net current assets), on the average value for the financial year.

5.92 In taking cost of capital into account, care should be taken to ensure that the cost of debt is not counted twice.

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4. Inflation is often defined as a general increase in prices and fall in the purchasing value of money.

## ADJUSTMENTS FOR COSTS ATTRIBUTABLE TO EXEMPTED FLIGHTS

5.93 In Article 3 of the *Convention on International Civil Aviation* (Chicago Convention — Doc 7300) a distinction is made between civil and state aircraft. Article 3 stipulates that the Convention shall be applicable only to civil aircraft and not to state aircraft. It also indicates that aircraft used in military, customs and police services shall be deemed to be state aircraft. No further elaboration on what constitutes a state aircraft is provided in the Chicago Convention. The guidance material provided in this manual does not change, revise or further interpret the definition of state aircraft or apply the Chicago Convention to state aircraft.

5.94 Many States have chosen, in the exercise of their sovereignty, to exempt from air navigation services charges certain types of flights, in addition to those expressly deemed to be state aircraft according to Article 3 of the Chicago Convention. Such exemptions are sometimes implemented by bilateral or multilateral agreements, national legislation or unwritten practical arrangements.

5.95 As per ICAO's policies on charges in Doc 9082, Section III, paragraph 5, States should analyse air traffic data, such as the number of flights by category of user (i.e. commercial aviation, general aviation and other) in both domestic and international operations, aircraft weight and other data relevant to the allocation of costs and the cost-recovery system, along with related financial data. Following such analysis, it can be determined whether the volume of exempted flights is such that the method of allocating the air navigation services costs amongst all chargeable flights is inconsistent with the principles of equity and non-cross subsidization. Where such traffic is minimal and incidental, and the costs associated with it are low, a detailed examination of the existing cost allocation methodology would normally not be warranted. However, if such traffic is substantial, it will be necessary to ensure that the principles of equity and of non-cross subsidization are observed and that the costs are allocated appropriately. Furthermore, air navigation services costs should be identified in such a way as to ensure that when a State chooses to host flights that are exempted from user charges, and the volume of such traffic is substantial, all costs are properly allocated according to sound accounting principles (paragraphs 1 and 5 of Section III of Doc 9082 refer) and the host State, not other users of the system, bears the costs of the exempted flights. In this respect, current practices in certain States include the reimbursement of costs incurred by service providers through the central State budget, or ministries such as defence, foreign affairs or transport. Such practices, consistent with the principle of proper allocation of costs, ensure that ANSPs avail themselves of revenues to recover the costs of the services that they provide to flights exempted from user charges.

## IMPLICATIONS OF ORGANIZATIONAL STRUCTURE

5.96 The organizational structure within which air navigation services are provided has a direct bearing on their financial management and the approach taken in arriving at the total costs to be included in the cost basis for air navigation services charges. In that context, for example, the manner in which financial management is to be organized needs to be given special attention when an entity occupying the central role in the provision of air navigation services is not operated as an autonomous entity but, like in the majority of instances, by a civil aviation administration (or another government department). In these circumstances, separate accounts should be established for such a department. Moreover, since the civil aviation administration's format of accounts may not be responsive to the requirements of air navigation services management, the department providing these services could establish its own supplementary internal accounting system that would meet these requirements.

5.97 Where the provision of air navigation services is operated as a separate entity or department, certain factors need to be taken into account when the actual costs and revenues of that department are to be determined. For example, since it is part of a larger entity, it is likely that certain other departments within that entity would provide services or perform functions for the air navigation services department. This may involve technical services, such as maintenance of equipment and vehicles, or administrative or overhead functions such as accounting, personnel administration, or the services of a legal department. In all these cases, the costs of the services or functions concerned must be determined and charged to the air navigation services department. If this is not done, the costs of providing the air navigation services will not be known and the air navigation services charges could be based on less than actual costs.

5.98 Various approaches may be taken to determine the costs of the services and functions to be charged to the air navigation services department. For example, concerning the costs of technical services, one approach is to calculate the costs per work-hour of the technical staff involved and then multiply the hours spent on air navigation services work by that rate. Another approach is to allocate costs for services and functions using a percentage based on the share of the costs for the air navigation services department in relation to the total costs of all departments involved in the services and functions concerned. To this the costs of material used should be added. An hourly rate should also be calculated for the costs of operation and maintenance of any tools and minor equipment used, including costs of power or fuel consumed, and an allowance for wear and tear. Moreover, depending on the extent of the technical services, an allowance should possibly be made for depreciation of building space and major equipment. Administrative overhead could be allocated by first establishing the total running costs as well as depreciation and cost of capital attributable to the departments concerned, and then estimating how much of their overall time is attributable to work pertaining to the air navigation services department's operations, on the basis of which the cost share of the air navigation services department would then be determined.

5.99 Conversely, the air navigation services department may be performing services such as those described in the preceding paragraph for other departments within the civil aviation administration or branch of government concerned. In these circumstances the reverse applies, in that the costs to the air navigation services department of providing the services concerned would have to be estimated and allocated to these departments with a consequential reduction in the overall costs of the air navigation services department. If this is not done and if the costs attributable to services performed for other departments were to form part of the cost basis for air navigation services charges, the users concerned would in fact be paying for costs not attributable to them.

## **PART D — ALLOCATION OF COSTS**

### **INTRODUCTION**

5.100 This part deals with certain aspects of the allocation of the costs of air navigation services, such an allocation being relevant in the context of the approach taken to charging in order to recover these costs. Once the total annual costs have been established, allowance will need to be made for any non-aeronautical purposes served by the facilities and services concerned in order to arrive at the actual annual costs properly attributable to their aeronautical utilization. Thereafter, where particular facilities and services serve approach and aerodrome control purposes as well as serving aircraft en route, an appropriate allocation of costs in respect of each dual utilization will be necessary to ensure that airport-related and route-related charges are based on their respective costs. Moreover, the costs attributable to approach and aerodrome control may need to be allocated to the different airports concerned. Further, at certain airports, approach and aerodrome control services are provided by different entities, and this is reflected in the guidance on cost allocation/cost basis for charges in the paragraphs below and related individual charges in Part H of this chapter. Whether any allocation of costs is needed where facilities and services physically located in one FIR serve aircraft operations in a contiguous FIR is also a question that may need to be considered where applicable in so far as the costs attributable to en-route utilization are concerned.

5.101 To the extent that charges are to be levied on users for the air navigation services provided, the total costs attributable to en-route utilization, to approach and/or aerodrome control utilization will have to be allocated among the different categories of users. As per ICAO's policies on charges, international civil aviation should not be asked to meet costs which are not properly allocable to it. Also, the proportions of costs attributable to international civil aviation and other users (including domestic civil aviation, State or other exempted aircraft, and non-aeronautical users) should be determined in such a way as to ensure that no users are burdened with costs not properly allocable to them according to sound accounting principles (Doc 9082, Section III, paragraph 5). Finally, wherever any allocation of costs is required, it is important to check that there has been no double counting and that the individual allocations do in fact add up to the total of the costs being allocated.

## SERVICE DESCRIPTIONS FOR COST ALLOCATION PURPOSES

5.102 The allocation of costs to services has traditionally followed the categorization of services provided in ICAO's policies on charges (Doc 9082). Principal types of services and related charges based on this categorization are specified in Part I of this chapter. However, in some circumstances, technological, organizational or operational developments have resulted in a need for changes in service categorization in certain regions. Providers of air navigation services have the option to allocate costs according to the traditional service categories or to apply an alternative categorization of services for cost allocation purposes, which encompasses the traditional service categories. These alternative categories of services are described below.

5.103 *Tower service.* This service is provided from an air traffic control tower located on or near an airport and includes clearance delivery, control of aircraft taxiing on the ground, take-off and landing clearances, initial and final visual separation for aircraft departing and landing at that airport, and any approach control service provided from the control tower.

5.104 *Radar approach/terminal area service.* These services are mutually exclusive and cannot both be provided at the same location.

- a) *Radar approach service.* This service is provided in control areas that have a level of density and complexity requiring dedicated radar approach/departure control to separate and merge the arriving and departing traffic flows at an airport or within a major metropolitan area. These services are provided from a radar control room and usually have dedicated radar equipment capable of a higher target refresh rate than the long-range radar used to control en-route traffic. Approach/departure services include separating aircraft during the climb and descent phases of flight and providing initial and final sequencing of aircraft traffic flows for handoff to either the aerodrome or en-route controllers.
- b) *Terminal area service.* This service is provided in areas where either the organizational requirements of the ATS provider combine radar approach/terminal area service with en-route service, or two or more airports are located relatively close to each other (which creates additional complexity than when only one airport is provided with radar service). A terminal area service covers all air traffic services within a defined area, up to a ceiling flight level that normally does not exceed flight level 245, except for tower services. It therefore usually includes radar approach services and air traffic services to aircraft transiting through the defined area.

5.105 *En-route lower airspace service* (an option is to have only one en-route service category that encompasses both the lower and upper airspace). This service is provided predominately to aircraft operating below a published altitude. Services include transiting aircraft to/from cruise altitude, maintaining cruise altitude separation, accommodating changes to planned flight parameters and providing advice regarding flight conditions along the route of flight.

5.106 *En-route upper airspace service* (an option is to have only one en-route service category that encompasses both the lower and upper airspace). This service is provided predominately to aircraft operating above a published altitude. Services include transiting aircraft to/from cruise altitude, maintaining cruise altitude separation, accommodating changes to planned flight parameters and providing advice regarding flight conditions along the route of flight.

5.107 *Oceanic service* (only if applicable). This is provided over the oceans and outside the range of normal ground-based radar coverage. Today, these services are mostly procedural in nature, often depend on third-party air-to-ground communications via high frequency radio for periodic position reporting, or by satellite communications. This service requires much greater aircraft separation standards than in en-route airspace.

5.108 Any reference to services includes an appropriate allocation of all air navigation services components, including ATM, CNS, MET, SAR and AIS (AIM).

5.109 Throughout this manual, wherever the terms aerodrome control, approach control and area control (en-route) services are found, these may be interchanged with the alternative service descriptions provided above.

5.110 Adoption of the service descriptions for cost allocation described above would require that costs be analysed and broken down further in order to reflect the cost of air navigation services provision. In addition, developments in air traffic management operations would need to be taken into consideration.

5.111 In general, adopting such service categories should not necessitate changes to the way costs are allocated. The following points should be noted:

- a) Tower services are provided on a discrete basis. Therefore, it should be relatively straightforward to identify the related costs for cost allocation purposes. This would also apply where aerodrome control is provided by an entity other than that providing approach and/or en-route air navigation services.
- b) A terminal area service may include approach and/or aerodrome control services, as well as en-route services to traffic transiting through the defined area. These services would normally be provided from either a dedicated air traffic control (ATC) centre or from a specific part of an en-route ATC centre. In the case of the former the direct costs are likely to be discrete whereas if only a part of a centre is used there will be shared services that will need to be taken into account. Nevertheless, costs can be shared according to the number of sectors controlled and/or the number of controller positions, these being the principal cost drivers for the direct costs of such services.
- c) Allocation of services between upper and lower airspace could follow the process outlined above. Clearly, where there is no division of airspace along these lines, this allocation would not be necessary unless it was decided to introduce zone charges (refer to paragraphs 5.207 to 5.210 in Part H below).
- d) Controller costs could be identified according to their watch rosters and the sectors under their responsibility. This is particularly relevant since it is the sectors that are one of the key drivers in the provision of air navigation services. The cost of engineering support could be allocated according to the number of controller positions.

5.112 Allocation of the cost of equipment used for communications, navigation and surveillance can be done as per the guidelines detailed above. For example, the number of radio channels for communications and controller positions for surveillance is often used. In the case of navigation aids, the published frequencies can be used as a guide to the type of service provided. The allocation of general support services costs and overheads should follow generally accepted accounting practices such as international accounting standards (IAS).

5.113 Consideration should also be given to those States/ANSPs which are principally involved in the provision of air navigation services to overflying traffic. In such cases, dividing the airspace in the manner described in paragraphs 5.103 to 5.107 may not be relevant.

#### NON-AERONAUTICAL UTILIZATION

5.114 Certain facilities and services such as ATM, AIS and AFS essentially exist only to serve aeronautical requirements, while others, namely MET, SAR and sometimes AMS and radio navigation aids, also serve non-aeronautical functions to a varying degree.

5.115 National MET organizations, while they serve aeronautical requirements, operate to serve the non-aeronautical community as a whole by providing weather information for maritime and other surface transport, agriculture, fishing, hydrology, air pollution control, the press and other media, and the general public. Generally, MET organizations engage in basic or core activities in fulfilment of a primary system requirement for meteorological

information that is jointly used by all service recipients. Examples of core activities include general analysis and forecasting, automated data processing, surface and upper-air observations, and general telecommunications. Since no single user requirement determines the level and cost of core activities, the further allocation of core activity costs among user categories should be approached with considerable caution. The proportion of overall MET costs that it is appropriate to attribute to the requirements of aviation will vary from State to State. Furthermore, there are States which do not allocate core costs to any specific user. It should also be recognized that aviation contributes to the core system by providing upper-air observations of winds and temperatures. It is therefore not possible to indicate any specific percentage for allocations that would have general validity for this purpose. The broad description of the meteorological facilities and services required for aeronautical purposes in 5.70 and 5.71 gives general guidance in this field, with more specific advice being presented in Appendix 2.

5.116 SAR services, in performing maritime and other search and rescue missions, including missions overland and sometimes in patrolling territorial waters, serve a variety of needs, not just those of civil aviation. In most States, aircraft, vessels and operating personnel utilized in search and rescue operations for civil aviation will be provided by the military and other agencies of government that may be equipped to contribute such resources. The participation of the civil aviation administration or agency may accordingly be relatively limited (e.g. temporary assignment of ATS personnel, equipment and premises to SAR operations, including the possible provision of rescue coordination centres (RCCs)).

5.117 Costing the use of the resources of the military or other government agencies which are provided for civil aviation SAR operations is a difficult task. It is especially complex when, as is commonly the case, the personnel and equipment so engaged are not assigned exclusively to SAR duties but tend to exist primarily to perform other functions and merely are seconded temporarily for SAR operations. With these difficulties in mind, and because humanitarian considerations are involved in the provision of SAR services, the ICAO Council concluded that a simple and equitable way of dealing with the matter would be for the costs to be taken into account to be limited to the costs of any permanent civil establishment of equipment and personnel maintained for the purpose of providing SAR services, and for an appropriate share of such costs then to be allocated to civil aviation. This is the basis for costing specified in Appendix 2 of Doc 9082.

5.118 The manner in which to determine civil aviation's allocable share of the costs of the civil SAR establishment concerned is for States to decide. One reasonably simple approach is an apportionment in the ratio that the work-hours devoted to civil aviation SAR operations bear to the total work-hours spent by the establishment in all of its activities, including SAR operations conducted for non-aeronautical activities such as shipping, and for military and state aircraft.

5.119 AMS (i.e. transmitting and receiving stations) frequently serve aeronautical as well as non-aeronautical functions, including maritime and general commercial and private message traffic. Considering the many factors involved, the cost share attributable to aeronautical utilization will inevitably have to be established by approximation. One method is to base the allocation on the share constituted by aeronautical message traffic of the total message traffic of the station concerned, measured in terms of the number of messages handled.

#### ALLOCATION WHERE FACILITIES SERVE APPROACH AND/OR AERODROME CONTROL AND EN-ROUTE REQUIREMENTS

5.120 Where a specific service or particular facilities serve the requirements of aircraft during the approach and/or aerodrome control phases of operations as well as those of aircraft en route, consideration should be given to dividing the annual costs of providing the service or facilities concerned so as to reflect the different uses. Such a division is especially relevant where the costs involved are substantial and a considerable distortion of the costs attributable to airport or en-route operations would otherwise result.

5.121 ICAO's policies on charges in Doc 9082 (Appendix 2) specifically recommend that "the costs of all MET provided to civil aviation should, where appropriate, be allocated between air traffic services provided for airports and air

traffic services provided en route. In States where more than one international airport is involved, consideration could be given, where possible, to allocating the costs attributable to airport utilization between the airports concerned". Here again, the guidance material provided in Appendix 2 (referred to in 5.71 and 5.115 above) may be useful in approaching this task.

5.122 Illustrative of other situations requiring cost allocations of this kind would be the case where ATS units, both those providing approach and aerodrome control and those providing area control, are physically situated in one location, and the personnel and equipment costs have been determined for ATS as a whole but not separately for each of the two services. In such a situation, an appropriate division between airport and en-route costs is needed, and this could be made by apportioning the total costs in the ratio that the control positions (or actual work-hours) devoted to approach and aerodrome control bear to those devoted to area control. The depreciation and cost of capital of the premises provided, as well as the related administrative and common costs, could be established on the same basis or, if considered more suitable, on the basis of the respective floor areas devoted to the two separate control services.

5.123 In circumstances where the use made of ATM for airport and en-route purposes cannot be allocated on a statistical basis, or otherwise, with any substantial degree of accuracy, and only in cases where the costs involved are low, the necessary cost allocations might be approximated as follows:

- a) facilities mainly serving en-route operations (allocation of 75 per cent of the corresponding costs to en-route services and 25 per cent to airport use);
- b) facilities serving en-route operations and approach/aerodrome control to virtually the same extent (allocation of 50 per cent of the corresponding costs to each); and
- c) facilities mainly serving approach/aerodrome control (allocation of 75 per cent of the corresponding costs to airport use and 25 per cent to en-route services).

5.124 Sometimes the costs of individual AFS facilities are known. This would be the case when, for example, landlines or radio channels are rented on a unit basis from another authority or entity, such as a postal or telecommunications authority/company, with the rental fee covering all the costs involved. In such instances, 100 per cent of the related costs could be allocated to en-route services where the link is between two area control centres, but normally only 50 per cent where the link is between such a control centre and an airport, the other 50 per cent being allocated to the airport concerned. The costs of individual links are frequently not known, however, for example, when a rental fee covers several links, or where the authority providing the route facilities and services operates a communications centre that serves en-route functions alone or, as is more common, airport functions as well. In such cases, the allocation of costs among individual links may be made on the basis of utilization (e.g. by the number of messages sent or time of operation of each link) rather than simply by the number of links.

5.125 The same AMS facilities very often serve both en-route and airport functions, which requires that the cost share attributable to each function be estimated. As with the allocation between non-aeronautical and aeronautical utilization of AMS facilities, referred to in 5.115, the division of costs between en-route and airport utilization could be carried out on the basis of the number of messages attributable to en-route control as opposed to airport (i.e. approach and aerodrome) control. Another method would be to estimate the total number of hours air traffic controllers spend communicating with aircraft during the respective en-route and airport phases of flight and allocate the costs between the two functions on that basis. Also, in some States the number of frequencies assigned for route and airport control respectively may offer a suitable basis for the allocation of costs between the two functions. Finally, the approach suggested with respect to ATS in 5.118 (last sentence) and 5.119 may also be applied when allocating the costs of these AMS facilities.

5.126 With radio navigation aids that have a dual utilization, for example, VORs which serve as approach aids in addition to serving aircraft en route, the costs involved are likely to be less significant but might be allocated between route and airport utilization in the ratio of estimated overflights to landings and take-offs.

### ALLOCATION OF TOTAL COSTS TO SERVICE LOCATIONS

5.127 Once the total costs by major item (that is operating and maintenance costs, administrative overhead, depreciation and cost of capital, and taxes) have been determined, they can, to the extent relevant, be allocated to the various service locations of the air navigation services concerned, such as those referred to in Part A above.

5.128 As to the allocation exercise itself, the costs would be allocated to the service location concerned using the same approach as described with regard to staff expenses and other operating expenses in Part A above, but also including depreciation and cost of capital, and taxes. As to the allocation of taxes, these could be allocated in the same manner as other operating expenses, except where the tax can be identified with a special service location. All costs that are directly attributable to service location services are allocated thereto. But for costs which are attributable to two or more locations, for example, administrative costs, allocation keys or parameters would need to be developed. Such costs would be allocated only where the amounts involved are considerable.

5.129 The type of allocation key applied to a specific cost item or items will depend on the nature of the item or items concerned. For example, the costs of staff working in more than one service location could be allocated according to time spent working in each of the service locations involved, and the costs of administrative staff could be allocated according to the total work time of staff working in each service location. With regard to cost allocation based on work time, it should be recognized that relevant time-recorded data for staff working in more than one service location are in most cases not available. Costs of power, electricity, water, heating or air conditioning could be allocated on the basis of measured or estimated consumption of these services or utilities in each area. Depreciation and cost of capital attributable to investments covering several buildings or areas could be allocated according to volume of space, floor area and/or movement area within each of the service locations concerned.

### ALLOCATION OF EN-ROUTE COSTS AMONG FLIGHT INFORMATION REGIONS

5.130 In the case where en-route services are provided by a State to aircraft outside the FIR in which the facilities concerned are physically located, separation of costs among FIRs may be desired where user charges are to be levied on an FIR basis. This separation would reflect costs incurred by that State in providing the en-route services to the flights operating through the respective FIRs. One approach to separation of costs of services covering two or more FIRs is to apply ratios based on the respective volumes of traffic for the adjoining FIRs. However, the task involved is considerable and it is considered that in general no gross inequity would result if the exercise were only undertaken if the costs of the facilities concerned and their use in one (or more) adjoining FIRs are substantial (e.g. where facilities located in one FIR primarily serve traffic in an adjoining oceanic FIR).

### ALLOCATION OF EN-ROUTE COSTS AMONG CATEGORIES OF USERS

#### Introduction

5.131 ICAO's policies on charges in Doc 9082 (Section III, paragraphs 1 and 5) specifically call on States to ensure that no users are burdened with air navigation services costs not properly allocable to them according to sound accounting principles. However, any required allocation of costs among the different categories of users will depend on the circumstances involved, which are likely to differ, and it may often be necessary to identify only costs attributable to international civil aviation. A general principle, though, is that where cost allocation needs to take place, the total costs are to be allocated equitably among the different categories of users served by the route facilities and services concerned. This is of particular relevance in the case of State traffic, including military traffic, which is often exempt from charges. States are therefore encouraged to maintain accounts for the route facilities and services they provide in a manner which ensures that en-route charges levied on international civil aviation are properly calculated.



5.132 In many situations it will be of prime importance to exercise sound economic judgement about the primary need for the establishment of the facilities and services and to allocate costs among user categories accordingly. In that regard, it is particularly important to recognize that the major part of the air navigation facilities and services infrastructure has been established to serve the requirements of commercial air traffic and that some users receiving extensive service could not, by reason of the nature of their activity, have called for the provision of service on such a scale on an economic basis. The prime beneficiaries among the users should therefore be carefully identified to ensure that realistic allocations of costs among the various user categories are made.

5.133 Within this broad judgemental approach to allocation of costs of services among categories of users, which may be required only in certain circumstances, the use of certain operational parameters will assist in refining and more precisely measuring the allocations. Naturally, in those circumstances where they are to be applied, the parameters selected for route facility cost allocation purposes, either singly or in combination, have to appropriately relate to the flight operations of all user categories, reflect the extent to which service is provided to each category and be readily and objectively measurable.

5.134 The cost allocation may be approached in various ways. One option is to make an overall allocation of total costs. Alternatively, total costs may be broken down into running costs and depreciation and costs of capital relative to the various services or service locations before they are allocated separately to different user categories. This latter approach facilitates the cost allocation exercise because it assists in identifying those costs which are directly allocable. Costs which are not directly allocable would be allocated using appropriate parameters.

#### **Categories of services and users**

5.135 The first step in allocating costs among categories of users is to define the categories of users as a function of the services provided and/or the traffic concerned. In this context it is recognized that users may be categorized differently according to the type of airspace and air traffic services involved and that the approaches adopted by States will vary according to circumstances. Certain categories of users may either be exempted, for example VFR flights, or handled in a different way, for example military flights, which are exempted from route charges but may pay for their services through other means. In the interest of transparency, the costs to these categories of users for these services may need to be identified.

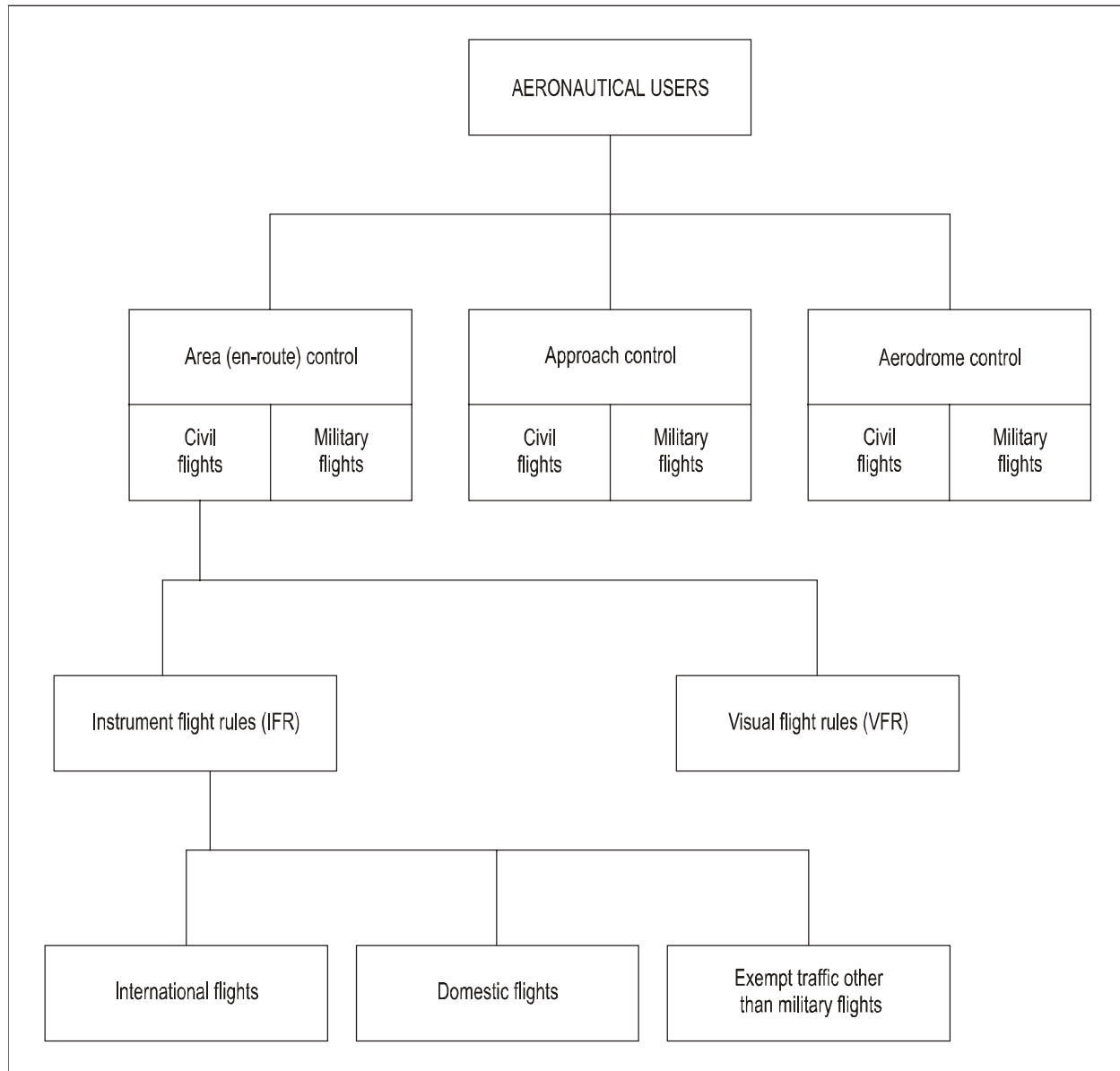
5.136 A schematic presentation of the categories of aeronautical users is provided in Figure 5-3.

5.137 The extent to which user categorization for cost allocation purposes can be pursued in individual cases will depend on a number of factors. Important among these are likely to be the main user categories involved, the extent of the requirement for cost allocation in government accounting, and the resources available for route facility cost accounting.

#### **Parameters for cost allocation among user categories**

5.138 The second step in allocating costs among categories of users is to apply appropriate parameters to those costs which are found to be attributable to two or more categories of users. If services and facilities are provided to serve only one user category, the related costs would be allocated to that user category only, but if more than one user category is identified, it may be necessary to establish and develop appropriate parameters for cost allocation among these user categories.

5.139 As indicated in 5.130, a parameter selected for en-route services cost allocation purposes would, ideally, be common to all user categories, reflect the extent to which en-route services are provided to each category and be readily and objectively measurable.



**Figure 5-3. Categorization of aeronautical users of air navigation services**

5.140 There are a number of parameters which, at first glance, appear to be suitable for application in the allocation of costs among categories of users, but after closer examination of the particular circumstances concerned, lead to an inequitable allocation of the costs involved. Each parameter needs to be carefully considered on its own merits, as indicated below.

#### *Number of flights*

5.141 The number of flights is readily and objectively measurable and will usually be a basic parameter for cost allocation. The number of flights by itself, however, generally does not indicate sufficiently accurately the extent of the

provision of route facilities to categories of users because other factors, in particular distance flown within the airspace concerned, are also important in determining the extent of service provided. Nevertheless, in cases where these other factors are reasonably homogeneous, the number of flights may represent a satisfactory parameter for the allocation of costs among categories of users. It also needs to be borne in mind that some costs are not directly related to distance flown but relate to routine tasks such as sector coordination; these may be more suited to allocation on the basis of numbers of flights.

#### *Distance flown*

5.142 Distance flown by each flight within an airspace appears to be a sufficient approximation of the extent of the provision of route facilities to be a satisfactory parameter for cost allocation among categories of users when used in combination with the number of flights in each category. Such a combination would involve determining the distance flown for each flight through the airspace concerned, identifying the number of flights by each user category, adding together the distances flown by each user category, and finally attributing to each category the proportion of the costs allocable to it.

#### *Time in the system*

5.143 The time a flight spends in the system is another indication of the duration of the services provided to it and could be used for cost allocation purposes, in combination with the number of flights in each user category. Where a significant proportion of flights operate at speeds different to the bulk of traffic, however, additional facilities and procedures may be required, the costs of which may not be appropriately allocable among the different categories of traffic in the same way. Another factor that dilutes the usefulness of time in the system as an allocation parameter is that its application would be quite cumbersome. The application of “time in the system” as a parameter therefore needs to be approached with caution and is not recommended.

#### *Aircraft weight*

5.144 The weight of an aircraft is readily and objectively measurable. It may not, however, provide an accurate indication, for cost allocation purposes, of the extent of the use of en-route facilities and services, even though such facilities may have been largely provided to serve larger and heavier aircraft, and its application could therefore lead to inequities and distortions in the allocation of costs among user categories. The application of aircraft weight as a cost allocation parameter should, therefore, be approached with caution and is generally not recommended.

### ALLOCATION OF APPROACH AND AERODROME CONTROL COSTS AMONG CATEGORIES OF USERS

5.145 Under “Allocation of en-route costs among categories of users”, reference is made to ICAO’s policies on charges in Doc 9082, Section III, paragraph 5, specifically calling on States to ensure that no users are burdened with air navigation services costs not properly allocable to them according to sound accounting principles. Such an allocation exercise is less complex for approach and aerodrome control costs than for en-route costs. Certain basic steps apply. As to the first of these, the air navigation services costs attributable to each airport (i.e. cost of approach and aerodrome control) would normally need to be identified, as outlined in paragraphs 5.135 to 5.137).

5.146 The next step involves identifying the categories of users concerned. For practical purposes this could be limited to the major categories that would either be charged or exempted from charges. The former includes international and domestic civil traffic (which could be subdivided into commercial and general aviation/business aviation), and the latter, State traffic, including military traffic, unless such traffic is minimal and incidental. The costs attributable to the

latter needs to be determined so that they can be deducted from the costs forming the basis for charges on other traffic. Similarly, where the entity providing the air navigation services does not levy charges on air traffic at the airport(s) concerned, but instead charges the airport(s) themselves, the cost share attributable to State traffic, including military traffic, is to be deducted and excluded from the costs charged to the airport(s). A related factor is that State traffic, including military traffic, is often exempted from airport landing charges. When this is the case, the State and the airport(s) concerned will need to determine how these costs are to be recovered (e.g. by a subsidy to the airport(s) concerned).

5.147 The third step involves deciding on the parameter or combination of parameters to be applied in allocating approach and aerodrome control costs among categories of users. The parameters that appear suitable and require further consideration are also those which were reviewed above with regard to the allocation of en-route costs among categories of users, namely number of flights, distance flown, time in the system and aircraft weight. Aircraft weight and time in the system have the same shortcomings for allocating approach and aerodrome control costs among different categories of users as they have with regard to en-route costs.

5.148 Distance flown is not as relevant to the allocation of approach and aerodrome control costs as it is to the allocation of en-route costs. This is because the distances flown are much more homogeneous during the approach and aerodrome phases of operations than during the en-route phase. The number of flights, however, meets the basic requirement for cost allocation purposes and is also a readily measurable parameter. Using that parameter, the approximate approach would be to determine the cost share of each of the major categories of users on the basis of the total number of movements by each category.

5.149 In the case where there are no differences in the level of services provided to the various users, the allocation of costs need not go beyond the allocation of the total air navigation services costs among the different services provided (i.e. approach and aerodrome, and en-route air navigation services).

## **PART E — COST BASIS FOR INDIVIDUAL CHARGES**

### **BASIC ASPECTS**

5.150 Once the total costs attributable to civil traffic have been established (see Figure 5-3) and, if required, divided into their international and domestic components, the cost basis for individual charges can be established. There are basically two types of charges for air navigation services, i.e. en-route charges and approach/aerodrome control charges. ICAO's policies on charges in Doc 9082 (Section II, paragraph 2 vii) recommend that the costs related to the provision of approach and aerodrome control should be identified separately.

5.151 Since the number of autonomous airport entities is expected to increase, there are likely to be more situations where a different entity provides approach and/or aerodrome control services (and en-route services). This in turn will mean a growth both in the number of instances where separate approach and/or aerodrome charges will be levied, and also in the alternative option where approach and aerodrome control costs will be charged to the airports involved, which presumably would include them in the cost basis for their charges. These issues are further addressed in Parts H and I below.

### **COST BASIS FOR EN-ROUTE CHARGES**

5.152 This includes all the costs attributable to the provision of air navigation services en route, by all the entities providing such services in the State concerned, including the costs of ATM (ATS), CNS (COM), MET, SAR and AIS (AIM).

COST BASIS FOR APPROACH AND AERODROME CONTROL CHARGES  
OR BASIS FOR CONTRACTUAL PAYMENTS FOR APPROACH  
AND AERODROME CONTROL — BY AIRPORT

5.153 This includes all the costs attributable to the provision of approach and aerodrome control services, i.e. ATM (ATS), CNS (COM), MET, SAR and AIS (AIM), by all the entities providing such services. Separate cost bases for approach and for aerodrome control would be required where such services are provided by different entities. Where an approach control office serves more than one airport, its costs are to be allocated among the airports concerned on the basis of the number of flights handled for each airport.

SECURITY MEASURES FOR AIR NAVIGATION SERVICES

5.154 Costs for certain security measures of a preventive nature for the provision of air navigation services, which are specifically related to civil aviation and performed on a routine basis, may, according to ICAO's policies on charges in Doc 9082, Section III, paragraph 3 v), be included in the cost basis for air navigation services charges to the extent that they have not already been considered in the context of safety-related measures. A clear distinction is to be made between the costs incurred for the provision of security for air navigation services and those incurred for the protection of other aspects of the aviation system such as those at airports for security control of passengers, cargo and airport/airline personnel. Air navigation services security costs may include the physical protection of ATM and supporting CNS and MET facilities, remote monitoring and/or control of distant CNS facilities, protection of data and voice communications (including software and satellite signals), security staff expenses and staff security training. A proper allocation of these costs among the different services performed by the air navigation services providers should be made.

**PART F — SPECIAL COSTING CONSIDERATIONS  
PERTAINING TO CNS/ATM SYSTEMS**

DETERMINING CNS/ATM SYSTEMS COSTS

5.155 As CNS/ATM systems components are implemented, States should add the associated costs to their cost base for air navigation services charges. Charges for CNS/ATM systems services should not be imposed unless these services are actually being provided for and implemented under the ICAO regional air navigation plan(s) (ANP), supplemented where necessary pursuant to recommendations made by the relevant ICAO regional air navigation meeting as approved by the Council (ICAO's policies on charges in Doc 9082, Section III, paragraph 3 ii) refers). Costs of CNS/ATM system trials and major research and development work may be included as part of the capital investment, the subsequent annual depreciation of which could then be included in the cost base for air navigation services charges.

5.156 Consequently, it is important that regional air navigation plans be promptly amended to incorporate the relevant CNS/ATM systems element(s) once the States involved have agreed that the element(s) should form part of the plan or plans concerned. The regional plans should also provide a schedule for the phase-out of facilities made redundant by the provision of CNS/ATM systems services. This is also of major importance because significant financial benefits from CNS/ATM systems implementation will not be realized if the facilities and services made redundant continue to be listed in the regional plans and charged for.

5.157 As noted in Chapter 3, Part G, the implementation of CNS/ATM systems offers the cost-saving potential of merging FIRs and correspondingly reducing the number of ATM facilities. However, even without an en-route ATM facility such as an ACC, a State would still need to incur costs associated with providing CNS/ATM systems services as well as other air navigation services for overflying traffic and during the en-route phase of traffic that lands on or departs

from its territory, e.g. costs associated with participation in and/or provision of GNSS augmentation, provision of AFS links with one or more ATM facilities, meteorological services (the recovery of such costs is discussed in Part J).

#### COST-RECOVERY DURING DEVELOPMENT AND IMPLEMENTATION

5.158 One particular issue that needs to be addressed in the implementation of CNS/ATM systems is the treatment of costs and cost-recovery during the three stages of systems implementation, i.e. development, transition and CNS/ATM systems as the only systems. The *Report on Financial and Related Organizational and Managerial Aspects of Global Navigation Satellite System (GNSS) Provision and Operation* (Doc 9660) addresses this particular issue in the specific context of GNSS (paragraph 3.8 of that report).

5.159 The implementation of CNS/ATM systems elements will, in many cases, lead to the retirement of existing ground-based facilities before the end of their economic life. In such circumstances, the balance of the undepreciated portion of the facilities concerned could be included in the cost basis for charges. The same procedure could apply to such costs as may be incurred because of premature retirement or training of personnel made redundant by the implementation of the new systems. Such costs, however, should be limited to termination settlements, costs attributable to early retirement and costs of retraining and/or relocation. Provisions for these costs would have to be set up and passed as expenses in the statutory accounts. However, for charging purposes, costs could be recovered over a longer period of time. These factors would need to be taken into account in any related cost-benefit analysis or business case study (see Chapter 6, Part C).

#### ALLOCATION OF CNS/ATM SYSTEMS COSTS

5.160 Civil aviation users constitute a minor share of navigation satellite users. More important than the magnitude of civil aviation's usage in relative terms is that users should not pay for more than their fair share of the costs of GNSS provision. Allocation of costs for systems augmentation or other costs of GNSS service provision attributable to users other than civil aviation, as well as civil aviation, should therefore precede any cost-recovery from civil aviation.

5.161 Costs in the form of payments made by a State to a service provider offering CNS/ATM systems services to several States will need to be allocated among the different States using the CNS/ATM systems services. That, in turn, would require an agreement between the parties concerned as to how such an allocation should proceed. Assuming a uniform level of service, such allocation could be based on distance flown or the number of flights in the airspace for which each State has accepted responsibility. Both can be considered as being reasonable proxies for the usage of CNS/ATM systems services. Distance flown would offer more precision while using the number of flights as the basis would be simpler to administer.

### PART G — SETTING CHARGES FOR AIR NAVIGATION SERVICES

5.162 The aim of levying air navigation services charges on air traffic (and/or to charge airports for air navigation services provided for them) is to recover the costs incurred by the provider for the air navigation services required for that air traffic (and airports).

5.163 The principle of cost-recovery is to charge users for the facilities and services that are directly related to their use of such facilities and services. An ANSP should avoid cross-subsidizing different user categories. Such cross-subsidization may not only result in discriminatory treatment of users, resulting in service pattern distortions, but can also result in an economically inefficient use of the air navigation facilities and services.

5.164 Because air navigation services charges are updated at most annually, cost-based pricing may, at times, result in periods of over- or under-recovery. In practice, major cost components such as depreciation/amortization or aeronautical meteorological services are sometimes not included in the cost basis for air navigation services charges. This indicates that some States, particularly those with low volumes of traffic, do not recover the full costs of providing air navigation services. Also, since most States levy route charges and essentially all levy airport charges, consideration should be given to the types and levels of charges on the various traffic categories and whether full or only partial cost-recovery should be sought from each of them (refer to Doc 9082, Section III, paragraph 4). For practical reasons, such as efficiency of billing, or to support certain user categories such as domestic operations or general aviation/business aviation, some States may wish to levy lower charges on them than could be justified by the allocable costs, or to exempt them from charges, as long as any shortfall in revenues does not have to be shouldered by other users (refer to Doc 9082, Section III, paragraph 5).

## ECONOMIC PRICING

### Objectives

5.165 Traditionally, air navigation services charges have been set on the basis of average costs. While administratively simple, this approach does not necessarily recover costs in a way that encourages the most economically efficient provision and use of the air navigation facilities and services. An alternative approach to setting charges is based on the principle of economic pricing. Such charges are expected to encourage a more efficient use of the scarce resources by incorporating the users' "willingness-to-pay" within the context of cost-recovery while at the same time ensuring that users will not be burdened with costs that are not properly allocated to them. Similarly, in situations where there are large fixed and/or joint costs, economic pricing can be used to ensure efficient cost-recovery. In each case, the application of economic pricing serves two purposes:

- a) it provides a mechanism to allocate resources efficiently; and
- b) it provides market signals, indicating where investment would yield the greatest benefit to the users of the air navigation services.

### Application of economic pricing for cost-recovery

5.166 The application of economic pricing may be consistent with guidance in Section III, paragraph 6 iii), of Doc 9082, which states: "Charges should be determined on the basis of sound accounting principles and may reflect economic principles as required, provided that these are in conformity with Article 15 of the Convention on International Civil Aviation and other principles in the present policies." Essentially, applying economic pricing in setting air navigation services charges refers to the concept of marginal (or incremental) cost. The marginal cost approach differs from the more traditional regulatory accounting-based approach in which charges are set on the basis of average costs. Assuming that the ANSP can adequately measure its marginal cost and has a sense of user demand, setting charges equal to marginal cost will produce a more economically efficient outcome than setting charges equal to average costs.

5.167 However, the challenge faced by many ANSPs is that their production process is characterized by "economies of scale" — total average costs decline as output increases. Setting charges equal to marginal cost would result in under-recovery. This requires ANSPs to subsidize these facilities and services from other revenue sources or to adopt some form of non-linear pricing in which charges are modulated<sup>5</sup> while ensuring that an adequate revenue stream is maintained. Examples of such charging techniques include the use of Ramsey pricing, two-part tariffs (involving a fixed

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5. According to the time and/or situation of use of the facility or service concerned.

charge and a variable charge related to marginal costs) and peak-period pricing, all subject to the constraint of full cost-recovery. With respect to peak-period pricing, in which there are significant variations in the level of service by time of day, charges could be established on the basis of short- and long-run marginal costs. To ensure consistency with ICAO's policies on charges, it is essential that ANSPs make certain that users engaged in similar types of operations be treated equally. To implement this particular form of economic pricing, ANSPs need to identify peak and off-peak users, the costs of serving peak and off-peak users and how users' behaviour changes once the pricing scheme has been implemented.

5.168 The use of economic pricing requires additional data beyond what are typically required when charges are based on an average cost approach. A prerequisite for using economic pricing is to have a well-developed cost accounting system capable of providing the necessary information needed to identify fixed, variable and marginal costs at the system and facility level. On the demand side, particular focus should be placed on understanding user responsiveness to changes in air navigation services charges. Often the responsiveness of users will be determined by the importance of the charge relative to the total cost of operating the aircraft, the existence of alternative service providers, and the flexibility of users with respect to the routes or city-pair markets served.

5.169 The decision on whether to adopt an economic pricing approach or to rely on the more traditional average cost approach should take into consideration the extent to which the former approach would improve economic efficiency. In situations where the efficiency gain is relatively small, it may be prudent for the ANSP to continue to use the more traditional approach and avoid the issues associated with setting a charge based on the concept of marginal cost.

5.170 ANSPs generally operate with a certain degree of market power. Where an ANSP has a degree of national monopoly power, there is potential for abuse of market power and over-recovery of the accounting cost base if effective oversight of air navigation services charges or sufficient countervailing airline power to resist any abuse is not in place.

### **Congestion management**

5.171 The application of economic pricing can also yield benefit in situations where the airspace is congested. Congestion charges are designed to address the situation where an airspace user imposes a delay or other type of congestion cost on another user, greater than the cost they themselves experience. This type of modulated pricing approach might be applicable in cases where capacity is constrained and certain flights impose a disproportionate cost on the air navigation services capacity. To implement this pricing approach, the ANSP needs to first determine whether one user is imposing a cost on another user. Second, this cost must be identified. Third, a charging system must be established to internalize these externalities. If the congestion charge is properly structured, users should not be burdened with costs that are not entirely attributable to their own business practices. The practical difficulty with this approach is that it becomes extremely complex to effectively measure the externality. Furthermore, given the fact that congestion costs are not directly associated with the cost of air navigation facilities and services, it is difficult to reconcile this pricing practice with the principle of cost-recovery. Consequently, the use of congestion pricing should be done with great care, and revenue derived from such charges should be reinvested in the air navigation services system in order to expand capacity to better address the congestion problem.

### **Differential charges**

5.172 In other circumstances, the ANSP may wish to set charges based on other objectives. For instance, the ANSP may want to modify air navigation services charges to include a differential component. This differential charge component refers to any preferential charge or other reductions in the charge normally payable for the use of air navigation facilities and services. Such charges are designed specifically to elicit distinct changes in user behaviour for purposes other than using pricing to recover economic costs. For instance, if an ANSP were seeking to expand its services or to encourage the use of certain technology to improve the efficiency of the air navigation system, the ANSP could use introductory discounts or other incentive schemes to achieve these goals. Given the nature of the differential charge, its application should be closely monitored.



5.173 In light of the potential adverse effects associated with differential charges, when performing their economic oversight function, States should, where necessary, assess the positive and negative effects associated with such charges on a case-by-case basis, according to national circumstances. ICAO's policies on charges (Doc 9082, Section III, paragraphs 6 iv) and 6 v)) describe four high-level principles for safeguarding users against potential negative effects of differential charges:

- a) *non-discrimination*: this principle has its roots in Article 15 of the Chicago Convention. Paragraph 6 iv) of Section III of Doc 9082 states that the charges must be non-discriminatory between foreign and domestic users, as well as between two or more foreign users. In practice, this could be interpreted as "all categories of users meeting the same criteria and offering the same or similar air services should be treated equally";
- b) *transparency*: ANSPs should publish the existence of differential charges together with the purpose and the criteria on which they are offered. This principle does not mean that ANSPs should have to disclose any commercially sensitive information to the public;
- c) *non-cross subsidization*: where any differential charges are extended to particular categories of users, without prejudice to modulated charging schemes, costs associated with such differential charges should not be allocated, either directly or indirectly, to those other users not benefiting from them. This means that revenue shortfalls resulting from the introduction of differential charges for specific user categories should not be shouldered by other users; and
- d) *time-limitation*: this principle relates to the amount of time that an ANSP may provide particular categories of users with preferential treatment to encourage the introduction of new technologies (e.g. early equipage). Since the air services receiving preferential treatment are ultimately expected to become profitable, such schemes should be offered only on a temporary basis.

Regarding the applicability of safeguards in the context of modulated and/or differential charges, it should be noted that the principles of non-discrimination, transparency and non-cross subsidization should be applied to all types of charges, while time-limitation should be applied to differential charges only.

### Incentives

5.174 The term incentive refers to an instrument that incites a particular course of action. In an economic context, incentives may take the form of a financial reward or penalty, or a change in operational efficiency. An ANSP could use a financial incentive through its charging scheme to encourage users to act in ways that will lead to the desired outcome. In the context of air traffic management (ATM), three types of incentives might be provided for users, according to different time horizons.

5.175 The first type of incentives for users would affect their tactical or operational decision at the level of each flight in terms of timing, routing or flight profile. Although tactical decisions are often made without consideration of such incentives, it is conceivable that, for example, in a congested airspace, some users would be willing to accept a less optimal flight profile in exchange for some form of financial remuneration. Depending on the circumstance, providing such incentives may even out traffic flows and reduce the overall cost of the provision of service.

5.176 The second type would target the demand for ATM services by affecting users' decisions regarding their services, for example, with respect to scheduling or fleet allocation. Charges for air navigation services could be modulated in such a way that higher charges would apply during peak periods when demand for ATM's limited capacity is greatest, and lower charges would apply during off-peak hours.

5.177 The third type would affect users' decisions on investments in new technology for on-board equipment. Experience has shown that users tend to defer as much investment in aircraft equipment as possible, preferring short-term savings (deferring an investment) to less certain collective benefits that are dependent on the synchronization of

ground and on-board equipment investments. Therefore, incentives for early adoption of on-board equipment may help support the implementation of new technologies and, over time, could contribute to a better adjustment of ATM capacity to the needs of the air transport industry.

5.178 The application of incentives would depend on specific circumstances. In general, an area-specific or local-level application would be suitable for the first and second types of incentives. The third type (and the second type in some cases) would ideally be developed for subregional or regional application through cooperation between States and ANSPs, considering that many aircraft operate well beyond the area managed by any single ANSP.

5.179 Regardless of the types of incentives, as a premise, States should ensure that, where ANSPs introduce incentives for users, the incentive schemes meet the principles set out in Doc 9082. Incentive schemes should be transparent and subject to periodic reviews (for example, to assess whether the incentives meet the stated objectives), and the estimated benefits such as savings generated by operational efficiency should offset, at a minimum, the cost imposed on the users.

5.180 A further type of incentive may be applied to an ANSP by an independent regulator to encourage improvements in service quality. Such incentives should be based on achieving standards of quality for which users would be prepared to pay.

## PART H — INDIVIDUAL CHARGES

### GENERAL

5.181 Part E above contains guidance on determining the cost basis for individual charges. In that context it is noted that apart from costs incurred by the entity carrying out the billing function (usually the entity that provides the ATS), with regard to functions that the entity is directly responsible for, adjustments in the form of transfers of costs to and from that entity may have to be made because of services provided by other government departments (or government or non-government entities) to that entity or provided to them by it.

5.182 As in the case of costs, one or more of the revenue elements an entity carrying out the billing function collects through its charges might be attributable to another department or entity providing air navigation services. This applies, for example, if the landing charges include an element attributable to en-route services provided by another department. That would require the transfer of the revenue element involved, once it has been collected, from the airport to the department concerned. The reverse would apply if, for example, route charges levied by a government department or non-government entity, other than the airport, to recover its costs, also contained an element for approach and/or aerodrome control, the costs of which were charged to the airport. In that case, the revenue element concerned could be allocated to the airport to offset the corresponding costs charged to it, which would reduce the costs that form the basis for the charges levied by the airport on air traffic.

5.183 A principal objective when establishing charges is usually to determine what charges should be levied on air traffic in the immediate future, normally the next financial year. This requires an estimate to be made of the cost basis for individual charges for the next year which is arrived at on the basis of costs from the most recent financial year.

5.184 Similarly, in order to set charges at a level which permits predetermined cost-recovery and revenue objectives to be met, air traffic for the following year would need to be forecast. This would involve estimating the total number of aircraft movements, broken down by the type of charge (en-route versus approach and aerodrome control charges) and by applicable charging parameters. Sometimes longer-term air traffic forecasts may be required in order to project future trends in revenues from air navigation services charges as necessary components to be incorporated into the budgeting process described in Chapter 4, Part A. For all these purposes, reference is made to the guidance on medium- and long-term air traffic forecasting contained in the *Manual on Air Traffic Forecasting* (Doc 8991). In developing their air traffic forecasts, it is desirable that ANSPs consult with regular users or their representative

organizations. As to arriving at unit costs for individual charges, the approach would normally be for the cost basis for the charge concerned to be divided by the estimated accumulated charging parameter units concerned (the divisor applied depending on what the charge concerned was based, as further discussed below).

## EN-ROUTE CHARGES

### Introduction

5.185 A number of parameters are available to establish en-route charges that more accurately reflect use of the services and their value to users, and therefore ensure greater equity. The advantages and disadvantages of several parameters are discussed in paragraphs 5.186 to 5.192 below. A flat charge per flight may be used in circumstances where there is little difference in both the distance flown and the weight of the aircraft flying through the airspace concerned (or in cases where the charge per flight is relatively low). In most situations, however, a flat charge per flight levied without regard to distance, type of flight or the aircraft used will not recover costs equitably from among users. Nevertheless, in some circumstances, it may be considered appropriate to use a combination of a flat charge per flight and a charge based on other parameters to recognize that there is an element of fixed costs in providing air traffic services.

### Parameters included in ICAO's policies on charges (Doc 9082)

5.186 According to paragraph 8 of Section III of ICAO's policies on charges in Doc 9082, the charge for en-route air navigation services should, so far as possible, be a single charge per flight that could be based essentially on the distance flown and the aircraft weight. This provides sufficient flexibility to adapt the formula to local requirements or circumstances. Taken as acceptable measures of the services rendered, the element of distance flown should be applied by means of a distance scale using great circle distances or other commonly agreed distances, and the element of aircraft weight should be applied by means of a weight scale using broad intervals that should be standardized so far as possible. It is recognized in Doc 9082, Section III, paragraph 9, that the characteristics of a given airspace will determine the most appropriate charging method for that airspace, having regard to the type of traffic, the distances flown and the characteristics of the aircraft in that airspace. When the distance flown and/or the aircraft types are reasonably homogeneous, the distance and weight elements may be separately or jointly neglected as the case may be (see Doc 9082, Section III, paragraph 9 ii), and paragraphs 5.187 and 5.189 below). In some circumstances, it may be considered appropriate to use a combination of a flat charge per flight and a charge based on distance flown and/or aircraft weight in recognition of there being an element of fixed costs in providing air traffic services.

#### *Distance flown*

5.187 The distance flown by a flight within a defined area is usually a good reflection of the extent to which en-route services are used. Depending on local circumstances, it may be taken into account in the establishment of a flight charge by means of a linear scale, a stepped scale with even intervals, or a stepped scale with uneven intervals. A straight, linear application, being simple, is to be preferred when circumstances permit. If a charging system established by a group of States, involving revenue sharing among them, uses distance as a factor, then it would need to be applied on a linear basis. Distance would, however, have little relevance for a charging formula where there are no significant differences in the lengths of flights over the routes in the airspace concerned (Doc 9082, Section III, paragraph 9 ii)). Therefore, the distance factor could be excluded from a charging formula in such cases.

#### *Aircraft weight*

5.188 It is stated in ICAO's policies on charges in Doc 9082, Section III, paragraph 8, that where aircraft weight is used as an element in the determination of route charges, it should be taken into account less than proportionally.

Nevertheless, aircraft weight is considered to be a valid charging parameter for representing the value of service to users and is recognized as such in Doc 9082. It is, however, recognized that its relationship to the cost of services is not necessarily direct. It may be assumed that the value of the service generally increases as aircraft payload increases, and since aircraft weight generally has an approximate relationship to payload capacity, it provides a reasonably good measure of that value. The use of heavier aircraft, however, may achieve greater productivity and efficiency for the aircraft operator as well as economy in operation of the air traffic management system through reduction in traffic congestion. Most en-route charging systems reflect this view. Applying the square root of weight, or by otherwise ensuring that the levels of the charges increase less than proportionately to the increases in aircraft weight, is the usual means of ensuring that heavy aircraft are not treated inequitably.

5.189 When aircraft weight is to be used in a charging system, it is important that it does not discourage the use of larger aircraft that can reduce the effect of a capacity constraint in the air traffic control system without the need for capital investment. It is also important to consider the mix of aircraft for which the air navigation services are being provided, which can vary significantly, to ensure equity in the impact of charges. Although a variety of aircraft weight scales can be devised to generate the required level of charges revenue for any given number of flights, the essential objective is to ensure that the system produces the appropriate level of revenue with reasonable equity to the aircraft operators. Also, in cases where the aircraft types served, and/or the distances flown (see 5.187 above), are relatively homogeneous, weight may be eliminated from the charging formula (Doc 9082, Section III, paragraph 9 ii).

### Other parameters

#### *Fuel intake*

5.190 While fuel intake may be a convenient parameter to use, the amount of fuel taken on or consumed during a flight may not necessarily reflect the extent of the use of en-route facilities and services. This applies particularly to general aviation flights, which are frequently conducted locally under VFR conditions. Moreover, for international flights there is no direct relationship between fuel taken on in one State and the use of en-route facilities provided by another State. A charge based on fuel intake, however, may be a useful approach to recovering costs from general aviation users in the absence of a more suitable basis of charging, since the potential revenues from separate en-route facility charges on each flight may not in many instances be commensurate with the costs of identifying flights, billing and collection.

#### *Revenue payload (passengers and freight)*

5.191 In the right geographical circumstances, a charge on revenue payload may be a useful approach to the recovery of en-route costs. Revenue payload may in such circumstances be used as a proxy for aircraft weight and distance flown when applied in the form of a flat rate charge on each passenger and/or each unit of freight carried. This parameter should be used with caution, however, since it constitutes an imperfect proxy for a combination of weight and distance factors when the charge is expressed as a percentage of the fares and rates applied, given the complexity and variations in air carrier fares and rates. There is also no relationship between charges levied by one State on the revenue payload of multi-sector international flights and their use of the route facilities of two or more States, for which this approach would be complicated and difficult to apply. Finally, this approach also discriminates in favour of empty flights.

#### *Flight time or aircraft speed*

5.192 The time a flight spends in the system is a function of its speed and indicates the amount of time that en-route services are provided to it. Higher speed means less time spent in a given airspace and therefore a reduction in the duration of the services provided en route. Faster aircraft can also alleviate traffic congestion by permitting more aircraft to be processed in a given time. However, where there is a significant mix of aircraft operating at different speeds in relatively congested airspace, additional and more sophisticated facilities and procedures may be required for traffic control purposes. These factors dilute the equity and usefulness of charges based solely on flight time or aircraft speed.

## Charging systems based on distance flown and aircraft weight

### Introduction

5.193 Charging systems based on a combination of distance flown and aircraft weight account for the majority of all en-route air navigation services charging systems. In such systems, the charge for a specific flight is usually determined by applying a unit rate to the number of “traffic units” represented by that flight. The number of traffic units is calculated by multiplying, for each flight, the distance flown by the weight factor for the aircraft used for the flight concerned. The traffic units thus calculated for each flight can then be added together to arrive at the total volume of traffic for each user category and for all categories combined.

### Distance flown

5.194 Where used as an element in the determination of en-route charges, distance flown is usually measured between:

- a) the airport of departure or the point of entry into the FIR or airspace for which the charging State or authority is responsible; and
- b) the airport of first destination or the point of exit from the FIR or the airspace for which the charging State or authority is responsible.

For charging purposes, distance flown is usually expressed in hundreds of kilometres (or nautical miles). A standard deduction (in many systems the equivalent of 20 kilometres) is usually made for each take-off and landing at an airport within the area concerned, to reflect the use of approach and/or aerodrome control facilities and services. The distance flown may be identified from the relevant records of the ACC/FIC processing the flight, usually the so-called “flight strips”, indicating the route travelled through the airspace.

### Aircraft weight

5.195 Where used as an element in the determination of en-route charges, aircraft weight is normally expressed in metric tonnes or an equivalent measure. In order to take aircraft weight into account less than proportionately, as recommended in ICAO’s policies on charges in Doc 9082, Section III, paragraph 8, various weight scales and intervals may be used, and a large number of States apply the square root of the aircraft’s weight to achieve this objective (see also paragraphs 5.188 and 5.189). Whatever approach is used, care should be exercised in selecting the type of aircraft weight to be applied, so as to ensure that the differences between the proportions of payload capacity to aircraft weight for different aircraft types are equitably reflected.

### Unit rate

5.196 The unit rate to be applied for each user category is determined by dividing the total estimated en-route costs to be recovered from each user category for the period concerned (usually one year), by the estimated total of “all traffic units” (see paragraph 5.193) produced by that user category. The number of traffic units for the following year may be estimated by applying a rate of anticipated growth (or decrease) to the total traffic units of the preceding year. Where the number of traffic units for the preceding year is not available, it may be estimated on the basis of flight data available from the ACC(s)/FIC(s). Similarly, the total estimated costs for the next year could be arrived at on the basis of the actual costs of the preceding year.

5.197 The unit rate can either be expressed in the local currency or another currency.

### Simplified charging systems

5.198 While en-route air navigation services charges are most commonly based on a combination of distance flown and aircraft weight, they may in certain circumstances, as indicated in 5.194 and 5.195, be based either on aircraft weight or distance flown exclusively. Where there is little difference in both the weight of the aircraft served and the distances flown, the charge could take the form of a fixed charge per flight. Being simple and less costly to administer, this approach may also be adopted in those circumstances where the charge per flight would be relatively low.

## APPROACH AND AERODROME CONTROL CHARGES

### General

5.199 Air navigation services costs attributable to approach and/or aerodrome control have in many instances been recovered through landing fees levied by the airport operator. With the increased tendency to set up airports and ANSPs as autonomous entities, or corporate entities, the relationship between airports and ANSPs has changed, including the competitive provision of airport-related air navigation services. In a number of these cases, the cost of providing approach, aerodrome control or terminal area navigation services could be recovered through direct charges on users or recovered from users in cooperation with the airport operators through landing or other similar charges. In certain other cases, where the services are linked directly to a specific airport, they could alternatively be recovered from the airport operator by means of an agreed charge. In the latter two cases this would normally be laid down in an agreement between the airport and the provider of air navigation services, following consultation with users, and subject to commercial confidentiality.

5.200 If an ANSP charges an airport directly, the airport operator, after consultation with users, would then establish the charge to be levied. The practice of some airports to include an air navigation services charge in their landing charges should be approached with caution for the following reasons:

- a) it lacks transparency for the users;
- b) the charging parameters for air navigation services charges and landing charges can be different; and
- c) ICAO's policies on charges (Doc 9082, Section II, paragraph 2 vii) recommend that the costs of air navigation services provided during the approach and aerodrome control phase of aircraft operations should be identified separately.

5.201 Whatever method is used for recovering the cost of these services, States should seek to facilitate arrangements to ensure that ICAO's policies on charges concerning consultation with users, as set out in Doc 9082, Section I, paragraphs 17 to 22, are observed.

### Parameters included in ICAO's policies on charges (Doc 9082)

5.202 In ICAO's policies on charges in Doc 9082, it is recommended in Section III, paragraph 7, that "where charges for approach and aerodrome control are levied, whether as part of the landing charge or separately, the charge should, so far as possible, be a single element of the landing charge or a single charge per flight and could take aircraft weight into account but less than in direct proportion".

5.203 As is the case for en-route air navigation services (see Doc 9082, Section III, paragraph 9 iii)), in some circumstances it may be considered appropriate to use a combination of a flat charge per flight and a charge based on other recommended parameters to recognize that there is an element of fixed costs in providing air traffic services.

### Other parameters

5.204 Other parameters, i.e. fuel intake, revenue payload (passengers and freight) and flight time or aircraft speed that were discussed above under en-route charges, can also be considered to be similarly applicable with regard to cost-recovery for air navigation services provided during the approach and aerodrome control phases of aircraft operations. Some States also offer the operators of small aircraft used for private and for pleasure purposes the option of purchasing annual or quarterly cards or certificates at fixed rates that cover the use of air navigation services and landing at some or all airports in the State concerned.

### Common approach or terminal area charges

5.205 There is a growing tendency, especially in complex, highly congested areas, for approach control services to be centralized, with controllers handling aircraft on behalf of a group of airports. It is recognized that in these situations there are some facilities and services that might fall into either the en-route or approach categories. In these circumstances, consideration might be given to designating these tasks to a specific terminal area control unit which would also cover services and facilities related specifically to approach control. The charging parameters could still reflect the parameters described in 5.202 and 5.203.

5.206 Some airports levy relatively high minimum landing charges and/or high fixed charges per aircraft movement during peak hours to reflect more accurately the investment in capacity that is determined by the number of peak users. Similar consideration could apply to approach and aerodrome control services. Peak charges have also been used by some airports in an attempt to smooth the hourly flow of airport traffic, although their effectiveness in redistributing traffic is limited by the fact that very large differentials would be needed before airlines would accept the commercial and operating disadvantages of moving from the peak. This might be particularly so for long-haul services where constraints on the times at which they can offer an attractive service are tightly drawn. On the other hand, peak charges may have an effect “at the margin”, which could result in reduced delays when capacity is severely constrained and would help to encourage its efficient use. Minimum charges for approach and aerodrome control services could also help to encourage the efficient use of capacity where general aviation movements account for a relatively high share of total movements. See also the discussion on application of economic pricing principles in Part G.

### ZONE CHARGING

5.207 Paragraphs 5.102 to 5.113 describe an alternative option for classifying air navigation services and allocating costs.

5.208 En-route charges have traditionally been calculated per State or per FIR. Under the above option, separate charges may be levied for upper and lower airspace, and this could be developed further by matching charges closer to service delivery. Under such a scenario, services in less complex airspace might be levied at a lower rate, thereby introducing a greater degree of cost-reflectivity to the charging structure. A “zone” may be established based on traffic flows and/or airspace structure, often covering more than one FIR. In that way, a zone may comprise airspace extending beyond national boundaries. For example, the concept of zone charging was introduced in the European Commission Single European Sky (SES) Charging Regulation. Zone charging might also be possible for services provided in complex terminal areas, e.g. if there are separate airports in a small area with complex approach procedures.

5.209 The introduction of zone charges is likely to lead to more cost-reflective charging. However, before this takes place, there are a number of issues that need to be considered, including the following:

- a) a more cost-reflective pricing system would send out better pricing signals, but at the same time, operational problems or difficulties need to be avoided;

- b) a zone charging system could be more complex, although it may lead to greater transparency;
- c) higher charges in complex areas may encourage users established at their periphery to use other airspace, which could contribute to more efficient use of airspace overall. However, this may be judged unfair by those who have little choice but to use the service. In this respect, a provider should not levy charges that are solely intended to increase revenue without proper cost justification; and
- d) zone charges would help to reduce cross-subsidies by charging those users who require the service the true cost. This could lead to a more efficient and effective use of resources.

5.210 Ultimately it will be for the State or ANSP to decide whether to introduce zone charges after consulting with airspace users or their representative organizations.

## PART I — COLLECTION OF CHARGES

### CHARGES LEVIED DIRECTLY ON USERS

#### General

5.211 Many entities providing air navigation services recover the associated costs by means of air navigation services charges levied directly on the users. In certain circumstances, air navigation services may be provided under contract to another service provider, for example, an entity providing air navigation services may provide en-route service to another State, or within another flight information region (FIR), or service on behalf of an airport. In the latter case, the air navigation services entity may recover its costs by means of a periodic charge to the airport.

5.212 States should refrain from segmentation of FIRs solely for the purpose of generating revenues not related to the cost of service provision.

5.213 Separate air navigation services charges may be levied to cover the different types of services provided. Principal types of services and their related charges are described below. It should be noted that an alternative categorization of services for cost allocation purposes is discussed in paragraphs 5.102 to 5.113.

- a) *Approach and aerodrome control service.* The associated charge may be levied either as a combined charge or levied separately.
- b) *Centralized approach control service.* This service usually refers to a situation where approach control is provided to a number of airports from a centralized unit — normally an area control centre. A combined charge or separate charges may apply.
- c) *Centralized approach/terminal area control service.* This refers to the situation where approach control and en-route services are provided by a terminal area control unit as described in 5.205. A combined charge or separate charges may apply.
- d) *Area control service.* This refers to all en-route (area control) services provided in the domestic FIR(s) of the State concerned. It is more common to have a single charge covering all those air navigation services properly attributable to en-route services. It may be considered appropriate, however, to have separate charges for individual FIRs.
- e) *Oceanic control service.* This refers to the situation where a State has accepted the responsibility of providing air navigation services over the high seas under specific delegation by ICAO. Separate route air navigation services charges for these services normally apply.



### Sources of data for billing

5.214 Data for charging can be obtained from a variety of sources. However, regardless of the source, the data should represent reasonable evidence that the flight being charged for the services concerned has taken place.

5.215 In the case of approach and aerodrome control charges, the source data may be the same or similar to the data used for calculating landing charges, for example, air traffic control logs, apron control logs or records kept by handling agents, unless the approach and aerodrome control charges refer to services provided centrally, in which instance the source data are more likely to be similar to data used for charging for en-route services (see below).

5.216 The prime source data for continental and oceanic en-route charges will emanate from the operations control rooms and can be in a variety of forms such as:

- a) daily summaries of flights handled;
- b) direct input from the flight data processing system;
- c) activated stored flight plans; and
- d) ATC flight progress strips.

5.217 The above would normally represent the direct operational data used for charging purposes. However, this may not represent the only data required especially where there are significant numbers of flights outside controlled airspace. In such cases services provided could include flight information services, meteorological services, the provision of navigation aids and area control services from aerodrome towers. Sources that could provide additional data required in these cases include:

- a) aerodrome air traffic control logs;
- b) flight plans/AFTN; and
- c) ATC flight progress strips.

5.218 Whatever the situation of the ATS entity, the source data used for charging purposes will need to be sorted and validated. Where the service is highly automated, data processing systems can be utilized making use of the operational ATC systems. This would be particularly applicable to high-volume operations; however, where volumes are low or these resources are not available, this is likely to be a manual operation. This will necessitate the employment of staff to sort the flight progress strips and other source data in order to identify the chargeable flights.

### Legal basis for the charges

5.219 Air navigation services charges are levied for services provided or made available to users (in accordance with the regional air navigation plan). Charges may be levied on the basis of the same unit rate regardless of category of user, or alternatively, some categories of users may be specifically exempted or charged at a lower unit rate, for example, flights made under visual flight rules (VFR).

5.220 In summary a flight may be defined as:

An aircraft movement through any airspace and defined by aircraft identity and/or airline flight identity, aircraft type, flight category, respective entry and exits points, departure and destination airports, date and time of departure.

5.221 In general the liability to pay the charge would fall on the user who at the time the flight was made was the operator of the aircraft concerned. In some cases, where the operator cannot be traced, the owner of the aircraft can be made liable for the charge.

5.222 Identification of the correct operator is fundamental to the smooth operation of any billing system. In the majority of cases the ICAO call sign and/or the registration of the aircraft will provide the crucial link. This information is usually entered on the flight plan and will appear on the ATC flight progress strip. In addition it may be used by handling agents and apron controllers. Nonetheless there can be problems when aircraft are leased, especially if there is a wet lease involved (an aircraft leased along with a crew to operate it). In these cases the call sign may not be sufficient unless the system's billing regulations specifically state to this effect. Follow-up action through to the aircraft owner may be necessary. If uncertainty remains, other factors may need to be considered. These could include:

- a) the carrier under whose certificate or permission the flight was made;
- b) the identity and employment of the crew; and
- c) the operator identified with the aircraft concerned.

5.223 It is recognized that where major carriers or operators are involved, the identification will normally be obtained from the activated stored flight plans or ATC flight strips generated from the operational system. These will usually identify the flight through its specific call sign rather than its aircraft registration.

5.224 A formal agreement between the ANSP and the owner/operator of the aircraft is generally not necessary. The charges for air navigation services are either levied through promulgated regulations or, where charges for aerodrome control services are levied as part of the airport charges, under the airport's published terms and conditions. Additional information required will depend to a certain extent on the charging parameters used. For example, if weight is a parameter then the aircraft type will need to be identified. Various weight options may be adopted. Many systems use maximum certified take-off weight but a system of published standard weights could be used, the main criterion being that this should be applied consistently.

5.225 If distances are also used, and this is very likely to be the case for en-route charges, then airports of departure and arrival and/or respective entry and exit points will need to be identified in order to take account of distances within the airspace for which the State concerned has accepted responsibility for providing air navigation services; this information can be obtained from the operational data. Some systems use standard distances, while others use actual distances. Relevant data are necessary to support the choice of distance methodology used for calculating distances, the main criterion again being consistency.

5.226 In the case of many charging systems, the conditions regarding their application as well as key elements of the system, for example, the method of calculating the charges, exemptions and payment conditions, are published. Such publication is recommended as a general practice.

#### **Verification and validation of data**

5.227 As stated above there are a variety of data sources but the most important are generated from the ATC flight data processing systems (FDPS). In addition programmes have been developed for extracting the chargeable data, but given the wide range of sources of data needed to ensure availability of all the data required, a data validation process needs to be installed in order to minimize future claims and reduce the burden on users.

5.228 In most systems it is advisable to establish an agreed timetable for validating and transmitting the data to whoever is responsible for the billing. In the case of multilateral systems (see below) adherence to this timetable is essential in order to prevent delays in charging.

5.229 Where there are high volumes of traffic, one option is to break down the data into specific days and assign the responsibility for validating a particular day's traffic to whom it may be most appropriate. Under this system a day's traffic could be a compendium of data from various sources as described above.

#### **Corrections and claims (disputed bills)**

5.230 In spite of having a validation procedure, the department or agency receiving the data for billing may identify queries that will require correcting by the group responsible for data transmission. For example, the ICAO designator may be incorrect. In order to minimize delays, a list of queries should be sent to the validating section for investigation.

5.231 In the case of claims, the situation can be sensitive since the user concerned will be expecting an answer as quickly as possible. Delays in processing claims are not only costly to the ATM entity but are also costly to users and unless they are handled promptly can bring the system into disrepute.

5.232 Some large users can receive details of the invoices electronically and that greatly eases verification since these details can be automatically compared with the user's own flight data. When a user submits a claim on a disputed bill, it should be passed back to the data validation department for verification.

#### **Multilateral systems**

5.233 This principally applies to air navigation services en route. A multi-State multilateral system can provide economies of scale for those States participating in the system, and because of the wider area covered, such a system can facilitate enforcing the recovery of charges. This particularly applies to States with a relatively small geographical area where a high proportion of the flights handled are overflights. In addition, and most importantly from a user's point of view, users will receive only one bill regardless of the number of participating States overflown.

5.234 In multilateral systems involving a number of participating States, it is usual to adopt a common convertible currency for billing and payment purposes. Where this is the case, ICAO's policies on charges in Doc 9082, Section I, paragraph 24 iv), note that when route charges are billed on a regional basis (i.e. on behalf of several States or by a jointly operated agency), it may be advantageous both to users and providers to denominate and pay charges in a single convertible currency. However, in so far as international operations are concerned, calling for payment in convertible currency would not be in conformity with Article 15 of the Chicago Convention unless it is equally applied to international operations of the national carrier(s).

5.235 The same criteria regarding flight definition, legality and validation, as described in paragraphs 5.119 to 5.232 above, would also apply to multilateral systems. In addition, rules would need to be established for reporting the chargeable data to the central authority for issuing the invoices. This would normally involve allocating specific reporting responsibilities to participating States, usually based on geographical location, to ensure a flight is reported and billed for only once. A feature of multilateral systems is that responsibility is placed on each participating State to report on behalf of other members thereby establishing a degree of interdependency. A further description of some of these systems is contained in Chapter 3 of this manual.

#### **Billing issues**

5.236 Following the collection of data on chargeable flights, data for air navigation services bills must be prepared and payment collected from the operators concerned. It will be more practical and economical to bill operators periodically where many regular operators or flights are involved rather than sending a separate bill for each flight. As stated above a multilateral system is particularly helpful in this respect.

5.237 Most States and charging agencies usually bill operators once each calendar month, although where source data are easily obtainable without undue delay consideration may be given to more frequent billing. This should reduce working capital exposure as a result of shortening the time between the flight taking place and the dispatching of the invoice and lead to an improved cash flow.

5.238 In certain circumstances the charging authority (e.g. an entity providing air navigation services, or an airport) may prefer to collect the charge directly after landing or prior to take-off of the flights concerned. The main advantage of this method is the prompt receipt of the amounts involved. This may be particularly relevant in the case of occasional or one-time users from whom collections might otherwise be difficult or users who have a poor payment record. Apart from such users, this approach is not recommended as it can involve more elaborate administrative arrangements to ensure the proper receipt and recording of payments.

5.239 Regardless of the approach, billing should be carried out as soon as feasible after the time the flight(s) involved took place, not only to accelerate the flow of revenues to the ANSP, but also to facilitate verification by the operator of the flight(s) involved and the facilities or services used or made available and charged for. Very late billing by the charging authority (for example many months or even a year after the flight(s) took place) could delay payment because of the difficulties the operator may experience in such verification so long after the event, and as a result it is recommended that charging authorities always issue bills promptly.

5.240 The bill or invoice must provide the aircraft operator with the information necessary for verification and payment purposes, for example, the type of charge(s) and amount(s) due, the flight(s) involved and the date by which payment is required (which should be reasonably close to the billing date to avoid undue delays in the receipt of revenues, but would still allow for verification of the data in the invoice). Terms of payment should also be indicated and where payment should be sent (for example, the charging authority itself or a bank, in which case the address(es) and account references should be included). The invoice should show a contact address and telephone/fax number to facilitate the handling of queries and disputes. If necessary, the invoice may also indicate that failure to make payment by the due date would lead to an interest penalty being charged at the discretion of the charging authority.

5.241 In some cases the entity providing the air navigation services will employ an outside agency to prepare its invoices. In situations such as these, care will need to be taken to ensure that the validation process does not delay transmission of data to the billing authority. Adherence to a strict transmission timetable and close monitoring of performance are essential attributes to an effective operation.

#### CHARGES IN THE FORM OF LEVIES ON PASSENGERS, FREIGHT AND/OR FUEL

5.242 Charges in the form of fees or taxes on passengers, freight and/or fuel are not normally collected by the charging authority directly from the user. For administrative convenience and economy, the charges would usually be collected by airlines or agents with respect to those relating to passengers and freight, and by fuel companies for fuel-related charges. Passenger- or freight-related charges, whether fixed or expressed as a percentage of the fare or rate, would be collected by the airline or agent when the ticket or air waybill is issued. For passengers with tickets issued abroad, the tax may be collected at the airport of departure in the State levying the charge at the time of check-in (most international passenger tickets are for return travel). Since freight is transported only one way (on each air waybill) such procedures could not be applied to incoming international air freight shipments. Fuel-related fees would be added to the price of fuel charged by the fuel companies.

### COLLECTION OF TAXES BY THE CHARGING AUTHORITY AS AN AGENT OF THE GOVERNMENT

5.243 The charging authority may in some instances be responsible for collecting taxes levied by the government for general or specific revenue purposes or other purposes unrelated to the provision of air navigation services. In such instances the charging authority acts solely as an agent of the government. The taxes collected should be recorded and held separate from air navigation services revenues even when they are collected at the same time as the air navigation services charges concerned. As the taxes are collected they should be transferred directly to a specified treasury or other government account; however, if the charging authority needs to transfer the taxes collected only at certain intervals, such as once a month, it could place the taxes collected prior to the date of transfer in an interest-bearing account in its own name.

### COLLECTION PROBLEMS

5.244 Problems may be encountered in the collection of air navigation services charges. In dealing with such problems, the extent and costs of any collection efforts should be commensurate with the amount involved. The extent of the difficulties encountered in collecting outstanding amounts will vary depending on whether the parties concerned are located in the State imposing the charge or whether they relate to payments for overflights by operators not located in that State. In the former case, collection may be easier because of the greater accessibility of the debtor. In extreme cases, seizure of aircraft or other assets of the debtor may be necessary.

5.245 With respect to overflights, ICAO's policies on charges in Doc 9082 (Section III, paragraph 10) confirm that the providers of air navigation services may require all users to pay their share of the costs regardless of whether or not the utilization takes place over the territory of the provider State. In practice, a State may have difficulty collecting the charge for one-time or infrequent overflights that do not land on its territory, by an operator not located or without an office in the State concerned. Where repeated collection efforts have proven unsuccessful and the amount involved is significant, the provider State may, as a last resort, for example, consider seeking the assistance of the Directorate of Civil Aviation of the State of Registry of the aircraft concerned, or contracting with a collection agency in the State where the operator is based.

5.246 Where such approaches have failed, consideration might be given to different kinds of sanctions in order to stop unscrupulous users from continuing their operations and benefiting from air navigation services without paying (without prejudicing safety requirements). The existence of a full enforcement procedure has a significant effect on the level of amounts collected. For example, a service provider (or a collecting agent) may benefit from laws on detention of aircraft and similar administrative enforcement procedures, which are effective in stopping non-payers and encouraging other users to pay. In situations where a debtor user goes out of business, such laws could allow a service provider to recover the debt from the aircraft owners as a debt attached to the aircraft. An alternative approach is to make the granting of any overflight permit or preflight clearance (if required) subject to the operator concerned naming an agent in the State to be overflown, who undertakes to pay the charges levied. The State should make its acceptance of such an agent contingent upon the agent having proper authorization from the operator and being capable of making the payments concerned.

5.247 Essential for the successful collection of charges is that the following functions of an organization's financial management are up to date: national legislation; precise and correct accounting; a transparent cost-recovery system with a fair and equal treatment of all users; comprehensive and updated databases on airlines; credit control; accurate invoicing; and enforced recovery procedures. With these basic functions in place, it is necessary to assign dedicated staff to the task and, where applicable, establish a team of experienced debt collectors. Furthermore, a collection policy needs to be established. The methods of collection should include repeated contacts with debtors as well as regular payers, automatic reminders from a proactive database, interest charges on late payments, the ability to reschedule payment of debt under strict guidelines, liaison with States' administrations, liaison with aircraft leasing companies and preparedness to take legal action. Where a provider of air navigation services still experiences frequent delinquencies in payment, a contract could be signed with a collection agency with a global network and representation in most States.

5.248 In cases where a regional agency has been established to levy and collect the charges for several States, the problem of non-payment for overflights is significantly reduced because most of the operators of overflights are likely, sooner or later, to land in one of the participating States. Such regional agencies are discussed in Chapter 3 under Part C. Collection problems could also be reduced through a cooperation between States over a larger geographical area where States merge their databases on airlines and other airspace users in order to make it more difficult for bad debtors to avoid payments.

#### **PART J — CHARGES AND COST-RECOVERY ASPECTS OF PROVIDING CNS/ATM SYSTEMS SERVICES**

The *Statement of ICAO Policy on CNS/ATM Systems Implementation and Operation*, approved by the ICAO Council in March 1994, addresses cost-recovery as follows:

“In order to achieve a reasonable cost allocation between all users, any recovery of costs incurred in the provision of CNS/ATM services shall be in accordance with Article 15 of the Convention and shall be based on the principles set forth in the *Statements by the Council to Contracting States on Charges for Airports and Air Navigation Services* (Doc 9082), including the principle that it shall neither inhibit nor discourage the use of the satellite-based safety services. Cooperation among States in their cost-recovery efforts is strongly recommended.”

5.249 Whatever approach is taken by a State or group of States collectively to provide CNS/ATM systems services within the airspace for which responsibility has been assumed, the resultant cost-recovery through charges must be in conformity with the basic ICAO cost-recovery policy for air navigation services contained in Article 15 of the *Convention on International Civil Aviation* (Doc 7300) and supplemented by ICAO’s policies on charges (in Doc 9082). The implementation of CNS/ATM systems should not require any basic changes to those policies.

5.250 When a portion of CNS/ATM costs is attributable to en-route utilization, these costs could be included together with other air navigation services costs allocable to en-route utilization in the cost basis for, and recovered through, route charges levied by the State concerned. Where a State does not operate an ACC of its own, it may still incur costs associated with providing CNS/ATM systems services as well as other air navigation services to traffic during the en-route phase of flight, e.g. costs associated with participation in or provision of GNSS augmentation, provision of AFS links with one or more ACCs, or meteorological services. Recovery of these costs would call for cooperation or agreement between the State concerned and the entity operating the ACC serving traffic in the expanded FIR wherein the State concerned would be located. The purpose of such an approach would be for en-route air navigation services costs of that State to be included as an identifiable element in the cost basis for, and recovered through, the charges levied by the ACC serving the expanded FIR. The charges share represented by these costs would then be transferred to the State upon payment by the users charged.

5.251 The approach and aerodrome control portions of the CNS/ATM costs could either be included in any such approach and aerodrome control charges as might be levied on traffic at the airports concerned, or recovered from the users in cooperation with the airports concerned; or alternatively they could be included in such approach and aerodrome control costs that would be charged to any of these airports. In the latter two instances each airport could then include those costs together with other air navigation services costs in the cost basis for, and recover them through, landing charges or, where they are levied by the airport, approach and aerodrome control charges.

5.252 With regard to cost-recovery aspects of GNSS, additional guidance is provided in the *Report on Financial and Related Organizational and Managerial Aspects of Global Navigation Satellite System (GNSS) Provision and Operation* (Doc 9660).

5.253 With regard to the allocation of the incremental costs of more advanced global navigation satellite system (GNSS), the Council agreed in 2007 on the following provisional policy:

- a) basic GNSS services will be provided free of charge as a common good to a multiple number of user categories, while more advanced GNSS services (including augmentation services) requiring a higher quality of service and hence higher costs will have to be paid for by all their users in most cases;
- b) the incremental costs for more advanced GNSS services should be allocated amongst all the users who can actually derive benefits from them. Such cost allocation should take place at the regional level and take into account the requirements of different user categories, where the service level can be adjusted to satisfy different requirements;
- c) before any costs are recovered from civil aviation, cost allocation amongst all users should be discussed and agreed upon through transparent negotiations and consultations between a GNSS service provider and representatives of civil aviation as well as other user categories;
- d) any cost allocation and resultant cost-recovery should be consistent with ICAO's policies on air navigation services charges in order to ensure that civil aviation is requested to pay only its fair share of the relevant costs according to sound accounting principles and that international civil aviation is not discriminated against vis-à-vis other modes of international transport and other user groups; and
- e) once civil aviation's share has been determined, the allocation among participating States (or air navigation services providers (ANSPs)) and on the different phases of flights should be performed according to existing ICAO policy and guidance. ANSPs could then recover the costs from the users within their existing charging systems.

5.254 Particular attention should be drawn to the emphasis placed in ICAO's policies on charges in Doc 9082, Section I, paragraphs 17 to 22, on consultation with users regarding increased or new air navigation services charges, and also on users being consulted as early as possible concerning capacity development and investment plans. This would call for such consultation to be carried out when plans are being developed for the implementation of CNS/ATM systems elements, whether at the global, regional or national level.

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## CHAPTER 6

### Financing Air Navigation Services Infrastructure

This chapter discusses various aspects of financing that need to be considered when embarking on an air navigation services infrastructure investment project, which may entail construction of a new, or extension of an existing, building and/or purchase and installation of new equipment, etc., required for providing air navigation services.

Part A addresses the relevance and content of traffic forecasts in the context of project development and financing and refers to related policies and other guidance available.

Part B identifies the types of experts likely to be involved in an infrastructure project.

Part C focuses on the relevance and purpose of economic and financial analyses.

Part D considers the purpose of financing plans and the basic information they need to provide, addresses currency requirements and discusses the repayment of loans.

Part E focuses first on possible domestic sources and then on foreign and other sources, including pre-funding, that might be used for financing an air navigation services investment project.

Part F reflects on some considerations related to CNS/ATM systems.

#### PART A — TRAFFIC FORECASTS

6.1 Sound traffic forecasts are essential to any air navigation services infrastructure development project and its financing. The main purpose of such forecasts is to identify traffic developments and to establish the associated capacity requirements of the air navigation facility or service involved. The forecasts should cover the planned life of the project concerned and should include predicted annual volumes of international and domestic scheduled and non-scheduled aircraft movements in terms of en-route traffic and also, if relevant, airport traffic at the airport(s) the facility would serve. In addition, en-route movements should be broken down into overflying and landing/departing traffic. The forecasts should also include, where relevant, general aviation/business aviation and State (including military) traffic. Depending on the project, distribution of traffic by month, day and hour may also be required in order to recognize traffic trends and peaking patterns, as would data relating to aircraft types expected to be operated.

6.2 For guidance on the preparation of traffic forecasts, reference is made to the ICAO *Manual on Air Traffic Forecasting* (Doc 8991). Reference should also be made to ICAO's policies on charges (Doc 9082, Section I, paragraph 19), which recommend that users of air navigation services, particularly aircraft operators, provide advance planning data to individual providers on a five- to ten-year forecast basis. Such data should include future types, characteristics and numbers of aircraft expected to be used, the anticipated growth of aircraft movements, and passengers and cargo to be handled.

## **PART B — ENLISTING THE SERVICES OF EXPERTS**

6.3 In the planning and throughout the implementation of an air navigation services investment project, it may often be desirable and advantageous for the provider of air navigation services without sufficient expertise in the planning field to obtain the services of one or more outside consultants. In so doing, however, it is important that every effort be made to ensure the consultant selected is thoroughly knowledgeable in the area of expertise required. Under normal circumstances it is also desirable that the consultant not be affiliated with a major contractor or a manufacturer of air navigation services equipment, as this could possibly influence any technical specifications drawn up by the consultant or prepared on the basis of the consultant's report. The management of the air navigation services entity should also work closely with the consultant, regularly monitor the work and carefully review the resultant report, assessing, for example, whether it is realistic and whether national and local circumstances have fully been taken into account. With regard to obtaining expert assistance, reference should also be made to Part E, paragraph 6.47. The type of experts generally used in an air navigation services investment project are:

- a) air navigation systems specialists;
- b) economists trained in evaluating the costs and benefits of public investments;
- c) financial advisers with expertise in infrastructure financing to assist in negotiating with banks and other fund providers (they should be independent of the entity providing the loan);
- d) legal advisers with expertise in drafting documents related to air navigation services investment projects; and
- e) project management companies, generally engineering companies with expertise in planning and construction.

## **PART C — ECONOMIC AND FINANCIAL ANALYSES**

6.4 All organizations are faced with decisions on how best to pursue their objectives. To guide investment decisions, organizations use evaluation techniques that focus on the options, and search for that which maximizes net benefits. Every major investment decision taken by a State or a provider of air navigation services should be supported by analyses to demonstrate to providers, users and, as appropriate, the wider community, costs and benefits accruing from investment in infrastructure. Consultation with users should assist States and providers with their major investment decisions. With regard to analyses undertaken, commonality in approach within a State or region is desirable.

6.5 The expensive nature of air navigation facilities makes the need for economic and financial analyses increasingly important when seeking government or private financing. The financial providers will require assurances of the project's financial and economic viability, which can only be demonstrated through detailed analyses.

6.6 The following paragraphs describe the various types of analyses that may be considered prior to beginning any large-scale investment project. These are financial evaluation, cost-benefit analysis, business case study and economic impact analysis. Each focuses on a different frame of reference. Considerable literature is readily available on each of these analyses which will provide much more detail than can be afforded in the limited space and scope of this document.

### **FINANCIAL EVALUATION**

6.7 Financial evaluation deals with the direct costs, revenues and sources of funds associated with a specific investment. This evaluation is intended to demonstrate to the provider of the capital funds the financial viability of the investment by identifying the total incremental costs and comparing these to the scope for recovering these costs over the

life of the asset. The financial evaluation is based on data from the financing plan, described in Part D, which contains such basic information as estimates of component costs (labour, material, equipment, etc.), the funds required to make disbursements at various stages of the project, currencies in which payments are to be made and the available sources of funds.

6.8 The total costs include not only the initial capital investment, but also the incremental operation and maintenance costs throughout the useful life of the asset. Capital costs include any project office costs that may be required to plan and integrate the new project into the current operations as well as the interest costs of borrowing the funds. Capital costs are often restated as depreciation and interest to be recovered over the life of the asset. Incremental operations and maintenance costs may indeed be a negative amount if the capital investment will result in reduced staff or other maintenance costs over the life of the asset. Technological advances are creating many new opportunities to provide increased levels of service while reducing long-term costs.

6.9 On the revenue side, the source of the revenues needed to pay the incremental costs must be identified and the risks associated with that source must be assessed. Usually, revenues come from user charges, which are set in order to recover the total costs over the useful life of the asset. User charges may decrease as a result of the investment. However, to help assess the risks, any increase in user charges can be restated to reflect the impact on the users, such as the resulting increase per passenger ticket, or as a percentage of the flight operating costs. Increases in user charges may have a direct impact on the demand for the services provided. The extent to which the demand is affected can then be taken into account in determining the risks associated with this revenue source and ultimately the financial viability of the project itself.

6.10 For ANSPs that seek investment funds from quasi-private or private sources, a financial evaluation will likely be necessary to secure funding for the proposed project. A properly completed financial evaluation will provide a complete assessment of the cash flows, including the risks of the downstream revenues associated with each investment option and will also assist with choosing between alternative solutions. How the evaluation is conducted is largely dependent on its target audience.

## COST-BENEFIT ANALYSIS

6.11 When air navigation services projects are publicly funded, a methodology that reflects both the public and private benefits and costs of the project should be considered. A cost-benefit analysis (CBA) identifies the investment option that best conforms to the economic goal of maximizing net societal benefits. This obviously goes well beyond a financial evaluation that focuses on the project's financial accounts and cash flows. In addition, there are differences between a financial evaluation and a CBA in the treatment of capital costs. While a financial evaluation normally restates the capital costs into annual depreciation and interest expenses, a CBA measures capital costs by the cash expenditures required in future years — not by depreciation and interest. The cash stream of expenditures is compared to the stream of benefits, and the annual net amounts are discounted to compute a net present value for the investment option.

6.12 To illustrate the difference in scope between a financial evaluation and a CBA, consider the installation of radar in a previously non-radar airport location. The financial evaluation would look at the financial cash flows and required user charges associated with this investment, while a CBA would consider the benefits to and costs for all parties involved. These would include the benefits to aircraft operators from fuel savings and to passengers from time savings. Additionally, if considering the wider social effects, the negative effects like increased traffic and noise experienced by individuals living or working in the vicinity of the airport would need to be taken into account.

6.13 There are also potential productivity gains for the ANSP that must be taken into consideration. For example, an investment in modern ATS technology may reduce the number of air traffic controllers required in the future thereby reducing future operating costs. Transportation efficiency benefits may also accrue to the aircraft operators and would include savings arising from the more efficient operation of aircraft and greater service reliability and predictability. Similar considerations to those noted in the last sentence of 6.12 would also apply.

6.14 The measurement of safety benefits requires an analysis of the safety risks, which are a composite measure of the probability and the severity of an adverse occurrence. A CBA takes the consequences determined by a risk analysis and attributes a specific monetary value to them. Where accident losses involve tangible goods such as property, accident risks can be valued on the basis of replacement or repair costs. Where losses have intangible consequences such as personal injury or loss of life, the proper valuation of accident risk becomes more uncertain and judgemental and should be approached with care. Given the difficulties involved with measuring safety benefits, they are often omitted in these analyses unless the safety benefits would differ among the options considered or prove decisive in establishing a positive net benefit for a single infrastructure investment. Where a project cannot be justified by consideration of the non-safety benefits, it may be necessary to consider whether the project will lead to an improvement in the level of safety.

6.15 The impact on the environment is an important factor in many large transportation projects. Whether considered as a cost or as a negative benefit (environmental effects are often unintended and typically negative), these effects are difficult to measure in a precise way. Nevertheless, it is important that they be identified and carefully evaluated. Extensive research has been carried out in the quantification of environmental effects.

6.16 Once all of the benefits and costs have been identified and forecast, in order to determine if a project is cost-beneficial, or to assess which option yields the greatest net benefits, the net cash stream of benefits and costs is discounted to today's value to produce a single net present value (NPV).<sup>1</sup> The preferred option, from an economic perspective, would be the one with the highest NPV. The need for discounting stems from the fact that the value placed on income and expenditures depends on when they occur. One unit of currency to be received a year from now is worth less than the value of one unit of currency in one's pocket today because of opportunities foregone during the year.

6.17 Benefits and costs do not necessarily follow the same distribution of cash flows arising from a financial evaluation. In addition, benefits accruing to aviation users may be insufficient to cover the total cost of the project.

## BUSINESS CASE

6.18 An important purpose of a business case is to facilitate coordination with all parties involved and to support negotiations with financial institutions. The development of a business case is often a complex process and includes a number of assumptions and assessments. A major part of a business case study is the financial analysis (or evaluation) discussed earlier. A business case often includes, among other components, a cost-benefit analysis and a risk management section. The information required for a business case goes beyond the scope of the budget and business plans (see Chapter 4, Part A).

6.19 A business case sets out the context, identifies the issue(s) to be addressed and provides a detailed description of the proposal selected, as well as the rationale for its selection from among other options, and a comprehensive assessment of its benefits, costs and risks. The other options should also be described together with their benefits, costs and risks. In addition, a business case may provide analysis of, and information on, products and services, markets, employees, technologies, facilities, equipment, capital, financing, contingency plans, etc. It evaluates performance and productivity, and critical success factors are identified and discussed. Key risk factors are identified together with the indicators which would alert of changes in results. For each risk factor, mitigating measures should be indicated. Consequences for the organization and human resources would need to be assessed with regard to the demands of recruitment, redeployment, training and discharging.

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1. The discounted value of benefits from the investment less the discounted value of expected costs. A positive NPV indicates that an investment is worthwhile.

6.20 The business case also appraises the impact on users of air navigation services. For example, investments in air navigation facilities and services could lead to increased airspace capacity and consequential improvements in quality of service (more direct flight routes and reduced traffic delays), which would be an incentive to increase user charges in order to recover the higher costs.

### ECONOMIC IMPACT ANALYSIS

6.21 An economic impact analysis attempts to identify the cumulative economic effect of a major investment project. Mainly for publicly funded projects, such an analysis is often performed to determine whether a project should be carried out with respect to national or regional economic development, even if it will not generate positive net benefits in any traditional sense. The contribution of an infrastructure project to the economy can be assessed on the basis of the following five key indicators of direct, indirect and induced economic activity: employment, personal incomes, business revenues, tax revenues and capital investment. Beyond the direct and indirect economic impact of the infrastructure project, there is the induced impact on the economy created by the “multiplier effect”<sup>2</sup> of direct and indirect impacts or activities. An economic impact survey can reveal the benefits to the economy from tourism and various related activities. It should be pointed out that an economic impact analysis is less relevant in the context of air navigation services projects than airport projects because the former normally has limited effects on the national economy and does not in most cases admit any choice. For a more comprehensive description of economic impact analysis, reference is made to Chapter 6 of the *Airport Economics Manual* (Doc 9562).

## PART D — THE FINANCING PLAN

### PURPOSE AND CONTENTS OF A FINANCING PLAN

6.22 Prior to embarking on an air navigation services investment project and securing the financing required, various data need to be compiled. Thus, estimates of the costs of the project involved need to be prepared and, as noted above in Part A, annual traffic estimates need to be made covering the planned life of the air navigation services infrastructure created by the project. Possible sources for financing the project need to be identified, as well as potential revenue sources subsequently required to meet debt-servicing obligations for which the ANSP will be responsible. All this information is also relevant to the preparation of the economic and financial analyses referred to above.

6.23 Once it has been decided to proceed further with the air navigation services project, it will be necessary to develop a much more detailed plan, the financing plan, which provides such basic information as:

- a) estimates of the component costs (labour, materials, equipment, etc.) of each distinct part of the overall project;
- b) the cash flow required to make disbursements at various stages in the project’s progress including construction costs and payments on the related debt;
- c) the currencies in which payments are to be made; and
- d) the sources from which the funds are to be forthcoming whether from:
  - 1) sources generated by the air navigation services entity from its operations (e.g. retained earnings); and

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2. For a definition of the multiplier effect, please refer to the glossary of terms. The value of the multiplier will differ between States.

- 2) other sources including information on the applicable conditions (i.e. interest rate, repayment period).

6.24 Also to be emphasized is the importance of the availability of data showing the trend in the financial situation of the ANSP concerned over recent years, as well as anticipated developments over the period of debt repayment. Of particular relevance is the recording of revenues and expenses by major item. Estimates regarding future financial developments would emanate from budgets and longer-term financial plans. In that context, reference is made to the text on the budgeting process in Chapter 4, Part A. In the absence of such financial data, it will be much more difficult for those involved to decide whether or not the loan or financing sought should be granted and, if granted, what terms should be offered.

6.25 It should be understood that apart from regular reviews prior to the decision to proceed with the air navigation services project, once that decision has been made, the original cost and revenue estimates will need to be reviewed and updated. This process should continue throughout the project construction and implementation phase.

### CURRENCY REQUIREMENTS

6.26 An important factor, and in some instances a determining one, as to whether or not an air navigation services investment project can proceed is the demand it places on foreign currency, and the extent to which costs can be defrayed in domestic currency. Where project costs call for payment in foreign funds and the national currency is not freely convertible, it is essential to establish at an early stage the practicability of obtaining the foreign exchange required. The provision of such exchange will need to be examined with the appropriate fiscal authorities of the government, and for this purpose a statement should be prepared detailing as fully as possible both the foreign currency payments involved and the extent to which prospective sources of financing for the project can be expected to accommodate foreign exchange requirements. While securing the loan of foreign funds, or even the provision of foreign goods and services on extended credit terms, serves initially to reduce currency exchange problems, such arrangements remain a legitimate concern of the fiscal authorities of the government, since repayment of the debt involved ultimately constitutes a demand on foreign exchange reserves.

6.27 The extent to which payment of project costs can be made in the domestic currency or will involve foreign exchange depends on the many and varied factors present in each situation, and it is therefore possible to give only the following general guide as to the kinds of costs that might typically be expected to fall into each category.

#### **Costs typically payable in domestic currency**

6.28 Such costs may include:

- a) construction work and other services performed by domestic contractors and firms;
- b) land acquisition including associated costs of any easements (e.g. rights of way over another's property);
- c) salaries, wages and other related costs of national employees;
- d) domestic materials, supplies and equipment of which the State is not a net importer;
- e) interest on domestic credit; and
- f) taxes.

**Costs typically payable (wholly or partially)  
in foreign currency**

6.29 Such costs may include:

- a) construction work and other services performed by foreign contractors and firms;
- b) imported equipment, materials and supplies;
- c) wages, salaries, allowances and other related costs of expatriate personnel; and
- d) interest on foreign credit.

It should be noted that policy directives and contractual arrangements seeking maximum use of domestic labour and materials can be effective restraints on foreign currency requirements.

REPAYMENT OF LOANS

6.30 Early in the planning stages, a determination needs to be made of the future ability of the provider of the air navigation services as such to service loan obligations. That ability depends to a large extent on the provider's revenue-generating capacity, which may increase significantly as a result of the availability of the new or improved facilities financed by the loan concerned. In this context it may be recalled that some providers still do not recover their total costs and those serving low traffic volumes have little or no immediate prospects of doing so. Where this is the case, the burden of securing funds to service the loan will normally fall on the government concerned. Nevertheless, where circumstances permit, growing emphasis is being placed on providers assuming responsibility for providing the funds required for meeting a part of the interest and instalment payments on a loan taken to finance air navigation services infrastructure development.

6.31 In a growing number of circumstances where governments have delegated the provision of air navigation services to an autonomous entity, they have also delegated to such a body the authority to negotiate and secure its funding and financing requirements, and the obligation of servicing loans taken, including their repayment.

6.32 Where such responsibility is assigned to an ANSP, a schedule should be drawn up showing, for every loan or part of a loan involved, when each instalment and interest payment is to take place and the amounts involved, as well as what revenue or other income the entity intends to pledge against these commitments. Funds required to service the debt obligations would need to be channelled from the overall revenue flow, principally revenues from user charges.

6.33 Repayment of foreign loans usually requires outlays in convertible currency. To the extent the entity that provides the air navigation services is responsible for any servicing of this type of loan, it may be advisable for it to be given access to such convertible currency as it might generate from its operations. This could involve the establishment of a convertible currency account (or accounts), held for that purpose by the entity, and subject, if required, to monitoring by the foreign exchange authorities in the State concerned to ensure it is used as intended.

6.34 More recently, growing attention has been given to offering a further guarantee to the lender by stipulating in the contract or agreement covering the loan that a certain portion of the air navigation services charges collected will be set aside (possibly in a separate account) specifically to service interest and capital repayment obligations. In some cases, it may be necessary for the State to guarantee the loan. Where a foreign loan in convertible currency is involved, the contract could stipulate, if this would facilitate obtaining the loan, that such an account would be held in a bank and State mutually acceptable to both parties.

## PART E — SOURCES OF FINANCING

6.35 A survey of potential sources of funds for an air navigation services project and the selection of which of them to approach should be done as early as possible in the planning process. Financial advisers can assist in locating sources of funds. It is important to do so in order to have, from the outset, an indication of the probability of financing being available, to provide adequate time for completion of the usually lengthy preliminaries preceding the conclusion of specific financial arrangements and to become versed in the procedural and other requirements of such arrangements in time to incorporate those requirements directly into the planning process.

6.36 Potential sources of funds will vary considerably from State to State, and which of them are to be approached has to be studied and decided individually for each project. Historically, the most common source of funds for air navigation services projects was from government sources. This includes funds provided by the government directly as well as through government-owned or sponsored financial institutions, including development or export-promoting agencies. The government may be a national government or one or more foreign governments. Also, one or more international governmental institutions or agencies may be involved. Another source of financing is retained earnings, although this does not mean that self-financing is or will be the largest source of financing. The reliance on government financing still remains significant in some States but is expected to decrease considerably with the continued increase in the number of autonomous entities operating air navigation services. The use of commercial loans has shown a remarkable increase, again reflecting the growth in autonomous entities that are expected to secure their own financing. An interesting new trend is the growing importance of bonds and share capital, which again is clearly linked to the new organizational structures. Pre-funding of capital projects through air navigation services charges is another source of financing that may be used in specific cases and under certain conditions (see Appendix 4).

### DOMESTIC SOURCES

6.37 Costs to be met in domestic currency may be financed by various means available within the State itself, including loans (and sometimes grants) from government sources, commercial loans negotiated through banks and other domestic financial institutions, and the extension of credit by contractors and other firms engaged in the project. Government assistance in the form of interest-free loans or even grants can appropriately be sought in recognition of the national (and possibly local and/or regional) benefits derived from the existence and development of the air navigation services concerned. Where revenues are insufficient to cover total operating costs, including depreciation and cost of capital, any new development project would inevitably depend on government assistance to some extent, and the benefits just mentioned could play a role of particular importance in securing such assistance. Their evaluation, even though only practicable in broad terms, should therefore not be neglected and is a primary purpose of the economic analysis referred to in Part C above. Financial assistance in recognition of such benefits may of course be sought from the local and regional, as well as the national, governments, but in so doing it would need to be demonstrated that the particular communities falling within such jurisdictions would in fact derive distinct benefits beyond those realized nationally.

6.38 Where an entity providing air navigation services seeks commercial loans directly from banks or other domestic financial institutions, it can expect that forecasts of its future operating costs and revenues will be required as a basis for assessing its ability to repay such loans. Where that ability is judged adequate, such commercial financing will probably be obtainable against an appropriate pledge of future revenues as already noted, but to the extent that it is found lacking, it is likely that the loan will be forthcoming only if repayment is backed by the government or some other acceptable guarantor.

### FOREIGN SOURCES

6.39 Further to paragraph 6.32, project costs payable in foreign funds constitute a demand on the State's reserves of foreign exchange and as such their financing will usually have to be arranged through, or with the approval



of, the appropriate government authorities. While fluctuations in the value of these funds can add to the cost of an air navigation services development project, hedging can be used to help reduce the volatility and risk associated with financing a project with the use of foreign funds.

6.40 Depending on the magnitude of the costs involved and the state of exchange reserves, it may prove possible to obtain the required financing through such domestic institutions as those mentioned above, but usually this will not be the case and foreign sources will need to be found. In any event, quite apart from foreign exchange considerations, such sources should always be explored as a matter of course, since financing may be available from them on more favourable terms than those obtainable from domestic institutions (lower interest rate, repayment over a longer period, etc.). Foreign loans, however, are subject to the uncertainties and risks associated with currency fluctuations.

6.41 For most States, particularly developing States, foreign sources of financing are principally government-operated. The following paragraphs focus first on such foreign government financing sources as bilateral institutions, and development banks and funds, and then comment on foreign commercial sources such as commercial banks, contractors and suppliers.

### **Bilateral institutions**

6.42 Foreign financing may be available from foreign governments in the form of loans negotiated directly with the government of the recipient country, or may otherwise be facilitated by particular agencies of government that have been established for the primary purpose of promoting the nation's export trade. The development of transport facilities and the consequential benefits to the national economy as a whole expected to result from any given project may evoke the provision of such assistance for various reasons, among them being the desire to promote trade and cultural relations between the two countries. Additionally, as mentioned, the wish to facilitate the export of technology and equipment required for the project, and available in the assisting State, may be a further reason for interest. Such assistance, as well as any subsequent negotiations, will usually need to be pursued through the appropriate governmental authorities of the State in which the project is being undertaken.

6.43 In the case of developing States in particular, such assistance may be available through the specific aid programmes that certain governments have established to promote economic and social development in various areas of the world. These programmes extend assistance in forms such as loans on preferential terms and the direct provision of supplies, equipment and technology. Examples, by State, of such sources of funds are presented in Appendix 5, Part A.

6.44 For projects not qualifying for aid from such sources, assistance in meeting the requirements for foreign financing may be available through the special export-promoting agencies of certain governments. Assistance from these sources takes various forms, including direct loans by the agency itself, guarantees covering private loans, and insurance of the risk assumed by national enterprises in providing goods and services on credit terms. Examples of agencies of this nature are the Export Development Corporation of Canada, the Export-Import Banks of Japan and the United States, COFACE of France, HERMES of Germany, the Export Credit Guarantee Agency of Sweden, and the Export Credits Guarantee Department of the United Kingdom.

### **Development banks and funds**

6.45 Probably of most importance among the possible sources of foreign financing available to developing States are the international banks and funds that have been established to assist in the financing and execution of projects seeking to promote national economic development. Such projects cover a wide range of economic activities of which the provision of air navigation services is but one. Prominent among these banks and funds are the International Bank for Reconstruction and Development and its affiliates, the International Development Association, and the International Finance Corporation (although the purpose of the latter is to promote development through loans to the private sector), and various regional development banks and funds. A list of such institutions is presented in Appendix 5, Part B.

6.46 As in the case of financing by foreign governments, the possibilities of obtaining financial assistance from the above institutions for any particular air navigation services development project, and the procedures to be followed in applying for such assistance, will inevitably involve the government of the State in which the project is being undertaken. There are two reasons for this: first, any loan or grant that may be extended will be made either to a government or government agency, or to a private entity with the support and guarantee of the government; second, the first test of suitability of a project is usually whether the sector of the economy in which it falls, and the project itself, are of high priority for development and are so recognized in the government's development plans.

### **United Nations Development Programme**

6.47 The United Nations Development Programme (UNDP) should be borne in mind by developing States as a source of assistance when seeking to finance air navigation services project(s). The various kinds of expertise required for the consideration, planning and execution of air navigation services development projects, such as will be needed for the necessary feasibility and cost-benefit studies, in the preparation of master plans and in the actual construction phase itself, may be requested from the State's programme of UNDP-funded technical support. As well as expertise, funding for minor necessary air navigation services equipment may also be obtained through the UNDP. Where such technical support is to be sought, the specific requirements will need to be formulated and submitted to the national government for approval within the State's overall programme of development projects for which technical support is being requested. It should always be remembered, however, that the principal role of the UNDP is to provide expertise and not the funds required to finance air navigation services construction or expansion projects.

### **Commercial sources**

6.48 One of the simplest ways of dealing with costs payable in foreign funds is to place the responsibility for financing arrangements on foreign contractors and suppliers who stand to benefit directly from the project. In foreign commercial dealings it is often the practice for suppliers to be required to state, as part of their bid, the financing arrangements that they are prepared to offer, and for contractors to be given the responsibility for securing financing on the most favourable terms. When applied, such practices will not only help to reduce the financing problems encountered in air navigation services projects, but will also enable the acceptability of bids to be evaluated from all perspectives, including financial. For the latter purpose the bids should of course be required to quote supply prices separate from the financing charges involved so that such charges may be compared with the cost of financing through alternative sources. In the financing of costs in such a manner, however, there is a risk that particularly needs to be guarded against, which is that in the process of selecting bids, a firm's financing capability may be allowed to assume an importance disproportionate to that of other considerations more basic to the project's successful execution.

6.49 Banks, investment houses and other traditional commercial credit institutions operating in the private sector of the State of the contractor providing equipment, supplies or services for the air navigation services project may, of course, be approached directly for financing assistance. However, the cost and other terms of credit obtained in this manner are in general likely to be more onerous than those obtainable from the various public sources described in the preceding paragraphs. Commercial institutions of the kind referred to here exist in a variety of forms in different States, and for any particular State, those likely to assist with an air navigation services project are probably best ascertained directly from the government concerned.

## **DEBT FINANCING**

6.50 Financing air navigation services infrastructure improvements has taken different paths around the world. In some States, the use of long-term debt through bonds is common practice. Short-term debt is often used to bridge periods of high interest rates or during a construction phase. ANSPs with large construction programmes often keep a portion of their debt portfolio in short-term debt, balancing the risk of rising interest rates. In other States, providers use

bank loans or other government-supported financing mechanisms to finance air navigation services development. With the prospects of a growing number of ANSPs moving toward partial or complete financial self-sufficiency, long- and short-term debt financing is increasingly viewed as an attractive alternative. Of course, the terms under which a debt obligation must be offered in order to be marketable, as well as the cost of the issue, will determine in each instance whether a debt obligation is more advantageous than other forms of financing.

6.51 In the financial markets, the attractiveness, to investors, of the debt obligation of an ANSP can be gauged by the following three conventional indicators of investment quality:

- a) *credit rating* — a simple system used by major investor services to grade bonds according to investment quality;
- b) *interest cost* — the interest paid by the air navigation services entity to attract investors relative to what issuers of competing bonds pay; and
- c) *tax-exemption* — exemption from the income taxes of a bond's purchase price and/or interest paid, for example. It can frequently be an important factor when determining the attractiveness, to a potential investor, of a debt obligation.

6.52 Debt obligations should not be planned and undertaken without the active involvement of experts because of the various and specific qualitative and quantitative judgements that need to be made, the thorough knowledge of the market required, the relatively large funds needed in an issuance and the costs of the issuance. Financial advisers independent of the loan provider generally provide an issuer greater assurance of the risks and rewards of a financing.

### **Credit rating**

6.53 A credit rating is a measure of the history and ability to repay loan obligations. A number of firms specialize in evaluating new debt obligations and providing ongoing surveillance of the outstanding debt of an entity. Credit rating agencies will review credit history and analyse an entity's historical financial statements. Rating agencies look at many aspects of an entity's financial and operational history and forecasts to rate the entity's ability to repay its debt obligations. Some of the criteria rating agencies evaluate are:

- a) financial strength;
- b) competitive position;
- c) diversity of aircraft operators;
- d) control over facilities;
- e) geographical location;
- f) demographics;
- g) environmental issues; and
- h) management/ownership structure.

6.54 Financial ratios such as debt service coverage can be used to evaluate the financial position of an air navigation services entity. As the structure of debt obligations and governance has become more complex, rating agencies typically review the underlying legal documents of the financing when assessing a rating.

6.55 To provide a quick snapshot of the creditworthiness of a business entity such as an ANSP, credit rating agencies have developed various rating scales. Over time, each rating agency has developed its own ranking system, but the purpose remains the same. For example, one leading credit rating company ranks long-term debt as shown in Table 6-1. Long-term debt judged to be of the highest quality with the smallest investment risk receives a rating of “triple A”, followed by a rating of “double A” for debt deemed to be of high quality. Debt judged to be of upper-medium quality receives a rating of “A”, followed by a rating of “triple B”. Ratings below this level are assigned to debt that is considered speculative or in danger of default.

**Table 6-1. Bond credit ratings scale**

Investment grade	AAA	Highest quality
	AA	High quality
	A	Upper-medium grade
	BBB	Medium grade
Speculative grade	BB	Speculative
	B	Speculative, low grade
	CCC	Danger of default
Default	D	Questionable value
<p><i>Note.— Individual company ratings will vary slightly and may indicate a slight variance from the standard by using “+” or “-”.</i></p>		

6.56 The risk for short-term debt is limited to the length of time the debt is held by the investor, anywhere from one day to one year.

#### PRE-FUNDING OF PROJECTS THROUGH AIR NAVIGATION SERVICES CHARGES

6.57 When more traditional sources of funds are not available, the use of pre-funding can be an acceptable means of financing air navigation services development, under certain conditions. Guidance on pre-funding of projects through air navigation services charges is contained in Appendix 4 (see paragraphs 1 to 6).

#### OTHER SOURCES

6.58 Where ANSPs are organized as corporations in which the shares are held by government, financing can be obtained by selling additional shares to private interests, the volume to be sold depending on whether or not overall control should remain in government hands. By issuing these shares, the equity owners share in the profits as well as the risks of the operation of the entity providing air navigation services.

6.59 Leasing rather than outright purchase may in some cases provide an attractive alternative where buildings and technical equipment are involved. The benefit to the entity providing air navigation services is that it can have the use of the item(s) leased without having to incur a substantial financial outlay. Also, such use normally takes place sooner than if financing has to be sought in order to purchase the items. Leasing, moreover, does not significantly influence the overall debt the provider needs to serve, and leasing arrangements may not be subject to the same extensive and time-consuming approval processes that purchases frequently are.

6.60 On the negative side, with leasing, the entity providing air navigation services does not enjoy the benefit of ownership, including the addition to total assets. This may be relevant when financing for other air navigation services investment projects is being sought and assets that can be considered as security are to be identified. Of greater significance is that leasing tends in the long run to be more expensive to the lessee because the overhead and profit of the lessor must be covered by the lease payments. In some circumstances, however, there may be offsetting factors; for example, where the items leased are renewed frequently, the maintenance expenses incurred by the provider may be reduced. Tax laws in some States may also encourage leasing arrangements.

#### **PART F — SPECIAL FINANCING ASPECTS OF CNS/ATM SYSTEMS IMPLEMENTATION**

6.61 Financing of CNS/ATM systems components, in particular at the national level, is normally approached in a manner similar to that applied to conventional air navigation systems. A characteristic, however, of most CNS/ATM systems components, which sets them aside from the majority of conventional air navigation systems, is their multinational dimension. Consequently, and because of the magnitude of the investments involved, financing of basic systems components (e.g. satellite-based augmentation systems, satellite-based ground-ground data and voice communications networks) may in most instances need to be a joint venture by the States involved at the regional or global level. Direct financing of many basic components may, however, not involve aviation at all, particularly when aviation is only a relatively minor (although important) user. In such instances financing may be arranged by the system operator, with aviation instead paying for access through leases or charges, which would include an element to recover the costs of financing and repayment of capital.

6.62 Where an international agency or corporate-type entity provides basic CNS/ATM services, its costs of financing could possibly be reduced if the States for whom the basic services are being provided were to guarantee the servicing and repayment of the loans concerned. This in turn should correspondingly reduce the costs to be recovered from these user States.

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## APPENDIX 1

### Service Level Agreement (SLA) Template (third-party operators)

#### INTRODUCTION

1. A service level agreement (SLA) is a contract between a service provider and a customer, which specifies, in measurable terms, the services that the provider will deliver to the customer. SLAs are often provided by service providers, such as outsourcing companies, to establish the quality of service they will provide to the customer, for example, availability, performance and timeliness of the services.
2. An SLA template should include, as a minimum:
  - a) an agreement on the services to be provided by the service provider;
  - b) specification of response time for problem resolution, performance levels to be provided, system availability, responsiveness, etc.;
  - c) establishment of a quality agreement using a set of agreed metrics; and
  - d) details on the responsibilities of the service provider, the rights of the customers, and financial penalties if the service provider violates any element of the SLA.
3. An SLA template for possible use by States or ANSPs to ensure that third-party operators deliver the agreed services as per recognized safety and performance requirements is provided below. The SLA template aims to:
  - a) demonstrate that adequate provisions have been made to ensure that all elements of performance requirements will be met when certain air navigation services have been outsourced or subcontracted to third-party operators;
  - b) explain how those requirements will be met; and
  - c) make provisions for appropriate notification of system changes.

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**SERVICE LEVEL AGREEMENT (SLA)**

BETWEEN:

**Service Provider**

**Organization:** [insert name of third-party operator]

**Name:** [insert name of signatory for third-party operator]

**Position:** [insert position of signatory for third-party operator]

(hereinafter referred to as the “[Service Provider]”)

AND:

**Customer**

**Organization:** [insert name of State/ANSP]

**Name:** [insert name of signatory for State/ANSP]

**Position:** [insert position of signatory for State/ANSP]

(hereinafter referred to as the “[State/ANSP]”)

The [Service Provider] and [State/ANSP] are sometimes hereinafter referred to individually as the “Party” and collectively as the “Parties”.



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## 1. DEFINITIONS

[Definitions specific to the environment or terminology referenced in this Agreement should be described in this section. Each party involved in the Agreement should be defined.]

[State/ANSP] is the provider of air navigation services in [insert definition and role of the State/ANSP].

[Service Provider] is [insert definition and role of the Service Provider].

## 2. AGREEMENT OVERVIEW

[This section should provide a general introduction to the Agreement, identify the parties involved and address the revisions and amendments to the Agreement.]

This Agreement constitutes a Service Level Agreement (“SLA” or “Agreement”). Under the terms and subject to the conditions set forth in this Agreement, of which the appendices constitute integral parts, [Service Provider] agrees to provide [State/ANSP] with the services described hereinafter, including without limitation those in section 6 (Service Agreement).

This Agreement remains valid until superseded by a revised Agreement mutually endorsed by the Parties. Changes are recorded in the amendments section (Appendix C) of this Agreement and are effective upon mutual endorsement by the Parties.

This Agreement outlines the parameters of all services covered as they are mutually understood by the Parties. This Agreement does not supersede current processes and procedures unless explicitly stated herein.

## 3. GOALS AND OBJECTIVES

[The purpose of this section is to identify the high-level purpose, goals and objectives of the Agreement.]

The subject matter of this Agreement is the provision by [Service Provider] of services in the area(s) of [insert service(s)/area(s) as appropriate]. Both Parties understand and acknowledge that the continuous and adequate provision of services pursuant to this Agreement is essential for users of said services. In particular, the [Service Provider] understands that any failure to provide said services adequately and continuously may lead to deficiencies in the air navigation infrastructure, which could have fatal consequences for third parties. By entering into this Agreement, [Service Provider] recognizes the highly sensitive nature of the services provided and undertakes to maintain the agreed level of services to that effect.

The purpose of this Agreement is to ensure that proper elements and commitments are in place to provide consistent service support and delivery to [State/ANSP] by [Service Provider].

The goal of this Agreement is to set forth the terms and conditions for service provision between [Service Provider] and [State/ANSP].

The objectives of this Agreement are to:

- provide clear reference to service ownership, accountability, roles and responsibilities;
- present a clear, concise and measurable description of service provision to the customer;
- match perceptions of expected service provision with actual service support and delivery.

**Non-performance**

The Parties hereto recognize the sensitive nature of services provided under this Agreement and the possibility of fatal consequences arising from non-performance of safety-critical obligations by the [Service Provider].

Therefore, without prejudice to other provisions in this Agreement, [Service Provider] undertakes to indemnify the [State/ANSP] against any liability (including, without prejudice to the generality of the foregoing, all costs and expenses which the [State/ANSP] may reasonably incur in defending any proceedings) that it may incur as a result of any defective performance by the [Service Provider] of any of its obligations pursuant to this Agreement.

**4. PARTNERS**

[The purpose of this section is to identify the specific partners involved in the Agreement. Primary partners are the individuals from each party who have overall responsibility for the Agreement. Additional partners should include individuals who have direct responsibility to implement or manage various aspects covered by the Agreement (e.g. managers who will be the contact points for the Agreement.)]

The following [State/ANSP] and [Service Provider] representatives will be used as the basis of the Agreement and represent the primary partners associated with this Agreement:

[State/ANSP]: Mr./Mrs./Ms. [insert name and position]

[Service Provider]: Mr./Mrs./Ms. [insert name and position].

The following partners are responsible for the deployment and ongoing support of this Agreement:

[State/ANSP]: Mr./Mrs./Ms. [insert name and position]

[Service Provider]: Mr./Mrs./Ms. [insert name and position]

[insert contact details for each partner: phone/fax number, email address].

The above partners may be changed from time to time by either Party, by way of written notice to the other Party.

**5. PERIODIC REVIEW**

[The purpose of this section is to identify the specific review periods for the Agreement, who is responsible for the periodic reviews, who updates the document and where the document is stored/located.]

This Agreement is valid from [insert date] until [insert date]. The terms and conditions of this Agreement should be reviewed by both Parties at a minimum once every xxx (x) months; however, in the absence of an agreement by the Parties on different terms and conditions, the current Agreement will remain in effect as such.

Mr./Mrs./Ms. [insert name and position] of [State/ANSP] is responsible for facilitating regular reviews of this document. The contents of this document may be amended as required, provided mutual agreement is obtained from the primary partners and communicated to all affected parties. Mr./Mrs./Ms. [insert name and position] of [Service Provider] will incorporate all subsequent revisions and obtain mutual agreements/approvals as required.

This Agreement will be posted to the following locations and will be made accessible to all partners:

- Network directory (\\server\agreements\State\ANSP-Service Provider\SLA.doc); or
- Web URL (www.mot.gov.xx/agreements/SLA.pdf); or
- [insert details on the location of the SLA].

## 6. SERVICE AGREEMENT

[The purpose of this section is to identify the specific types of services covered by the Agreement, including the services offered and the various parties' responsibilities.]

The following service parameters are the responsibility of [Service Provider] in support of this Agreement.

### 6.1 Service scope

[The specific services covered by the Agreement should be clearly identified and described.]

The following services are covered by this Agreement:

<i>Reference number</i>	<i>Service</i>
1	[insert detailed description of service]
2	[insert detailed description of service]
3	[insert detailed description of service]
4	[insert detailed description of service]
5	[insert detailed description of service]

### 6.2 [State/ANSP] programme requirements

[Identify [State/ANSP] programme requirements for the Agreement: all specific activities of [State/ANSP] programme that will be required to properly implement the Agreement, including providing information to the partner, identifying changes as they relate to the services being provided and all specific activities that are the responsibility of the [State/ANSP] programme.]

[State/ANSP] responsibilities and/or requirements in support of this Agreement include:

- reporting identified problems to the service provider;
- identifying changes to the service user base that may affect capacity plans;
- identifying service modifications and enhancements.

### 6.3 [Service Provider] requirements

[Identify [Service Provider] requirements for the Agreement. This should include all specific activities by the partner that will be required to properly implement the Agreement, including how specific services are to be provided, resource requirements, adhering to the defined schedule of activities and all service delivery processes used/supported by the partner.]

[Service Provider] responsibilities and/or requirements in support of this Agreement include:

- supporting the services as defined in section 6.1 within the defined service availability as defined in section 7.1;
- maintaining an appropriate level of trained primary and back-up resources to maintain the identified services;
- providing regular status reporting for incidents and service requests;
- capacity planning for services;
- maintaining a management database of all items covered in this Agreement;
- performing availability and contingency management of services.

## 7. SERVICE MANAGEMENT

[Effective support of in-scope services is a result of maintaining consistent service levels. The following sections provide relevant details on service availability, monitoring, measurement and reporting of services.]

### 7.1 Service availability

[The specific times of service availability that [State/ANSP] requires should be documented in this section. Depending on the service(s) covered by the Agreement, each service may have its availability defined specifically, or a number of services may be grouped if their availability requirements are the same.]

Coverage parameters specific to the service(s) covered in this Agreement are as follows:

- standard hours of system availability are 24 hours per day, 7 days per week;
- [insert other requirements as appropriate].

### 7.2 Availability restrictions

[The specific times of service restrictions required by [Service Provider], such as provisions for routine system maintenance.]

Services provided by [Service Provider] will normally be available every day of the year on a 24-hour basis, with the exception of the following situations:

- Scheduled downtime: [State/ANSP] will be notified via email at least [x] working days in advance of any planned maintenance or upgrades likely to affect the availability of services. Urgent downtime notices will be made via telephone to the designated contact person. The primary contact for the customer affected should then notify users by the most appropriate means.

- **Unscheduled downtime:** an unplanned outage may occur without adequate user notification. [Service Provider] will make every effort to provide notification to [State/ANSP], but cannot guarantee notification to all users in certain circumstances, such as when the network (whole or part) is effectively out of service due to a hardware or software failure.
- **Maintenance window:** normal maintenance on services will be conducted on a scheduled basis.

### 7.3 Service measurement

[Specific metrics to measure service quality should be documented in this section. To ensure that an acceptable level of quality is provided and maintained, service measurement is used to ensure that [Service Provider] knows, understands and reports on the service metrics agreed. Service measurements are metrics used to ensure service standards. Measurements can be defined in terms of service availability, performance and quality.]

The following measurements will be established and maintained by [Service Provider] to ensure optimal service provision to [State/ANSP]:

<i>Measurement</i>	<i>Definition</i>	<i>Performance target</i>
Service uptime	Percentage of time the service is available (excluding scheduled maintenance)	100%
Emergency priority incident completion time	Average closure time for emergency incidents	x hours
High priority incident completion time	Average closure time for high priority incidents	x hours
[insert other items as appropriate]	[insert other items as appropriate]	x
[insert other items as appropriate]	[insert other items as appropriate]	x

### 7.4 Service level reporting

[Reports used to measure service levels should be documented. These reports must align with the service measurements from the previous section and support these measurements.]

[Service Provider] will supply [State/ANSP] with the following reports at the intervals indicated:

<i>Report Name</i>	<i>Interval</i>	<i>Recipient</i>	<i>Responsibility of</i>
Up time report	Weekly and monthly	Partners	[Service Provider]
Emergency priority incident report	Weekly and monthly	Partners	[Service Provider]
High priority incident report	Weekly and monthly	Partners	[Service Provider]
[insert other reports as appropriate]	[insert other interval times as appropriate]	Partners	[Service Provider]
[insert other reports as appropriate]	[insert other interval times as appropriate]	Partners	[Service Provider]

## 8. FINANCIAL CONSIDERATIONS

[This section is used to document any financial considerations associated with the Agreement. It should include details of how services are charged between the parties and should identify any financial penalties that may be applied when services are not properly delivered or service levels are not met.]

The services defined in this Service Level Agreement are provided at a cost as agreed by [State/ANSP] and [Service Provider]. Failure by [Service Provider] to provide the services or meet the service level targets defined in this Agreement may result, at the option of [State/ANSP], in one or several of the following actions:

1. financial penalties [insert as appropriate]; and/or
2. escalation of the issue to senior management for resolution; and/or
3. renegotiation of this Agreement; and/or
4. termination of this Agreement.

## APPENDIX A — SERVICE PERFORMANCE REVIEWS

[This section may contain additional details on SLA reviews. Service performance reviews should include details as to the frequency of the reviews, how they will be performed and their probable outcomes (i.e. financial penalties, renegotiate/amend SLA, etc.).]

Service performance reviews will be scheduled every six months between [Service Provider] and [State/ANSP]. Performance reviews will be held in [month] and [month] of each year during the term of this Agreement. The intent will be to review service levels for the prior period, identify issues and actions resulting from the previous period's experience, amend this Agreement based on the results of the service performance review, and state the financial penalties for below normal performance.

## APPENDIX B — BUSINESS CONTINUITY MANAGEMENT

[This section may contain service recovery plans and related details, if required. It should identify the requirements for business continuity management, including the time frame for restoring key business functions and the time frame for restoring all business functions.]

[State/ANSP] has a requirement to maintain continual service to their customers and, therefore, requires availability of [Service Provider] services 24 hours a day, 7 days per week. However, [State/ANSP] acknowledges that disasters may happen that cause disruptions in business continuity. In the event of a disaster, [State/ANSP] requires that a minimal level of service be restored within xx (x) hours of the disaster and full service restored within xx (x) days of the disaster.

## APPENDIX C — AMENDMENTS

[This appendix should be used to reference any subsequent amendments to this Agreement.]

Amendment No. 1:

Amendment No. 2:

Amendment No. 3:

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## APPENDIX 2

# Guidance for Determining the Costs of Aeronautical Meteorological Services

### INTRODUCTION

1. Meteorological services are shared by many different users, including aeronautical users. This generates cost savings and creates specific relationships. Aeronautical meteorology is dependent on the basic meteorological system, and the meteorological provider is bound by the general policy concerning air navigation services charges. Therefore, it is necessary that the national authorities concerned acknowledge these relationships when implementing this policy and determining the corresponding costs.
2. As indicated in Chapter 5, Part B, the first step in determining the costs of aeronautical meteorological services is to prepare an inventory of all those meteorological facilities and services which serve to meet the aeronautical requirements stated in the Annexes to the Convention (e.g. Annex 3 — *Meteorological Service for International Air Navigation*), the Procedures for Air Navigation Services (PANS) (e.g. *Procedures for Air Navigation Services — Air Traffic Management* (Doc 4444)) and the Regional Air Navigation Plans (ANPs)/Facilities and Services Implementation Documents (FASIDs). This inventory should be drawn up jointly by the national aviation authorities (such as the civil aviation administration) and the meteorological authority (designated in accordance with Annex 3, 2.1.4) in the State concerned. Meteorological services needed for meeting aeronautical requirements are summarized in Chapter 5, paragraphs 5.70 and 5.71, of this manual.
3. As indicated in paragraph 5.115 of Chapter 5, aeronautical meteorology is an interlinked part of general meteorology and is sometimes difficult to differentiate from other parts, depending on the manner in which national meteorological services are organized. In this respect, the national aviation authority together with the meteorological authority shall ensure clear procedures with regard to aeronautical and non-aeronautical meteorological services. It is important to note that national meteorological services, while they serve aeronautical requirements, operate to serve the non-aeronautical community as a whole by providing meteorological and climatological information for maritime and other surface transport, civil protection, agriculture, fishing, hydrology, air pollution control, retailing, sports and recreation, tourism, building and construction, the press and other media, and the general public. Usually meteorological services engage in general meteorological activities, i.e. core activities, in fulfilment of a primary system requirement for meteorological information which is jointly used by all service recipients. Examples of core activities include general analysis and forecasting, automated data processing, weather radar and satellite data processing, surface and upper-air observations, telecommunications to collect and exchange basic data, training, research and development. Since no single user requirement determines the level and cost of the core activities, the further allocation of core activity costs among aeronautical and non-aeronautical users should be approached with considerable caution. The proportion of core activities used for the benefit of air navigation that it is appropriate to attribute to the requirements of aviation will vary from State to State. Furthermore, there are States which do not allocate core costs to any specific user. It should also be recognized that aviation contributes data to the core system by providing upper-air observations of wind and temperature. In addition it should be recognized that there are core activities that, in terms of the level of sophistication, exceed aeronautical requirements. It is therefore not possible to indicate any specific percentage of allocations that would have general validity for this purpose. However, the broad description of the meteorological facilities and services required for aeronautical purposes in paragraph 2 above gives general guidance in this field, with more specific advice being provided below.

4. The proper approach for allocating aeronautical meteorological costs involves analysis of each element of the meteorological service concerned to determine the extent to which its functions are attributable to aeronautical requirements.

5. The method of calculation of costs for the meteorological facilities and services provided and charged to aeronautical users should be available. Furthermore, the allocation of costs for the meteorological facilities and services should be done after consultation with users. Consultation aims at an increased involvement of interested parties, should be undertaken in a clear, concise manner and should include all necessary information to facilitate responses (see also Chapter 1, Part D). Such consultations between the meteorological authority, the service provider (if different from the meteorological authority) and users should be held regularly and at least before the cost basis for charges is established or revised.

6. For determining the costs of aeronautical meteorological services the following steps of inventory, category of costs and allocation have to be followed.

a) *Inventory of facilities and services.* The first step consists of establishing an inventory of the facilities and services to be provided by the meteorological service provider concerned to meet the aeronautical requirements stated in ICAO Annexes, PANS, ANPs/FASIDs and as specified and agreed by national aviation authorities. The facilities and services comprising the inventory may be classified under the following categories:

- 1) facilities and services needed to serve exclusively aeronautical requirements; and
- 2) facilities and services which may be needed to serve both aeronautical and non-aeronautical requirements.

These facilities and services are listed in paragraph 10 below.

b) *Categories of costs.* The second step consists of identifying the costs of each facility or service (including the costs of maintenance and supporting services) to be taken into account. For guidance in establishing the costs of meteorological facilities and services and a description of the various cost categories involved, reference should be made to Chapter 5, Part C.

c) *Allocation of costs between aeronautical and non-aeronautical users.* The third step consists of establishing an appropriate basis for allocation following the guidance material in Chapter 5, Part D. As a general principle, the allocation of costs should be determined in such a way as to ensure that no users are burdened with costs not properly allocable to them. Here, a differentiation should be made between facilities used exclusively for aeronautical requirements, those used exclusively for non-aeronautical requirements and those serving both categories:

- 1) For the facilities and services needed to serve exclusively aeronautical requirements (listed in paragraph 10 below), the costs are allocated 100 per cent to aeronautical use. (It is understood that the related services would not be provided to non-aeronautical users.)
- 2) For any facilities or services needed to serve exclusively non-aeronautical requirements (e.g. agrometeorology, maritime meteorology, hydrology), the costs are allocated 100 per cent to non-aeronautical use and should not be allocated to the cost base of aeronautical charges.
- 3) The costs of facilities and services needed to serve both aeronautical and non-aeronautical requirements (core activities), listed in paragraph 10, if allocated at all (Chapter 5, paragraph 5.115, refers), may be allocated between aeronautical and non-aeronautical users using such methods as the following:

- in proportion to the estimated aeronautical and non-aeronautical use made of the products supplied (e.g. applicable to general analysis and forecasting offices);
- in proportion to the estimated time of use of the computers for aeronautical and non-aeronautical purposes (e.g. applicable to electronic data processing facilities);
- in proportion to the estimated volume of information transmitted for aeronautical and non-aeronautical purposes (e.g. applicable to telecommunications facilities);
- in proportion to the personnel working on aeronautical and non-aeronautical data (e.g. applicable to climatological services); and
- on the basis of results from an analytical accounting system that ensures an equitable allocation of the costs concerned.

The aim should always be for the allocation of meteorological costs between aeronautical and non-aeronautical users to be based on one or more of the methods described above. However, in circumstances where the use made of meteorological facilities and services cannot be allocated on the basis of one of these methods, the necessary cost allocation should be approximated on the basis of the best data available. One possible approach would be to establish a ratio between the costs of those facilities and services needed to serve exclusively aeronautical requirements and the costs of those needed to serve exclusively non-aeronautical requirements; this ratio would then be applied to the costs of those core facilities which serve both aeronautical and non-aeronautical requirements (paragraph 10) in order to estimate the aeronautical portion of these costs.

In the final analysis, the fixing of the share of civil aviation in the core costs has to be done at the government level, considering *inter alia* the ICAO recommendation that States should “refrain from imposing charges which discriminate against international civil aviation in relation to other modes of international transport” (paragraph 2 ii) in Section I of Doc 9082 refers).

#### **ALLOCATION OF AERONAUTICAL METEOROLOGICAL COSTS BETWEEN AIRPORT AND EN-ROUTE UTILIZATION AND BETWEEN IFR AND VFR TRAFFIC**

7. By the same kind of analysis, the total costs so attributed to aeronautical requirements can further be allocated between airport (approach and aerodrome control) and en-route requirements. In the context of dual airport and en-route utilization of facilities or services, it is noted in Chapter 5, paragraph 5.121, that the costs of aeronautical meteorological services require particular attention. Doc 9082, Appendix 2, specifically recommends that the “costs of all MET provided to civil aviation should, where appropriate, be allocated between air traffic services provided for airports and air traffic services provided en route. In States where more than one international airport is involved, consideration could be given, where possible, to allocating the costs attributable to airport utilization between the airports concerned.”

8. When developing criteria for the allocation of costs between airport and en-route utilization, the following considerations should be taken into account:

- a) the allocation of aeronautical costs among users should be carried out in a manner equitable to all users;
- b) the allocation should be made in such a way that costs are recovered from the appropriate users; and
- c) the allocation should be based on the phase of flight operation in which the facilities or services are used.

Where allocation of aeronautical meteorological costs between airport and en-route utilization is required, the allocation criteria described in paragraph 6 above may be equally applied, with the terms “airport/en-route” being used instead of “aeronautical/non-aeronautical” as indicated below. As to facilities and services referred to under “Inventory of facilities and services” (paragraph 6 a) above), those listed in paragraph 10 below indicate whether the requirement and utilization of the facilities or services concerned are en route (E), mainly en route (mE), airport (A), mainly airport (mA) or mixed airport/en route (A/E).

9. Where deemed necessary for reasons of equity and where the necessary basic data are available, including all required traffic statistics, consideration should be given to allocating the aeronautical meteorological costs between IFR and VFR traffic. When developing criteria for the allocation of costs between VFR and IFR traffic, the following considerations should be taken into account:

- a) the allocation of aeronautical costs between IFR and VFR should be carried out in a manner equitable for all users; and
- b) all costs for services and products that have to be provided for IFR aviation to meet the needs of international and national requirements should be allocated to IFR aviation.

Where allocation of aeronautical meteorological costs between IFR and VFR traffic is required, the allocation criteria described in paragraph 6 may be equally applied, with the terms “IFR/VFR” being used instead of “aeronautical/non-aeronautical” as indicated below. As to facilities and services referred to under “Inventory of facilities and services” (paragraph 6 a)), those listed in paragraph 11 indicate whether the requirement and utilization of the facilities or services concerned are IFR (I), mainly IFR (mI), VFR (V), mainly VFR (mV) or mixed IFR/VFR (I/V).

### **INVENTORY OF FACILITIES AND SERVICES AND THEIR ALLOCATION BETWEEN AIRPORT AND EN-ROUTE USE**

10. The inventory of the facilities and services and their allocation between airport and en-route use are presented below.

#### **Facilities and services intended exclusively to serve aeronautical requirements**

Legend indicating utilization:

A	airport;
E	en route;
mA	mainly airport;
A/E	airport and en route;
mE	mainly en route.

World area forecast centres (WAFCs).....	E
Volcanic ash advisory centres (VAACs) .....	E
Tropical cyclone advisory centres (TCACs).....	E
Meteorological watch offices (MWOs) .....	E
Aerodrome meteorological offices .....	A/E
Aeronautical meteorological stations .....	A/E
Operation of a regional OPMET databank.....	E
Aeronautical fixed service (AFS) telecommunications for aeronautical meteorological purposes, including VSAT stations to receive WAFS products and OPMET data (if not included in COM) .....	A/E
Facilities to provide meteorological data processing of WAFS products .....	mE

Provision of D-VOLMET or VOLMET broadcasts .....	E
Observing instruments provided for aeronautical purposes (e.g. transmissometers, ceilometers) .....	mA
Specific aeronautical meteorological research .....	A/E
Specific aeronautical meteorological training .....	A/E
Specific aeronautical technical support (including administration).....	A/E

The above facilities and services provide the following products and functions. Their utilization is indicated in brackets:

Meteorological observations and reports for local ATS units .....	A
Meteorological observations and reports disseminated beyond the aerodrome (METAR, SPECI) .....	mE
Aerodrome forecasts (TAF, including amendments thereto) .....	mE
Landing forecasts (i.e. TREND) and forecasts for take-off .....	A/E
Area and route forecasts, other than those issued within WAFS (including GAMET, ROFOR).....	E
Aerodrome and wind shear warnings .....	A
SIGMET, AIRMET, volcanic ash advisories, tropical cyclone advisories.....	E
Preparation of aerodrome climatological information.....	A
Provision of flight documentation (WAFS products, SIGWX forecasts for low-level flights and required OPMET data) .....	mE
Meteorological watch by MWOs over FIR/UIR for the issuance of SIGMETs and AIRMETs .....	E
Aerodrome weather watch by the meteorological office concerned for the issuance of amendments to TAFs, aerodrome and wind shear warnings .....	A/E
Volcanic ash and tropical cyclone watch by VAACs and TCACs for the issuance of VA and TC advisories .....	E
Briefing and consultation (including display of OPMET and other meteorological information) .....	A
Provision of information to meteorological information systems (for use in remote briefing/ consultation systems) .....	A/E
Provision of information to ATS and AIS units .....	A/E
Provision of information to SAR units .....	E
Provision of WAFS and OPMET data to operators.....	mE

*Note.— An ultimate goal would be the identification of the costs attributable to the individual products and functions where this is feasible.*

### **Core facilities and services that may serve both aeronautical and non-aeronautical requirements**

Legend indicating utilization:

A	airport;
E	en route;
mA	mainly airport;
A/E	airport and en route;
mE	mainly en route.

General analysis and forecast offices.....	A/E
Meteorological data processing .....	A/E
Commonly used meteorological telecommunications facilities and services .....	A/E
Surface synoptic observation stations .....	mE
Climatological observation stations (precipitation stations to be excluded) .....	mE
Upper-air observation stations.....	E
Weather radar .....	A/E
Meteorological satellite image reception.....	mE

Core training.....	A/E
Core research.....	A/E
Core technical support (including administration) .....	A/E

### INVENTORY OF FACILITIES AND SERVICES AND THEIR ALLOCATION BETWEEN IFR AND VFR TRAFFIC

11. The inventory of the facilities and services and their allocation between IFR and VFR traffic are presented below.

#### Facilities and services intended exclusively to serve aeronautical requirements

Legend indicating utilization:

I	IFR;
V	VFR;
ml	mainly IFR;
I/V	IFR and VFR;
mV	mainly VFR.

World area forecast centres (WAFCs).....	I
Volcanic ash advisory centres (VAACs) .....	I
Tropical cyclone advisory centres (TCACs).....	I
Meteorological watch offices (MWOs) .....	I
Aerodrome meteorological offices .....	I
Aeronautical meteorological stations .....	I
Operation of a regional OPMET databank.....	I
Aeronautical fixed service (AFS) telecommunications for aeronautical meteorological purposes, including VSAT stations to receive WAFS products and OPMET data (if not included in COM) .....	I
Facilities to provide meteorological data processing of WAFS products .....	I
Provision of D-VOLMET or VOLMET broadcasts .....	I
Observing instruments provided for aeronautical purposes (e.g. transmissometers, ceilometers) .....	I
Specific aeronautical meteorological research .....	I
Specific aeronautical meteorological training .....	ml
Specific aeronautical technical support (including administration).....	ml

The above facilities and services provide the following products and functions. Their utilization is indicated in brackets:

Meteorological observations and reports for local ATS units.....	I
Meteorological observations and reports disseminated beyond the aerodrome (METAR, SPECI) .....	I
Aerodrome forecasts (TAF, including amendments thereto) .....	I
Landing forecasts (i.e. TREND) and forecasts for take-off .....	I
Area and route forecasts, other than those issued within WAFS (including ROFOR) .....	I
Area and route forecasts, other than those issued within WAFS (including GAMET).....	I/V
Forecasts for VFR aviation and air sports (e.g. GAFOR) .....	V
Aerodrome and wind shear warnings .....	I
SIGMET, volcanic ash advisories, tropical cyclone advisories .....	I
AIRMET .....	I/V
Preparation of aerodrome climatological information.....	I

Preparation of flight documentation (WAFS products, SIGWX charts/forecasts for low-level flights and required OPMET data) .....	I/V
Meteorological watch by MWOs over FIR/UIR for the issuance of SIGMETs.....	I
Meteorological watch by MWOs over FIR for the issuance of AIRMETs.....	I/V
Aerodrome weather watch by the meteorological office concerned for the issuance of amendments to TAFs, aerodrome and wind shear warnings .....	I
Volcanic ash and tropical cyclone watch by VAACs and TCACs for the issuance of VA and TC advisories.....	I
Briefing and consultation (including display of OPMET and other meteorological information) .....	I/V
Provision of information to meteorological information systems (for use in remote briefing/consultation systems) .....	ml
Provision of information to ATS and AIS units.....	I
Provision of information to SAR units .....	I
Provision of WAFS and OPMET data to operators.....	I

**Core facilities and services that may serve both  
aeronautical and non-aeronautical requirements**

Legend indicating utilization:

I	IFR;
V	VFR;
ml	mainly IFR <sup>1</sup> ;
I/V	IFR and VFR;
mV	mainly VFR.

General analysis and forecast offices.....	ml
Meteorological data processing.....	ml
Commonly used meteorological telecommunications facilities and services .....	ml
Surface synoptic observation stations .....	ml
Climatological observation stations (precipitation stations to be excluded) .....	ml
Upper-air observation stations.....	ml
Weather radar .....	ml
Meteorological satellite image reception.....	ml
Core training.....	ml
Core research.....	ml
Core technical support (including administration) .....	ml

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1. "Mainly IFR" means core facilities and services that may serve both aeronautical and non-aeronautical requirements more than 90 per cent (as identified by the States concerned).





## APPENDIX 3

### Calculation of the Weighted Average Cost of Capital (WACC)

#### CAPITAL ASSET PRICING MODEL (CAPM)

##### 1. Cost of equity

1.1 The cost of common equity is an estimate of a reasonable rate of return on the shareholder's or owner's investment. It is normally estimated by using a market-driven model called the "capital asset pricing model" (CAPM), which attempts to measure the relationship between the risk of a share of stock and its return.<sup>1</sup>

1.2 The CAPM formula states that an organization's cost of capital is equal to the risk-free rate of return (typically the yield on a ten-year treasury bond) plus a premium to reflect the extra risk of the investment or its "beta". The exact rate of return on equity will depend on perception of risk ("beta" or "β") on the part of the equity holders.

1.3 The formula could be expressed algebraically as follows:

$$\text{cost of equity} = R_f + [(R_m - R_f) \times \beta]$$

where  $R_f$  and  $R_m$  represent risk-free rate and market rate, and  $\beta$  represents the industry or company risk. A government bond rate with a ten-year yield spread is considered a good representation of a risk-free rate. The formula may have to be amended to meet the requirements of various structures of ANSP ownership.

1.4 The average market return obtained on share indices like FTSE, DAX, S&P 500, etc., represents the market return in a particular State. The difference between the market return and the risk-free return represents the "market risk premium". The market risk premium is then adjusted to the industry premium by multiplying by the industry beta.

##### 2. Cost of debt

2.1 Determining the cost of debt is relatively straightforward. This cost is represented by the weighted rates of interest paid by the ANSP on its debt instruments. The rate of interest of debt will depend on the market interest rate plus a premium based on the conception of risk of the ANSP on the part of lenders. Therefore the cost of debt should reflect the cost of actual borrowing (i.e. interest rates attached to the bonds and loans) plus any contributory risk factors,  $\beta$ , attached to the debt (normally risk of default).

2.2 The beta of debt could be close to zero for large organizations and, in particular, low-risk organizations. However it can be high for organizations with poor credit rating. ANSPs could have different types of debts like long-term bond or loans, pension reserves or short-term debt. The weighted average rates of interest paid on these different debts should be taken as the representative rate.

---

1. Cost of equity capital is a long-term, minimum hurdle rate. The actual recovery of costs in any given year may need to include a cost of equity capital above the CAPM calculation taking into account market fluctuations such that the actual cost of equity capital is achieved over time.

### 3. Weighted average cost of capital

3.1 The weighted average cost of capital (WACC) would therefore depend on the financing structure of the ANSP, that is, the proportion of equity and debt in its total capital as:

$$\text{cost of capital} = \text{cost of equity} + \text{cost of debt}$$

or

$$\text{return on capital} = \text{return on equity} \times \frac{\text{equity}}{\text{debt} + \text{equity}} + \text{return on debt} \times \frac{\text{debt}}{\text{debt} + \text{equity}}$$

3.2 As discussed above, the calculation of the WACC is a multiple-step process. First, the cost of equity is calculated; second, the capital structure of the airport is identified (i.e. per cent of the airport financed by debt versus equity); and third, the weighted average cost is calculated.

3.3 The following is an example of how to calculate the WACC.<sup>2</sup> This example is illustrative and is not intended to serve as a proxy value for estimating the WACC for any particular service provider. Consider the following parameters:

- a) return on ten-year government bond: 2.0%;
- b) average market rate of return: 7.0%;
- c)  $\beta$  industry risk: 0.55.

3.4 First, the cost of equity is calculated. Based on the formula noted above, the cost of equity is calculated as follows:

$$\text{cost of equity} = R_f + [(R_m - R_f) \times \beta] = 0.02 + [(0.07 - 0.02) \times 0.55] = 0.0475 \text{ (or 4.75\%)}$$

3.5 Second, the capital structure of the airport is identified. For the purpose of this example, assume the following capital structure:

Long-term debt	€ 1 400 000	40%
Equity	€ 2 100 000	60%
Total	€ 3 500 000	100%.

3.6 Third, the WACC can be calculated according to the following formula:

$$\text{WACC} = (4.75 \times 0.60) + (2.0 \times 0.40) = 3.65\%$$

---

2. The calculation of the cost of capital should be either in nominal or real terms but not a combination of both.

## **APPENDIX 4**

### **Pre-funding of Capital Projects through Charges**

#### **INTRODUCTION**

1. ICAO's *Policies on Charges for Airports and Air Navigation Services* (Doc 9082) and this manual espouse the principle of cost-relatedness in establishing user charges. Under this principle, the development of airports is normally financed using funds obtained from sponsoring States, retained earnings of autonomous airport entities, commercial loans, or the issue of debt securities. Once facilities are completed and commissioned, their capital cost is generally recovered by including associated amortization or depreciation costs in user charges. Thus, aircraft operators are charged only the cost of services actually provided.

2. However, the possible use of pre-funding for the development of air navigation services in specific circumstances and subject to detailed safeguards is recognized in Doc 9082, Section I, paragraph 23. The safeguards include effective and transparent economic oversight of user charges and the related provision of services, including performance management; comprehensive and transparent accounting; substantive consultation; and application of charges for a limited time period. Pre-funding should be employed only where aircraft operators will benefit by the provision of needed, improved, or lower cost service, which could not otherwise be provided because regular sources of financing are insufficient and it is not possible or it is too costly to access capital markets. Management and accounting safeguards should clearly identify links between pre-funding charges and project costs, link charges to users who ultimately benefit from the project, encourage advance consultation, and ensure that transparent and generally accepted accounting principles are implemented for the project in question. Further details on pre-funding criteria and procedures are outlined below.

#### **ECONOMIC OVERSIGHT**

3. Part C of Chapter 1 provides guidance on the need for, and possible forms of, economic oversight. Of particular relevance, when pre-funding is contemplated, is the need to protect users against overcharging, which could result from abuse of any dominant position that the providers may have, as well as the provision of dispute resolution mechanisms.

#### **CRITERIA FOR CAPITAL PROJECTS**

4. ANSPs should be able to clearly demonstrate to aircraft operators and economic oversight authorities the advantages of pre-funding over traditional capital funding techniques. Pre-funding should be considered only for capital expansion projects that have reached a substantial level of maturity in the capital planning process, including project justification, project scope, proposed implementation schedule (including project start and completion dates), cost estimates, and required project approval levels. In the case of developing countries, consideration could also be given to funding large-scale capital refurbishment projects. Pre-funding should not be used for the establishment of a capital sinking fund for undefined projects because current ICAO cost-recovery policies allow for limited capital reserves, nor should pre-funding pay for operating costs.

5. Pre-funding may be used to pay capital project-related development and implementation costs including preparation of final engineering and architectural project plans, contracting and administration costs (including reasonable costs related to the collection of the pre-funding charge), construction, equipment purchases, environmental costs, and construction site security costs. When it is possible to finance some, but not all project development costs, pre-funding should not be used as the sole source for financing the totality of the project. Rather, the ANSP needs to consider what percentage of total project costs reflects an acceptable balance between the benefits and risks of undertaking a pre-funding initiative and should consult with users, and if appropriate, the economic oversight authority.

### **CONSULTATION WITH USERS**

6. ANSPs contemplating the use of pre-funding should consult with aircraft operators and, if appropriate, authorities responsible for economic oversight, in advance of project initiation. The requirement for comprehensive consultation prior to the establishment and subsequent operation of a pre-funding account is both a challenge and the key to the success of any pre-funding initiative. The objective of a consultation is to illustrate to users the financial benefits derived through pre-funding, the respective share on a multi-year basis of each of the financing methods planned for the project, and the opportunity to explore other financing solutions. Ideally, consultations should be able to clearly articulate the benefits of a proposed pre-funding initiative to users. The introduction of a pre-funding charge should not be undertaken until transparent and substantive consultations with air navigation services users are completed and the approvals prescribed within the economic oversight regimes of individual States are received. Appropriate consultations and notice provisions should be undertaken in any proposed revisions to pre-funding charges, including a change in the level of the charge, or a material change in the scope, timing or cost of the designated project.

### **ACCOUNTING FOR REVENUES AND EXPENSES RELATED TO PRE-FUNDING OF PROJECTS**

7. Comprehensive and transparent accounting for the pre-funding of capital projects is a necessary safeguard to ensure that revenues derived from pre-funding charges are being collected and allocated against a specific project in a manner consistent with the pre-funding framework, the cost-recovery methodology of the ANSP, and the economic oversight framework of the State, wherever applicable. The objective is to ensure that no abuses are committed resulting from any dominant position that an ANSP may have and that all available measures are taken to lead the ANSP to improved productivity.

8. A dedicated or separate pre-funding account should be established for the project in question. This will result in greater transparency regarding the degree to which project-specific charges are being allocated to air navigation services users and the crediting and debiting of the account in relation to the project implementation schedule. It will also enable the ANSP to clearly demonstrate the cessation of charges to users once the need for the pre-funding account is no longer required. Transparent accounting, in conjunction with comprehensive consultation with users, will serve as a means of ensuring that users will not be double-charged for the facility under traditional charging regimes once the facility becomes operational.

9. Any interest accrued in the course of establishment of a pre-funding account should be applied to offset or reduce the costs of the specific project for which the account was established.

10. Charges collected through pre-funding should be evaluated commensurate with Chapter 5 but without taking into account, in the cost basis, the amortization of the pre-funded share of the investments.

11. Where applicable, the principal elements of a pre-funding framework, and a summary of the revenue and expenditure transactions in a fiscal year, should be reflected in annual reports or other public accountability documentation of the ANSP. The dedicated pre-funding account should also be subject to the provider's audited

financial statements for the fiscal year and as part of any specific financial or performance auditing of the specific capital project in question. This could also include any documentation prepared by the ANSP that supported the benefits of implementing a pre-funding strategy over traditional funding techniques prior to the introduction of the pre-funding charge.

### **SOURCES OF PRE-FUNDING CHARGES**

12. Pre-funding frameworks should reflect the broader ICAO principle of cost-relatedness: charges should not be set at levels that would, based on reasonable and prudent projections, generate revenues that exceed cost-based funding requirements. Pre-funding sources could include a surcharge on existing aviation charges or the introduction of a new, but project-specific, aviation charge.

13. Providers could also employ a mixed pre-funding strategy whereby new charges could be levied on different users of the air navigation services in a manner commensurate with the costs and benefits assumed by the respective users upon the completion of the project, consistent with the charging methodologies of the ANSP. This would provide ANSPs with greater flexibility to respond to their unique operating environment. Other external sources of funding such as grants, contributions or other subsidies (both principal and interest) should be considered in the overall funding strategy.

14. Pre-funding charges should be consistent with, and applied within, the economic oversight framework of individual States and should be in accordance with the ANSP's accepted methodology for determining user charges. A pre-funding framework would also have to be developed within the context and possible limitations imposed by any existing cost-recovery agreements with air navigation services users. The pre-funding framework should also recognize those segments of the user population that are otherwise exempt from charges (e.g. military and other flights exempted from user charges).

### **TIMING AND RESTRICTIONS**

15. The commencement of a pre-funding period is linked to the complexity of the project, the financial maturity of the ANSP undertaking the project, the portion of the project that pre-funding is eligible to fund, and other sources of funding available to management.

16. A pre-funding framework should include provisions regarding the cessation of pre-funding charges if a project has not commenced within a certain time frame, is halted for a defined period of time, is completed, or if total project funding requirements are met when all revenue sources are considered.

### **COLLECTION OF PRE-FUNDING CHARGES**

17. Depending on the form of the pre-funding charge (surcharge on an existing aviation charge or new project-specific aviation charge), the collection aspects of this charge will be of the same nature as those described in Part I of Chapter 5.

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## APPENDIX 5

### Bilateral and International Sources of Financing

#### PART A — BILATERAL DEVELOPMENT AGENCIES

Belgium .....	Belgian Development Cooperation — Brussels
Canada .....	Canadian International Development Agency (CIDA) — Gatineau, Quebec
Denmark .....	Danish Development Assistance (DANIDA) — Copenhagen
France .....	Agence Française de Développement (AFD) — Paris
Germany .....	Federal Ministry for Economic Cooperation and Development (BMZ) — Bonn Kreditanstalt für Wiederaufbau (KfW) — Frankfurt Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) — Eschborn (Frankfurt)
Italy .....	Direzione Generale per la Cooperazione allo Sviluppo (DGCS) — Rome
Japan .....	Japan Bank for International Cooperation (JBIC) — Tokyo
Netherlands .....	Ministry of Foreign Affairs — The Hague
Norway .....	Norwegian Agency for Development Cooperation (Norad) — Oslo
Russian Federation .....	Ministry of Economic Development and Trade — Moscow
Spain .....	Agencia Española de Cooperación Internacional (AECI) — Madrid
Sweden .....	Swedish International Development Cooperation Agency (SIDA) — Stockholm
United Kingdom .....	Overseas Development Administration (ODA) — London
United States .....	United States Agency for International Development (USAID) — Washington, D.C.

#### PART B — DEVELOPMENT BANKS AND FUNDS

African Development Bank Group (AfDB) .....	Abidjan, Côte d'Ivoire
Andean Development Corporation (CAF) .....	Caracas, Venezuela
Asian Development Bank (ADB) .....	Manila, Philippines
Black Sea Trade and Development Bank (BSTDB) .....	Thessaloniki, Greece
Caribbean Development Bank (CDB) .....	St. Michael, Barbados
Central American Bank for Economic Integration (CABEI) .....	Tegucigalpa, Honduras
East African Development Bank (EADB) .....	Kampala, Uganda
Eastern and Southern African Trade and Development Bank (PTA Bank) .....	Nairobi, Kenya
European Bank for Reconstruction and Development (EBRD) .....	London, United Kingdom
European Development Fund (EDF) .....	Brussels, Belgium
European Investment Bank (EIB) .....	Luxembourg, Luxembourg
Financial Fund for the Development of the River Plate Basin (FONPLATA) .....	Sucre, Bolivia
Fund for Cooperation, Compensation and Development (ECOWAS Fund) .....	Lome, Togo
Inter-American Development Bank (IDB) .....	Washington, D.C., United States
International Bank for Reconstruction and Development (IBRD) .....	Washington, D.C., United States
International Development Association (IDA) .....	Washington, D.C., United States
International Finance Corporation (IFC) .....	Washington, D.C., United States
Nordic Development Fund (NF) .....	Helsinki, Finland
Nordic Investment Bank (NIB) .....	Helsinki, Finland

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Organization of the Petroleum Exporting Countries (OPEC) Fund for  
International Development.....Vienna, Austria

In addition, the following institutions are established and financed essentially by Arab States:

Abu Dhabi Fund for Economic Development.....Abu Dhabi, United Arab Emirates  
Arab Bank for Economic Development in Africa (BADEA) .....Khartoum, Sudan  
Arab Fund for Economic and Social Development (AFESD).....Kuwait City, Kuwait  
Arab Monetary Fund (AMF).....Abu Dhabi, United Arab Emirates  
Islamic Development Bank Group (IDB).....Jeddah, Saudi Arabia  
Kuwait Fund for Arab Economic Development (KFAED).....Kuwait City, Kuwait  
Saudi Fund for Development (SFD) .....Riyadh, Saudi Arabia

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