



# **Study of the Terminal Charges for Air Traffic Control services**

**Commission of the European Communities**

*Final Report - March 2001*

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### **Notes on confidentiality**

Appendices 3 and 4 are confidential and have been printed and bound separately

In the published version of this report, some numbers in section 4 have been omitted on the basis of confidentiality. This is shown in the text.

## **Executive summary**

### **Introduction and background**

1 In recent years, there has been a significant increase in air travel in Europe, resulting from both liberalisation and economic growth. However, this has led to an increase in delays, particularly those attributed to air traffic control. This, combined with greater price competition between European airlines, has sharpened airlines' focus on both the quality and the price of the services that they receive from air navigation service providers (ANSPs).

2 Charges are levied on aircraft in order to cover the air navigation services provided in three main phases of flight: movements at and around the aerodrome (aerodrome control), approach and departure of flights including initial climb and descent (approach control), and en-route. Whilst EUROCONTROL, through the Central Route Charges Office (CRCO), provides a harmonised system of charging for en-route services, there is no equivalent system for aerodrome or approach control services, which we collectively term terminal air navigation services (ANS). Certain characteristics of the current system for these charges in the EU have raised particular concerns amongst users including inconsistency of charging methodologies between states, resulting in perceived unfair discrimination between airlines; a lack of transparency in cost information, including attribution methodologies; and instances of explicit price discrimination.

3 As a result, the Commission of the European Communities (the Commission) has contracted PricewaterhouseCoopers (PwC) to consider the current framework of charges for terminal ANS use and to propose a harmonised structure for such charges.

4 In the first phase of this study, we undertook a detailed evaluation of the existing systems for terminal charges in the Community. We set out the current structure of terminal charges in Europe in our report to the Commission on the first phase. In this report, we also assessed where the existing charging systems were not compliant with the Commission's objectives for transport infrastructure pricing.

5 In the second stage of this study, we have developed proposals for reform to the charging structure. We have undertaken consultation with ANSPs, government regulatory authorities and user organisations on the implications of our proposals. This document constitutes our final report. It proposes reforms to the terminal charging structure in order to bring it, as far as possible, in line with the Commission's objectives.

### **Objectives**

6 We have analysed the Commission's objectives for transport infrastructure pricing and our proposals are designed to be consistent with these as far as possible. We have also taken into account guidance from ICAO and EUROCONTROL, and the practical implications of implementing different policy options.

7 An optimal system of ANS pricing would encourage both the efficient use and the efficient provision of ANS infrastructure. In order to encourage the efficient **use** of

infrastructure, charges would be related to costs and would therefore be **non-discriminatory**. In order for charges to be cost-reflective, there would need to be specific charges for each ANS phase that reflected the operational boundaries between these phases. Although the level of charges will inevitably differ between states, charging methodologies need to be consistent in order to avoid unfair discrimination between different users. The Commission also seeks to ensure an efficient choice between transport modes: charges for use of different modes would therefore need to be based on consistent principles.

8 The efficient **provision** of ANS infrastructure is harder to incentivise through transport infrastructure pricing, as the majority of ANS providers are monopolistic and are free to set charges at whatever level is necessary to recover costs. Improved **consultation and regulation** procedures may, however, make services more user-focussed; better **financial information disclosure** would encourage cost-efficiency by enabling users to challenge cost items. It may also be possible to streamline the current processes for **billing and collection**.

9 At present, charges for terminal ANS are designed to recover the average costs of providing infrastructure. However, in principle, the Commission supports the use of pricing systems for transport infrastructure that are based on the marginal costs of infrastructure use<sup>1</sup>. Two bases for estimating marginal costs could be applied, which should in most cases of efficient capacity provision tend towards similar results over the long run:

- **Short run marginal cost pricing (SRMC):** SRMC would relate charges to the short run marginal social costs of infrastructure use and thus encourage the efficient use of existing infrastructure. The main short run marginal costs are social costs, principally congestion and pollution, as most of the ANSPs' direct financial costs are fixed in the short run; or
- **Long run marginal cost pricing (LRMC):** LRMC would relate charges to the long run costs of expanding ANS infrastructure. LRMC would therefore ensure that there was an efficient level of capacity provision and ensure that only those users that created the need for marginal additional infrastructure paid for it.

## **Structure of reform**

10 We found that there are insufficient data available at present to design a charging structure based on marginal costs:

- **Short run marginal cost pricing (SRMC):** As the main short-run cost of ANS use is increased congestion, a system of SRMC would require an analysis of the total incremental delay caused by marginal flights. In practice, even the *total* delay caused by approach ANS is unclear: the Central Flow Management Unit (CFMU) does not distinguish delay in terminal ANS from airport delay and a high proportion of delay is 'masked' by delay in other sectors;

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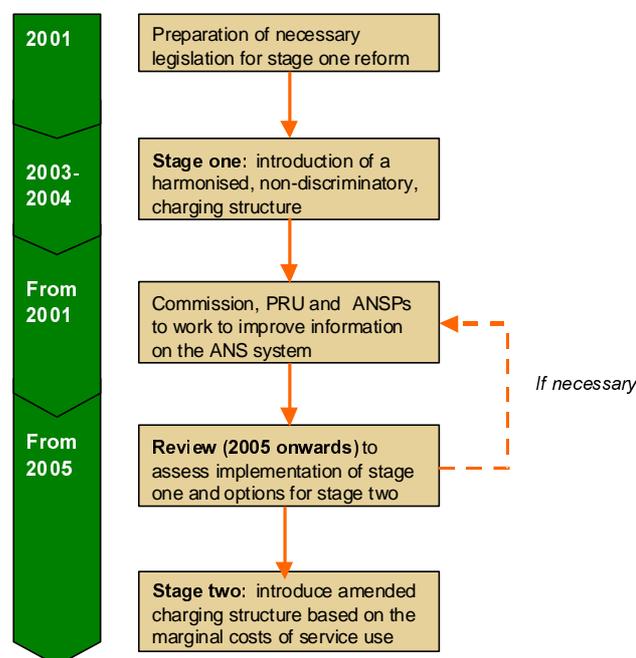
<sup>1</sup> White Paper on Fair Payment for Infrastructure Use, 1998

- **Long run marginal cost pricing (LRMC):** No ANSP has, as yet, quantified the relationship between investment spending and terminal ANS capacity. However, we believe that in principle this should be possible: any business should evaluate the benefits of an investment before undertaking it.

11 We would expect that the availability of data should improve as a result of reform to the structure of European ANS undertaken both by Member States and as part of the Commission’s Single European Sky initiative; and greater information disclosure as a result of work by the Performance Review Commission. The Commission, in co-operation with EUROCONTROL and ANSPs, should work to improve the range and quality of data available.

12 We have therefore recommended that the Commission should implement a two-stage process of reform. Figure 1 below illustrates the structure of the reform process. In the first stage, a non-discriminatory and, as far as possible, harmonised charging structure should be introduced, which seeks to take the first steps towards the longer term objectives of encouraging efficient use and provision of infrastructure. Some of our proposals may need to be phased in over a two to three year period in order to enable airlines to adjust their fleet plans and route structures. The charging system should be reviewed again after a defined period (probably of at least 3-5 years). At this stage, decisions could be made about the practicality and benefits of progressing to a second stage, which would be the introduction of a charging structure based on marginal costs.

**Figure 1: Proposed structure of reform**



13 The structure of the second stage of reform will be dependent on improvements to the availability of data. It is also likely that the wider structure of European ANS will be reformed. Therefore, while this report evaluates broad options for the second stage of reform, we have not discussed in detail the implications of different options, as there is

insufficient data available at present to quantify their effect. A decision about the exact shape of the second stage should therefore be made only at the time of the review: it would not be useful to make such decisions at present.

## **Proposals for reform**

14 Our stage one proposals are designed to develop a charging structure that allocates costs in a fair way amongst users, and in particular seeks to ensure that users do not have to pay for the directly attributable costs of terminal ANS facilities and services that they do not use. Although, after implementation of these proposals, the European ANS charging structure will continue to be based on the average rather than marginal costs of service use, the introduction of a more cost-reflective system is a necessary precondition for the later introduction of a marginal-cost based system.

15 We have designed these proposals to be implemented as soon as all necessary legislative, consultative and administrative procedures have been completed. However, we expect that some of our proposals will be controversial, as they are intended to end a number of the hidden cross-subsidies and examples of discrimination inherent in the existing charging system. These proposals, taken together, would tend to increase the charges levied on smaller aircraft operating short distance services within the Community. At present, these flights are cross-subsidised by other flights through a number of means including disproportionately low terminal ANS charges in many states, uniform charges across all airports and tariff formulae that benefit small aircraft at the expense of larger aircraft. Abolition of these cross-subsidies will result in fairer competition between airlines and between transport modes. However, we estimate that the net effect of our proposals might increase costs on such short-haul regional routes by €3-10 per passenger per one-way flight, depending on the existing charging structure of the Member State, the airport served and the type of aircraft used. Charges would be correspondingly reduced for larger aircraft, particularly those on longer haul routes within and to the Community, and those overflying the Community. We could therefore expect to see reductions in fares on these routes.

16 Table 1 below sets out the estimated impact of our proposals on four illustrative flights. This analysis assumes that the flights were operating in states where the total level of charges and the terminal ANS charging structure were broadly typical of the structures in most states. In practice, the implications will vary significantly between states. Greater detail on our specific proposals is given below.

**Table 1: Estimated mid-case impact of reforms on example routes<sup>2</sup>**

Example route		Hub-Hub	Hub-Region	Region-Region	Hub-non EU
Nature of flight	Aircraft	Airbus A321	Fokker 100	Saab 340	Boeing 747-400
	Distance travelled within Europe (km)	800	600	250	2000
	European airports used	2 hub airports	1 hub and 1 regional airport	2 regional airports	1 hub
<b>Proposal</b>		<b>Charge changed</b>		<b>Impact of proposal on charge</b>	
Recovery of all terminal costs from terminal charges <sup>3</sup>	Terminal	+70%	+70%	+70%	+70%
	En-route	-20%	-20%	-20%	-20%
	Total	+10%	+10%	+25%	-7%
Change to exempted distance in en-route formula	En-route	-10%	-15%	-50%	+4%
	Total	-6%	-10%	-30%	+3%
Non-uniform airport charges	Terminal	-40%	+10%	+60%	-40%
	Total	-12%	+2%	+25%	-6%
Use of charge formula with exponent of 0.70, 50% not related to weight	Terminal	-30%	+0%	+90%	-40%
	Total	-10%	+0%	+40%	-6%
Removal of exemptions/discounts	Terminal	-2.5%	-2.5%	-2.5%	-2.5%
	Total	-1%	-1%	-1%	-1%
<b>Total impact of proposed reforms on charges</b>	<b>Terminal</b>	<b>-15%</b>	<b>+80%</b>	<b>+400%</b>	<b>-35%</b>
	<b>En-route</b>	<b>-30%</b>	<b>-30%</b>	<b>-40%</b>	<b>-15%</b>
	<b>Total</b>	<b>-25%</b>	<b>+5%</b>	<b>+150%</b>	<b>-20%</b>
	<b>Total €</b>	<b>-250</b>	<b>+25</b>	<b>+150</b>	<b>-800</b>
	<b>€ per passenger</b>	<b>-1.75</b>	<b>+0.40</b>	<b>+7.00</b>	<b>-3.00</b>

### Scope and structure of services and charges

17 We propose that, where separate services are provided (typically from different locations in busier parts of the system), there should be separate charges for aerodrome and approach control. These charges should recover all of the costs associated with the operational phases of aerodrome and approach ANS respectively. Where the provision of aerodrome and approach services is operationally integrated however, there should be provision for a corresponding integrated charge for aerodrome and approach services.

<sup>2</sup> This table represents an assessment of the approximate impact of charges in states where the characteristics of the charging system for terminal ANS is consistent with the charging structure in other states. However, it has been compiled based on very limited information from a small number of ANSPs. The value of any change in charges, and even in some cases the direction of change, will vary between states

<sup>3</sup> Note that the main category of flights that benefits from these reforms is overflights that do not land at any airport within the charging area.

18 The principle of cost-reflective charges will imply that there should also be separate charges for upper and lower airspace where the relative unit costs of service provision (and/or the identity of the service providers) are significantly different.

19 We recommend that, in any event, the formula for en-route charges should be amended so that, instead of excluding the 20km of flight closest to the airport from en-route charges, 80km are excluded at those airports where a separate control service is provided for the approach phase of flight and 40km are excluded at all other airports. An exemption from charges that is airport-specific, reflecting the operational characteristics of each airport, could be undertaken as part of the second stage of reform.

20 States should have the option of introducing separate charges or charge elements for MET, AIS and CNS services, the costs of which would then be excluded from the calculation of the core elements of terminal ANS charges. This would increase the transparency of the costs concerned to users and thereby facilitate the provision of these services on a contestable basis. Where Member States opted to continue to recover the costs of these services through other ANS charges the allocation of costs to these charges should be transparent to users and consistent with the operational patterns of use of the services.

### **Variation of charges between airports**

21 We propose that charges for the provision of terminal ANS at each airport should be set to recover at least the avoidable costs associated with providing services for the airport. We would expect this to result in an increase in charges at most secondary airports, although empirical evidence on this is mixed and we would expect that cost-reflective charges would lead to greater cost-efficiency in service provision at secondary airports. However, in order not to unnecessarily encourage further use of major airports, and thus potentially exacerbate congestion further, we would propose that costs which cannot be attributed to the provision of services to specific locations could if necessary be recovered via charges for the (relatively congested) fully co-ordinated airports.

22 Within this general principle, we would propose that where services are provided, and costs managed and incurred by the ANSP, jointly for two or more airports, these airports may be designated an airport group, and uniform charges may apply within this group. However, this should only be necessary for approach (TMA) control charges, where a coordinated service is typically provided from a single ACC (rather than individual aerodrome control towers).

23 Where incremental facilities are provided, and costs incurred, at a secondary airport purely in order to enable the airport to handle flights that have been diverted from a major airport, the incremental costs of providing these diversionary facilities may be recovered from the aerodrome charges levied at the major airport.

### **The tariff formula**

24 We propose that charges should be partially based on ability to pay and that maximum takeoff weight (MTOW) should continue to be used as a proxy for this. We propose that charges should be related to MTOW on the basis of a uniform exponent at all

airports within the Community. We have calculated that MTOW would be best related to ability to pay through use of an exponent of 0.70. The use of a uniform relationship between charges and MTOW will reduce the risk of charging formulae being set by ANSPs in different Member States in ways that benefit particular airlines or groups of users, such as national flag carriers.

25 Where ANSPs are able to identify the proportion of their total chargeable terminal ANS costs that is related to the provision of capacity in the long run, no more than that proportion of total chargeable costs would be permitted to be recovered through an element of terminal ANS charges that was not related to weight.

### **Exemptions and discounts**

26 We propose that all exemptions and discounts from terminal charges should be removed, unless the exemptions or discounts reflect different levels of costs, or the exemption of a flight confers clear benefits on other users of the airspace. The only flights that could be entirely exempt from charges, on these criteria, are search and rescue flights. Exemptions for some categories of flight would however be permitted to continue if the national government of the state, or another government organisation, reimburses the ANSP in full for the charges that would otherwise have been levied on the exempted aircraft.

27 We consider that aircraft training is a commercial activity and therefore exemption of training flights would therefore result in an implicit subsidy towards airlines undertaking training in certain states. We propose that Member States should be permitted to retain this exemption under limited circumstances, but in any case only for a maximum of 5 years.

28 VFR flights, and other flights with small aircraft, should not be exempt from charges. However, we propose that ANSPs may offer discounts to these flights if it can be demonstrated that the discounts reflect lower standards of service used. We also propose that ANSPs should be able to sell season tickets to small users in order to reduce collection costs, although the use of such season tickets should be restricted to unconstrained times and airports.

29 Volume discounts on terminal charges benefit the carriers based within a state at the expense of other carriers, and therefore represent unfair discrimination against smaller and international carriers. We propose that all such discounts should be removed from the terminal ANS charge structure in the EU. However, we believe that this restriction need not be enforced in the relatively rare circumstances where:

- terminal ANS services are provided to airports by ANSPs (and not directly to users) on a contestable commercial basis; and
- there is genuine competition between the commercialised airports procuring the terminal ANS services concerned. This cannot be the case if the alternative airports are slot-constrained, as this would mean that airlines are not free to transfer services between the airports.

In such cases, the offering of discounts by a commercial airport to some specific carriers may represent a legitimate commercial decision on the part of that airport, subject only to broader competition law and regulation.

### **Regulation and consultation procedures**

30 Terminal ANS charges should be set only after consultation with users. Users should also have the right to make direct representation to the government or regulatory authority that is responsible for approving charges, and should have a right of appeal, if necessary through the courts, if the national laws on terminal ANS charges have not been applied. Where an ANSP is privatised or fully commercialised, charges should be subject to approval by an economic regulator within the broader framework of economic regulation applied to such ANSPs.

### **Accounting procedures**

31 We recommend that ANSPs should be required to provide detailed accounts, disaggregated by airport and by ACC. ANSPs should use an accounting procedure that is consistent with that used for en-route charges. Where there are separate charges for separate phases of ANS, accounts should also be disaggregated by these phases of flight. This would ensure that the cost bases of the separated charges are transparent to both users and the authorities responsible for approving charges. We suggest that these accounts should be independently audited.

32 Charges should recover capital costs as well as operating costs, and the return on capital should be reasonable.

### **Billing and collection**

33 The provision of billing and collection services for terminal ANS charges to ANSPs should be a contestable activity, as third party providers can and do provide these services on a contractual basis. Where billing and collection of charges is the responsibility of the ANSP rather than the airport, it should market-test the efficiency of its own service delivery at least once every five years. The format of bills for terminal ANS charges should be standardised, in order to minimise the administrative burden on users dealing with ANSPs across the Community.

# **1 Introduction**

## **1.1 Background**

1.1.1 There has been a significant growth in European air travel in recent years. This has resulted from many factors including liberalisation of the airline industry and economic growth. However, there has also been a significant increase in delays, particularly those attributed to air traffic control. This, combined with greater price competition between European airlines, has sharpened airlines' focus on both the quality and the price of the services that they receive from Air Navigation Service Providers (ANSPs).

1.1.2 Charges are levied on aircraft in order to cover the air navigation services provided in three main phases of flight: movements at and around the aerodrome (aerodrome control), approach and departure of flights including initial climb and descent (approach control) and en-route. Whilst EUROCONTROL, through the Central Route Charges Office (CRCO), provides a harmonised system of charging for en-route services, there is no equivalent system for aerodrome or approach control, which we jointly describe here as terminal air navigation services (ANS). Certain characteristics of the current systems for these charges in the EU have raised particular concerns amongst users. These include:

- most states levy 'terminal navigation charges', but it is in some cases unclear what costs these actually recover. There is no common approach in charging methodologies;
- unclear boundaries between en-route and approach, which may lead to distortions;
- instances of explicit price discrimination in the charging formulae, where charges bear no relation to costs; and
- a lack of information on the costs underlying terminal charges.

1.1.3 As a result of these concerns, the European Commission contracted PricewaterhouseCoopers (PwC) to investigate the current structures of terminal charges within the Community and to propose a harmonised structure. Our proposals for a harmonised structure are as far as possible compliant with the Commission's objectives for transport infrastructure pricing, set out in the 1998 White Paper on Fair Payment for Infrastructure Use. The objectives for the study are set out in section 2 below. However, we have had to take into account other factors, such as the feasibility of implementing policy options and their acceptability to airlines and other stakeholders.

1.1.4 This report represents a draft of the final report for this study. It presents our proposals to the Commission for reform of the terminal charging structure.

## **1.2 Scope of study**

1.2.1 This study was originally envisaged as a study of the terminal charges – as opposed to en-route charges – levied for the ascent and descent phase of flight (approach control). However, in practice the situation is more complex:

- A large part of the ascent and descent phase is within en-route control and part of it is within aerodrome control. For flights within Europe, ascent and descent can represent a high proportion of the total flight distance and an aircraft may never ascend to its normal altitude for level flight (which is usually over FL300); and
- The current systems of terminal navigation charges do not usually, at present, recover all of the costs of approach control – and in some states they do not recover any of these costs. Terminal charges recover the costs of aerodrome control services and some other services which vary by state but may include approach control, apron management, MET, CNS and AIS.

1.2.2 Differences in the scope of the services, which are paid for by terminal charges, have made the system opaque and have caused confusion to users. Some ANSPs also define the phases of ANS in different ways for operational and financial purposes. Table 1.2.1 below lists the definitions we use within this report. These definitions are based on the operational characteristics of each phase of flight and are therefore applied regardless of how ANSPs administratively or financially allocate these services. Figure 1.2.1 below demonstrates the vertical scope of each service.

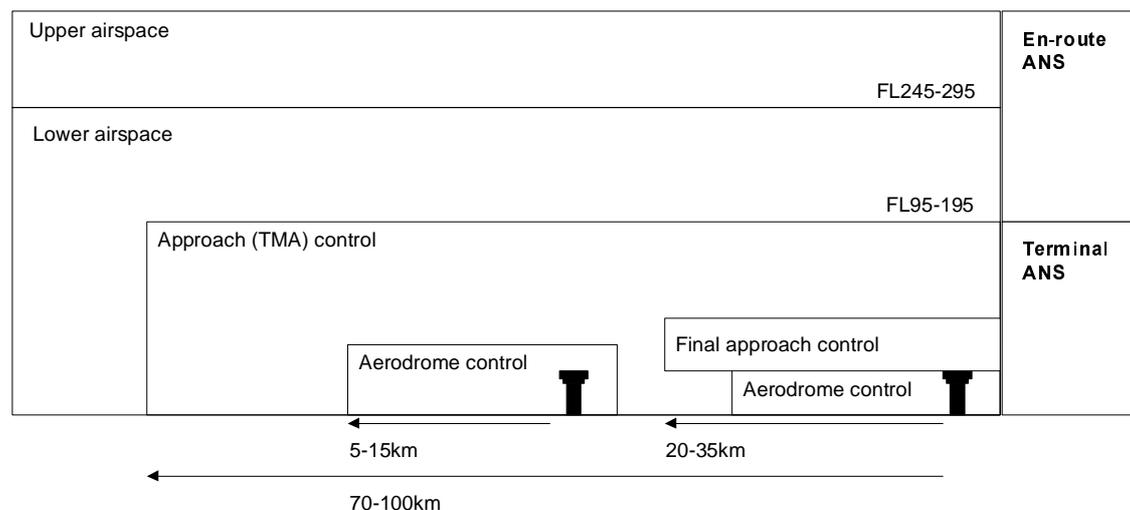
**Table 1.2.1: Definition of terms**

<b>Service</b>	<b>Description<sup>4</sup></b>
<b>En-route control</b>	The phase of flight associated with level flying and descent prior to handover of control to an approach controller. En-route control is divided into upper and lower airspace (see below).
<b>Approach control</b>	The phase of flight between handover of control from an en-route controller and handover to an aerodrome controller. Approach control operates within the boundaries of the terminal management area (TMA) where there is one in place; however, the TMA can serve more than one airport.
<b>Final approach control</b>	Additional phase of flight at a small number of airports, applicable on landing only: the phase between handover from an approach controller and handover to an aerodrome controller. As this phase is aerodrome-specific, we consider it to be part of aerodrome control.
<b>Aerodrome control</b>	The phase of flight directly associated with takeoff and landing at a particular airport, after handover from an approach or final approach controller. Usually applies until the aircraft has left the taxiway.
<b>Apron management</b>	Control of aircraft on the apron, including parking.
<b>Terminal control</b>	Includes approach control; aerodrome control; final approach control where this exists and apron management where this is provided by the ANSP.
<b>Upper airspace</b>	En-route control of aircraft, usually above FL245. Most flights within upper airspace are level flying (overflights)
<b>Lower airspace</b>	En-route control of aircraft, usually below FL245. Most flights with lower airspace are ascending or descending

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<sup>4</sup> This description applies to the approach of aircraft to an airport; the definitions generally apply in reverse on takeoff.

**Figure 1.2.1: The current structures of European airspace**



1.2.3 The proposals in this report relate to terminal ANS. However, a key issue for this study is to determine which services should be paid for through terminal ANS charges and which services should be paid for through en-route charges. As a result, these proposals will also impact on en-route charges.

### 1.3 Structure of study

1.3.1 This study was undertaken in two phases:

- **Phase One:** analysis of the current systems of charging for terminal ANS; and
- **Phase Two:** development of proposals for reform.

#### Phase One

1.3.2 In Phase One of this study, we sought to undertake a detailed information gathering exercise. The intention was to develop a detailed understanding of the current structure of charges in all Member States. Our objective was to involve all Member States in this information gathering exercise: however, Nav-EP, the Portuguese ANSP, was not able to participate fully in this study, and the information provided by some other states was limited and in other cases subjected to delay. We developed a detailed information request which all ANSPs, except Nav-EP, at least partially completed; we then undertook face-to-face interviews with six ANSPs and telephone interviews with the others. DFS was unable to participate within the original timeframe for Phase One, but we agreed with the Commission to adjust this in order to enable them to do so.

1.3.3 The ANSPs with which we undertook face-to-face interviews were DFS (Germany), NATS (UK), DGAC (France), ENAV (Italy), CAA Finland and CAA Greece. The ANSPs in Germany, the UK, France and Italy were selected because of the range of different charging structures used in these states and because of their position as the largest states in both the Community and EUROCONTROL. Finland was selected because, at the

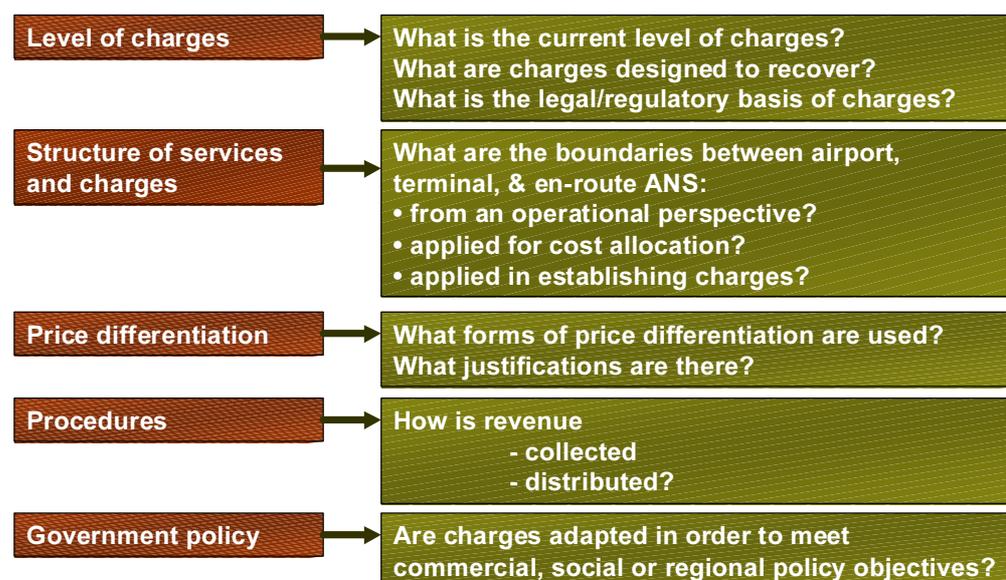
time the information gathering exercise was carried out, it was, uniquely amongst the EU Member States, not also a member of EUROCONTROL<sup>5</sup>. Greece was selected because it does not have any specific terminal ANS charges at present.

1.3.4 In Phase One, we requested that ANSPs provide quite detailed financial data and projections. In practice, ANSPs were not able to provide all of these details: in most cases, this was because the data we requested are not calculated at present; in some cases, it was because the information was confidential. This has limited our ability to undertake financial analysis. In section 4, we have estimated the impact we would expect our proposals to have on a range of typical users, but the information we have been given is not sufficient to enable us to quantify the impacts precisely.

1.3.5 We also undertook a detailed consultation exercise, prior to the development of the information request, in order to improve our understanding of users' concerns about the current systems of charging of terminal ANS charging. We undertook consultation with organisations representing all major categories of user: IATA, IACA, ERA, IAOPA, ACI and SCARA (representing French airlines other than Air France).

1.3.6 Based on the information submitted to us in Phase One, we submitted a report to the Commission setting out the current systems of charging for terminal ANS. The report also discussed whether these systems were compliant with the Commission's objectives for transport infrastructure pricing and examined the implications of divergence from these principles. A key issue in Phase One was the boundaries between phases of flight used by ANSPs, and in particular the implications of discrepancies between the boundaries used for cost-allocation for charging on the one hand and operational boundaries on the other. Figure 1.3.1 below sets out the main issues in Phase One.

**Figure 1.3.1: Issues for the information-gathering phase of the study**



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<sup>5</sup> Since our information-gathering exercise was carried out, Finland has joined Eurocontrol

## Phase Two

1.3.7 The aim of Phase Two was to develop policy proposals for a harmonised structure of terminal ANS charges that improved its economic efficiency, was practical to implement and was as far as possible consistent with the Commission's objectives for transport infrastructure pricing. Inevitably, there have been some tradeoffs between these objectives.

1.3.8 The structure of Phase Two is set out in figure 1.3.2 below.

**Figure 1.3.2: Phase Two - Development of proposals for reform**



1.3.9 As part of Phase Two, we undertook consultation meetings in order to discuss policy options, assess their impact and examine the practicalities of implementing them. Consultation meetings were held with:

- **ANSPs:**
  - LVNL (Netherlands), representing an ANSP located in a congested area of western Europe; also selected because the Netherlands has recently reviewed terminal ANS provision at regional airports; and
  - Luftfartsverket (LFV), representing an ANSP located in a relatively remote region.
- **Government/regulatory authorities:**
  - UK Civil Aviation Authority and Department of Environment, Transport and the Regions, selected because of the unique structure of ANS in the UK;
  - German Transport Ministry, selected because Germany is currently undertaking reform to its charging mechanism for terminal ANS;

- DGAC (CAA France); and
- SLV (CAA Denmark).
- **User groups:**
  - ERA, representing regional airlines;
  - IACA, representing charter airlines; and
  - IATA, representing international airlines.

1.3.10 Section 2 sets out the Commission's objectives for transport infrastructure pricing. We have also taken into account guidance from ICAO, states' international obligations through the Chicago Convention, and principles on charging established by EUROCONTROL, to the extent that these are relevant to terminal ANS. Section 3 sets out the structure of our proposed reform. A key issue in this section is which of the Commission's objectives for transport infrastructure pricing can be implemented at present and what additional requirements would need to be fulfilled before the other proposals can be implemented. Section 4 discusses in detail and quantifies the impact of the reforms to the terminal charging structure that can be implemented at the present time. Section 5 proposes the next steps in the reform process.

## 2 Study objectives

### 2.1 Introduction

2.1.1 This section sets out the principles that were used in analysing the existing systems for terminal ANS charging, and which have been used as the basis for our proposals for a harmonised and more efficient structure of terminal charges to apply throughout the Community.

2.1.2 The proposals in this report are, as far as possible, consistent with the Commission's policy on transport infrastructure pricing, set out in the White Paper on Fair Payment for Infrastructure Use (1998). A key element of this study has been to investigate how applicable these general principles are to terminal ANS, and to understand whether they are acceptable to stakeholders (users, states and ANSPs). Our proposals also need to be consistent with states' international obligations, through ICAO, although we note that ICAO policy in many areas relevant to this study, such as the use of congestion related pricing, is currently under review. This section sets out the broad principles that have been used in analysing terminal ANS and developing our proposals: in sections 3 and 4 below, we discuss how these have been applied.

2.1.3 An optimal system of terminal charges would encourage ANSPs to provide an efficient level of terminal ANS infrastructure, and for users to use services in an efficient way. These principles are summarised in Figure 2.1.1 below.

2.1.4 In order to encourage the efficient **use** of ANS infrastructure, charges should **reflect costs** and therefore be **non-discriminatory**. However, users can only receive clear and consistent signals if there is a clear definition of the services funded through the charges. A procedure for cost attribution is therefore needed which is based on the operational **boundaries between services**; and requires **consistency of application within and between states and across modes**.

2.1.5 The efficient **provision** of terminal ANS infrastructure is harder to incentivise through charging as the majority of providers are, at present, monopolistic and can recover the costs of any inefficiency through a combination of their user charges and funding arrangements with governments.

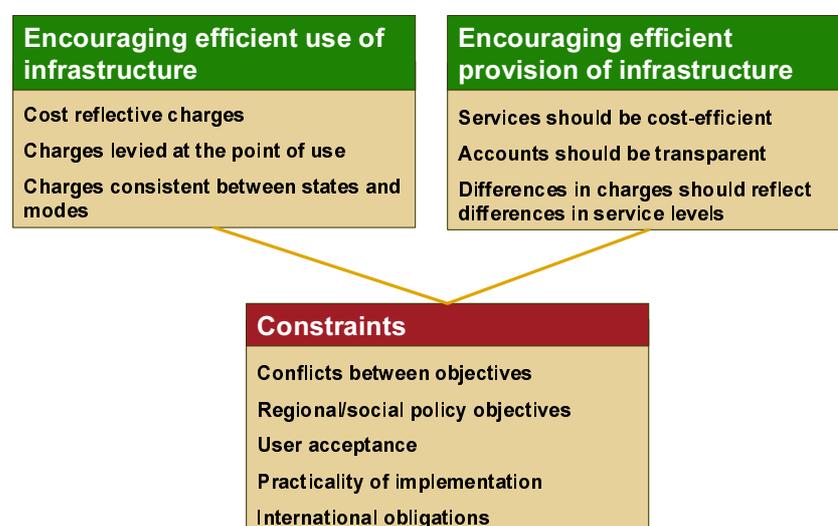
2.1.6 However, there is pressure within the European ATM industry for more effective economic regulation of these monopolistic businesses, and the work of the Performance Review Commission of EUROCONTROL has seen some important first steps being taken in this direction. Government funding of ANS infrastructure will, in any case, unfairly benefit airlines based within the state, as these will be able to offer lower fares than airlines which have hubs in other states. It may also constitute a state aid under article 87 of the Treaty of Rome as well preventing fair competition between airlines. Government funding of ANS prevents fair competition between air transport and other modes.

2.1.7 More transparent accounting procedures would facilitate external scrutiny of ANSP performance, and service level agreements could supplement harmonised charging systems

by incentivising the quality of service provided. Charges can also be structured and administered so that the administrative costs of billing and collection are minimised allowing more cost efficient provision.

2.1.8 There are a number of factors that could constrain these objectives. For example, a measure designed to incentivise efficient user behaviour, such as congestion related pricing, could have perverse effects if it instead incentivised ANSPs to limit capacity. We have also considered the wider economic and social effects of charging proposals, particularly on services to more remote regions. Thirdly, the intention of this study is to produce practical proposals that can be implemented. Practicality is therefore a key constraint, which can conflict with the objective of economic efficiency.

**Figure 2.1.1: Principles for an efficient charging structure**



## 2.2 Encouraging efficient use of infrastructure

### Relationship to costs

2.2.1 A key principle for the Commission, ICAO and EUROCONTROL is that charges should be **non-discriminatory**. Only charges that are related to costs can be non-discriminatory, and charges are therefore discriminatory if either variations in charges do not reflect variation in costs, or variations in costs are not reflected in charges. Uniform charges are therefore discriminatory unless unit costs are also uniform.

2.2.2 It also follows from this that **users should not be exempt from charges**, although this conflicts with both ICAO and EUROCONTROL principles that allow for exemption of certain types of flights. However, ICAO guidance also states that, if flights are exempt, the costs of providing services for these flights should not be passed on to other users, and in any case if doing so would be imposing an unfair additional cost on the other users. We consider in section 4 whether it is feasible to abandon all exemptions, but a key principle should be that the cost of exemptions should not be passed on to other users unless they benefit from the flights concerned being so exempted.

2.2.3 Further issues of discrimination arise if the parameters used in the charge structure do not accurately reflect the true unit cost drivers of total costs. Failure to correctly determine and reflect the en-route and terminal cost bases in the structures of the respective charges for each service can result in a cross-subsidy between the sets of users concerned. For example, allocation of approach costs into the cost base for en-route charges discriminates against users that over-fly the Member States concerned, in favour of those terminating in the Member State (in particular domestic airlines).

### **Marginal versus average costs**

2.2.4 The White Paper establishes the broad principle that the **charges for transport infrastructure use should reflect the marginal social costs of its use**. These charges should reflect the additional operating costs of the infrastructure imposed by the users on the infrastructure providers (in this case ANSPs) directly. In addition, charges should take into account external social costs such as the congestion and pollution imposed by users on other parties (other users, residents and so on). Therefore, the charging structures proposed by the White Paper would be based on the marginal costs associated with infrastructure use, whereas the existing structures of charges are based on the average costs to the ANSP of this use.

2.2.5 Within the context of marginal social cost-based charges, congestion-related pricing should encourage airlines to operate flights at less congested times. This would reduce delays and would therefore benefit all users. However, any form of social cost pricing conflicts with both the EUROCONTROL pricing principles and the pricing guidance established by ICAO, which are based on the principle of 100% financial cost recovery. Nonetheless, we note that these principles are not binding on European terminal ANS providers, and in any case, ICAO's principles in this area are currently under review.

2.2.6 A switch towards a charging structure based on marginal social costs could only take place if it was acceptable to the main stakeholders in the ANS system, including airlines, ANSPs and governments. As a result, we have investigated the acceptability and practicality of marginal social cost pricing.

### **Tariff structure**

2.2.7 In the short to medium term, most costs of ANS provision are fixed: although controllers in some ANSPs work overtime if needed, as explained above, the only significant short run marginal social costs are congestion and pollution. Over the longer term, a higher proportion of ANSPs' financial costs are capacity related: estimates used by the EUROCONTROL Possible Pricing Mechanisms (PPM) task force implied that approximately half of en-route costs were capacity related, but the remaining costs are fixed. The Commission accepts that under these circumstances, either Ramsey pricing (pricing based on ability to pay) or two-part pricing can be used in order to recover fixed costs<sup>6</sup>. Any proposals for two part pricing would need to avoid the use of fixed-rate 'standing' charges, whereby a uniform charge is levied on all users of the ANS system regardless of the number

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<sup>6</sup> High Level Group on Transport Infrastructure Pricing, Final Report on Estimating Transport Costs, paragraph 13

of flights, or type of flights, they operate. These would hinder entry and thus be incompatible with the Commission's wider objective of encouraging greater competition in air transport.

2.2.8 Some pricing based on ability to pay will therefore be necessary. In practice, all ANSPs relate charges to MTOW (maximum takeoff weight), which is a proxy for ability to pay: however, an important issue is to ensure that the relationship between charges and MTOW is a reasonable reflection of users' relative ability to pay charges. ICAO does not specifically recommend use of MTOW as a parameter in setting terminal charges, but accepts that it can be taken into account if it is used in less than direct proportion. ICAO principles state that if MTOW is used in direct proportion, which is the practice in a number of states at present, it will result in the overcharging of large aircraft, and wasteful use of capacity.<sup>7</sup>

2.2.9 A small number of ANSPs argued that there was some relationship between MTOW and costs. If this were true, it would influence the cost-reflective relationship between charges and MTOW. However, there was no agreement about what this relationship was:

- One ANSP suggested that larger aircraft could be considered to impose higher costs, because the spacing (for example in the stack) between these aircraft would be greater; however
- Other ANSPs considered that smaller aircraft imposed higher costs, because they operate at slower speeds to other aircraft and thus providing ANS to these aircraft requires relatively more controller effort. Larger aircraft may also tend to have more advanced equipment installed on board which results in reduced workload for controllers. However, this may be offset by the fact that they could then use more land-based equipment that is not needed by some smaller aircraft.

In practice, we consider that aircraft size only has a significant impact on costs if an aircraft is operated that is of significantly different size or speed to other aircraft using the same aerodrome. This may result in increased spacing requirements in order to avoid turbulence caused by wake vortices. Although, in order to ensure efficient use of an airport, an ANSP may try to order approaching flights in a way that minimises these additional requirements, this is not within the control of the airlines and should not therefore be reflected in charging signals. For the purposes of developing a harmonised and economically efficient charging structure, we have therefore assumed that there is no consistent relationship between MTOW and marginal costs.

### **Boundaries between ANS phases**

2.2.10 A key principle in the White Paper is that **charges should be levied at, or as close as possible to, the point of use**. This implies that the costs of providing approach and aerodrome ANS should be recouped through specific charges, rather than through airports' landing fees or en-route charges. The costs recovered through these charges should be an accurate reflection of at least the avoidable operational costs of their provision, with any

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<sup>7</sup> Document 9161/3, paragraph 5.12 and document 5082/4

common ANSP cost recovered through an equitable allocation between the various services. The maximum revenues raised from charges for any distinct service should be no more than the stand alone costs of delivering that service efficiently in isolation.

2.2.11 ICAO supports these principles, stating that the practice of some airports to include an ANS charge in their landing charge should be approached with caution because it lacks transparency for the users and the appropriate cost-reflective charging parameters for air navigation services charges and landing charges respectively can be different. EUROCONTROL principles do not state how the costs of terminal ANS should be recovered, but emphasise that it should not be through en-route charges.

2.2.12 In principle, the need to levy charges at the point of use implies that there should be **a separate charge for each phase of terminal ANS** (approach, aerodrome and apron control). A separate charge is not in practice necessary if the cost drivers of the phases are similar. However, separation of charges would be required if there were a potential for these services to be provided by different ANSPs.

2.2.13 Although there is a clear consensus that terminal ANS should be separately charged for, and both ICAO and EUROCONTROL state that allocations of costs for charging purposes should be in accordance with operational boundaries, neither provide any guidance on where the boundary between approach and en-route ANS should be. ICAO describes terminal ANS as those parts of controlled flights associated with arrival and departure<sup>8</sup>, but because, ultimately, the whole flight is dependent on arrival and departure this principle does not supply a clear and unambiguous boundary for cost allocation and charging purposes. The ascent/descent phases of flight extend beyond the operational boundaries of approach control: a high proportion of traffic under lower airspace en-route control is ascending or descending. EUROCONTROL exempts the 20km of flight closest to the aerodrome from en-route charges, but in practice, the approach phase of flight extends significantly further than this.

### **Consistency between states and modes**

2.2.14 A key principle of the White Paper is that the structure of charges should be consistent between states, and between modes of transport. Failure to maintain some consistency of charges between states, across airports within the same state, and across modes of transport would give final users confused signals and lead to sub-optimal transport choices and behaviour within the Community.

2.2.15 The single market and the common aviation policy have eliminated much of the impact of national boundaries on air transport within the Union, but air traffic management continues to be organised in accordance with national boundaries. Although the structure and organisation of European airspace is an issue being considered by the Commission independently from this study, the system of charges for air traffic services needs to be consistent with the increased integration of air traffic management. As European transport policy has not been fully integrated up to this point, and no there has been no specific policy

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<sup>8</sup> Chicago Convention, Annex II (Air Traffic Services)

on terminal ANS charges, we would not expect the system of charges to be consistent between states, or between modes of transport, at present.

## **2.3 Encouraging efficient provision of infrastructure**

### **Cost efficiency**

2.3.1 ANS charges comprise, on average, 5.6% of airline costs in Europe<sup>9</sup>. Although this is low in comparison to some other costs, such as crew, maintenance and aircraft ownership, it has increased from 3.8% since 1986, and has led to increased pressure from users for ANSPs to justify their charges. Terminal charges represent approximately one quarter of the total ANS charges levied in Europe.

2.3.2 Historically, users favoured charges based purely on accounting cost-recovery. However, there are significant disparities in efficiency between different ANSPs: it has been estimated that if all ANSPs were able to improve their efficiency to the level of the second best, total route charges could be reduced by 25%.<sup>10</sup>

2.3.3 Although some ANS services may be contestable, in the medium term ANSPs have a monopoly over the provision of most air traffic services. Other than limited opportunities to chose routes for overflights, users usually do not have a choice of ANS provider. The monopolistic nature of provision has typically been driven by safety concerns and the (proper) exploitation of economies of scope and scale by the national providers. Barriers to entry therefore prevent the provision of additional ANSP capacity by new entrants, and pricing cannot easily be used to signal the need for capacity increases.

2.3.4 The fact that most ANS charges are levied on a full cost recovery basis does little to encourage cost efficiency on the part of the ANSPs, as they do not, ultimately, face “hard” budget constraints. The role that can therefore potentially be played by a harmonised system of approach or terminal ANS charges must therefore be seen in this context, but also with an understanding of the potential changes likely to affect the status quo in the industry, as discussed below.

### **Contestable services**

2.3.5 Whilst the majority of air navigation services are monopolistic in the economics of their efficient provision, some services, such as meteorological services (MET), communications, navigation and surveillance and aeronautical information services are not inherently so. The Commission paper on creation of a single European sky advocates the unbundling of contestable services where possible. This report focuses on the system of charges, rather than the method for provision of services. Nevertheless, we have investigated the bundling of these services with air traffic control in order to be able to propose a charging structure that allows the flexibility for any competitive services to be provided separately.

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<sup>9</sup> Communication on the creation of a Single European Sky, paragraph 14

<sup>10</sup> Communication on the creation of a Single European Sky, annex 7

## **Billing and collection**

2.3.6 Whilst many of the institutional and organisational characteristics of ANS do not encourage cost-efficiency, the structure of charges adopted can help to minimise costs by reducing the administrative burden imposed on users by their collection.

2.3.7 The CRCO provides an established and harmonised framework for the billing and collection of en-route charges in Europe. There is no equivalent system for aerodrome or approach control services, although some ANSPs subcontract billing and collection to the CRCO. ICAO acknowledges that there may be advantages in centralised collection, but does not specifically recommend it. Small airlines, in particular, have expressed concern about receiving a proliferation of bills in different formats; however, other airlines have expressed concern that centralised billing could be less efficient without at least the preservation of contestability in service provision. If a harmonised policy for billing and collection is developed, the key principle should be minimising administration costs and the burden on users.

## **Transparent accounting**

2.3.8 Transparent and consistent accounts would enable users to scrutinise ANSP accounts more effectively and hence exert customer pressure on those ANSPs thought to be inefficient. ICAO guidelines stress the importance of good accounting procedures: costs attributable to ANS should be transparent and have been accurately and properly determined<sup>11</sup>; full management accounts should be produced, and where possible, costs should be broken down to the level of airports and air traffic control centres (ACCs). This study was hampered by a lack of transparent financial information from ANSPs.

2.3.9 The EUROCONTROL principles include accounting principles for en-route services, but these do not include any suggestion of independent auditing or dis-aggregated management accounting, and it is not within the CRCO's remit to audit cost base submissions or to enforce compliance with their principles.

## **Variation in service levels**

2.3.10 At present, ANSPs tend to seek to provide a uniform service to all operators for a uniform charge. Variations in charges would allow both the incentivisation of users (for example, to install certain types of equipment that improved ANS capacity) and ANSPs (for example, through service level agreements). In principle, the Commission supports variation in charges for different levels of service.

2.3.11 Commission policy states that as well as rewarding users for efficient behaviour, service providers should be allowed to make a profit 'when the quality of their services is above average'<sup>12</sup>. Both ICAO and CRCO principles acknowledge that ANSPs may make a

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<sup>11</sup> Manual on Air Navigation Services Economics (ICAO document 9161/3) sections 2 and 3

<sup>12</sup> Communication on the creation of a Single European sky, paragraph 21

profit under some circumstances and hence do not directly conflict with this assertion<sup>13</sup>. Although the financial and organisational structure of ANSPs is outside the scope of this study, our proposals are intended to be consistent with greater commercialisation of ANSPs, when and where this is undertaken.

## **2.4 Factors constraining an efficient charging structure**

2.4.1 There are some conflicts between the objectives of incentivising efficient use and efficient service provision, which should also be taken into account when developing a harmonised charging structure.

2.4.2 Pricing including external costs would encourage efficient service provision in a perfectly competitive world where there were no barriers to entry in provision, and a user was free to choose between suppliers, through new entrants or the threat of them. In practice, since ANS tends to be supplied by a government-owned monopoly, there is neither the incentive, nor in most cases the ability, for the providers to seek to maximise profit. Even where ANSPs are commercialised, while there may be competition in order to provide a service, there is never competition between service providers on a day-to-day basis, at least in relation to the provision of air traffic control services. In the absence of an adequate system of economic regulation, the introduction of congestion charging could make the situation worse by incentivising the ANSP to limit capacity.

2.4.3 Some states have taken into account **regional and social policy** objectives while setting charges. This is in principle consistent with the ICAO guidance, which states that charges should have regard to ‘the goal of promoting the sound development of international civil aviation as a whole’<sup>14</sup>. The Commission also acknowledges that cost related charges may create specific problems for remote or cohesion regions, which may require changes to charges to be delayed in these regions, or specific impact amelioration policies to be developed. There may also be a conflict between the need for a charging structure to be cost-reflective and the need to minimise congestion costs. For example, *average* costs tend to be higher at secondary airports, but discouraging these airports’ use by seeking to ensure only these airports’ users pay for their services could lead to greater traffic levels at major airports where *marginal* costs tend to be higher.

2.4.4 Proposals for harmonising structures of charges should also take into account the practicality of their implementation. Factors which should be taken into account<sup>15</sup> include the impact of the proposed charging system on revenue, distribution of income, competition, economic growth and employment; transparency and simplicity; the practicality of compliance and enforcement and minimisation of administration costs. The proposed system of charges needs to be justifiable to relevant stakeholders, including airlines, airports and passengers.

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<sup>13</sup> ICAO guidelines allow ANSPs to make a risk adjusted return on equity, whilst CRCO guidelines state that in a regulated environment, the ‘regulator should take into account market returns of business facing equivalent risk’.

<sup>14</sup> ICAO Doc. 9082/5, paragraph 37.

<sup>15</sup> See report of the Higher Level Group on charging users directly for transport infrastructure costs

## **2.5 How compliant is the current system with the Commission's objectives?**

2.5.1 In the first phase of the study, we undertook a detailed information gathering exercise, to determine the existing structure of terminal charges in the Community. All ANSPs, other than Nav EP, the Portuguese ANSP, participated in this exercise, although the participation of DFS, the German ANSP, was delayed beyond the intended time for Phase One. This exercise demonstrated that the existing structure of terminal ANS charges in the EU fell some way short of the Commission's objectives in several respects. However, we found that most ANSPs were unable to provide the detailed financial information we requested. We are therefore unable to quantify precisely the financial impact of the various deviations from the charging principles that we have highlighted. In section 4 below, we have made some indicative estimates of the financial impact on various users of reforming the terminal ANS charging structure to be more cost-reflective; these estimates are based on limited data from a small sample of states.

2.5.2 The current structure of charges generally does not reflect the operational structure of terminal ANS. In a few states, there are no terminal charges ANS at all: the costs of terminal ANS are meant to be recovered through landing and other charges, but it is not always clear what proportion of these charges are intended for which service. In many states, large proportions of the costs of terminal ANS are recovered through en-route charges. This results in an unfair cross-subsidies from overflights towards aircraft taking off and landing, which in turn results in a cross-subsidy from long-haul flights to short-haul and regional flights.

2.5.3 Terminal ANS charges often include the recovery of costs of services other than traffic control, such as MET and AIS services, which are not necessarily monopolistic and which should, therefore, be charged for separately. The division of these costs between en-route, terminal and other services is in many cases not transparent, and as a result users have complained that, in particular, the terminal charges are a 'black hole' the underlying costs of which they cannot monitor effectively.

2.5.4 The observed variations in charges that do exist tend not to reflect variations in costs, and some variations in costs are not reflected in charges. This results in discrimination between users. Most states, for example, apply uniform charges at all their airports, but average per-flight costs vary substantially between airports, and tend to be lower at larger airports. As a result, regional airports are subsidised by users of major airports.

2.5.5 In all states, charges are related to MTOW. As discussed above, a consistent function of MTOW can be a good proxy for users' relative ability to pay terminal ANS charges, but there is no relationship between MTOW and average or marginal costs. Indeed, in the majority of states, the relationship between charges and MTOW even exceeds that which could be justified on the basis of ability to pay. Such structures result in a cross-subsidy from large to small aircraft.

2.5.6 A small number of states offer volume discounts on the charges that recover the costs of terminal ANS. Volume discounts inevitably benefit primarily airlines based within the state, without corresponding cost justification, and are thus clearly discriminatory. One

state explicitly discounts domestic flights relative to international flights, but we were informed that this discount was to be phased out.

2.5.7 Some states exempt a number of users from charges, and in many cases pass the costs of these exemptions on to non-exempt users (principally, commercial flights). There is no economic justification for commercial users subsidising military or government flights. The case for exemption of some other categories of flight, such as training, is unclear.

2.5.8 Table 2.5.1 below summarises our interpretation of the Commission’s objectives for terminal ANS charging, and compares the current structure with this. It can be seen that the current structures fall well short of the Commission’s objectives. Our proposals, set out in sections 3-5 below, seek to address these shortfalls.

**Table 2.5.1: How compliant is the current charging structure with the Commission’s objectives?**

Commission principle		Current charges system
Encouraging cost-efficient use of ANS infrastructure	Flights should not be exempt from charges	✘
	No direct discrimination on the basis of nationality	✓
	Charges should be related to the costs at each airport	✘
	Charges may include a fixed element to reflect fixed costs	✘
	Any relationship to MTOW should not exceed that which reflects ability to pay	●
	Charges should reflect external costs (congestion, pollution etc)	✘
	Charges should be levied at the point of use – implies separate ANS charges with boundaries for cost allocation that reflect operational reality	✘
	Consistency between states and modes	✘
Encouraging efficient provision of ANS infrastructure	Contestable services should be provided competitively	✘
	Centralised billing and collection	✘
	Transparent, disaggregated, accounts	✘
	Variation in service levels reflected by variation in charges	✘
	Efficient ANSPs may make a profit	✘

Key:

✓ - current system of charges complies with principles in most or all states; ● - current system of charges compliant in a significant number of states; ✘ - current system of charges fails to comply with principle in most or all states

## 3 Outline of proposed reform

### 3.1 Introduction

3.1.1 The objective of this study is to propose a harmonised structure for terminal charges that is economically efficient, acceptable as far as possible to users and other stakeholders, and compliant with both the Commission's objectives for transport infrastructure pricing and Member States existing international obligations through ICAO and EUROCONTROL.

3.1.2 The Commission's policy for transport infrastructure pricing is that charging structures, for all transport types, should be based on the short run **marginal** rather than **average** costs of use. As explained in section 2 above, the application of this principle in ANS would result in charging structure based primarily on congestion and pollution costs. However, we found that there were two key problems with the implementation of such a system at present in terminal ANS:

- Most of the data that would be required in order to calculate marginal costs are not available; and
- Congestion-related pricing is strongly opposed by airlines, as well as the majority of EU governments and ANSPs.

These issues are discussed in more detail below.

3.1.3 Section 2.5 above explained that there were substantial discrepancies between the Commission's objectives and the current charging structure. The current charging structures vary widely across the Community, are not cost-reflective and result in unfair discrimination between users. We have therefore agreed with the Commission that our proposals will be based around a two-stage process of reform:

- In the first stage of reform, a **harmonised** and **non-discriminatory** charging structure should be applied throughout the Community; and
- Meanwhile, the Commission and other relevant bodies should work to improve the quality and range of data available that would permit estimates of the relevant **marginal social costs** to be derived. After some time (probably at least three to five years), the charging structure should be reviewed again with a view to implementing structures which explicitly sought to reflect the differential marginal social costs concerned.

3.1.4 Our medium-term objective for reform of the European ANS charging structure would therefore be a system based on the marginal social costs of ANS use. However, in the short term, charges would seek at least to reflect more clearly the average costs of ANS use, so that users of ANS services, collectively, paid for them, with charges differentiated primarily on users' relative ability to pay them.

3.1.5 To some extent, this intermediate step would represent a continuation of the **principles** inherent within existing charging structures. However, in practice, many charges do not even reflect these principles, as the total revenues from charges do not recover the costs of the services concerned. In many parts of the Community, the charging structure encourages inefficient patterns of ANS use by, on average, undercharging some flights and overcharging others when an efficient (marginal cost based) structure would not imply such differentiation.

3.1.6 We therefore expect that implementation of our more limited proposals for the first stage of reform to the charging structure will result in changes to traffic patterns which may achieve some of the objectives of marginal cost pricing. In this sense, a virtue can be made of necessity in implementing the move to full marginal cost-based charging in two steps. Many of the reforms we propose for stage one are also necessary preconditions for the implementation of stage two, because in order to develop an efficient system of marginal cost related charges, the basic charging structure would need to be related to costs. This section discusses the objectives for stage two and sets out the data that will be required in order to proceed with this. It also discusses the key issues that will be involved in gaining consent from stakeholders for the programme of data collection and analysis that would be required.

## **3.2 Marginal social cost pricing**

### **3.2.1 Outline**

3.2.1.1 A charging structure based on marginal costs could be based on either short run or long run marginal costs:

- **Short run marginal cost pricing (SRMC)** would be based on the short-run costs of infrastructure use. This would include any direct financial marginal costs imposed by users on ANSPs, although we found that these tend to be low in the short run. SRMC pricing should also however include social marginal costs, such as congestion or pollution. This would be consistent with the Commission's objectives for transport infrastructure pricing. SRMC based prices should incentivise airlines to operate flights at less congested times and to less congested airports, and thus minimise the impact of their operations on other users. It would also encourage them to minimise any adverse impact on the environment. Each flight would only make use of the terminal ANS services concerned if the user was willing to pay the additional social costs it imposed;
- **Long run marginal cost pricing (LRMC)** would normally be based on the ANSPs' long-run costs of expanding transport infrastructure, reflecting the principle that the costs of expansion should be paid for by those users who require additional infrastructure to be provided. With an efficient investment programme, ANSPs should ensure that capacity was expanded to the point where further increases cost the same, at the margin, as the social costs imposed by users in using existing capacity: society would be indifferent to further capacity expansion. In practice, the efficient costs of capacity expansion can become very high and/or lumpy, in which case the LRMC will become the marginal social

costs, including opportunity costs, of rationing the use of existing capacity, and ANSPs will have no efficient capacity expansion plans.

3.2.1.2 Where efficient capacity expansion remains feasible, the marginal costs implied by both SRMC (if social marginal costs were included) and LRMC should, broadly, converge over time and a pricing which reflected either would result in a system of peak-related pricing at congested airports:

- A system of SRMC pricing would directly relate charges to the costs of congestion. This would be based on the direct costs of congestion to other users, the value of time for the passengers that are delayed, and the total amount of delay directly caused by congestion in each approach and aerodrome control sector;
- The link between congestion and charges under a system of LRMC would be less explicit, as charges would not be directly based on congestion costs, but rather the investment costs of addressing the capacity constraints that caused congestion. However, higher charges would be levied for users operating flights at congested times in order to cover the costs of expansions to infrastructure required in order to provide ANS capacity for these flights. Users operating during periods where additional capacity was not required (such as in the middle of the day or late at night) would not be expected to pay for these costs.

3.2.1.3 The Commission supports in principle the use of short run marginal social cost pricing<sup>16</sup> for transport infrastructure. However, both short and long run marginal cost pricing should ultimately achieve similar objectives: an efficient level of capacity and delay. We have therefore investigated the practical requirements for implementing both short and long run marginal cost pricing. A decision as to which of these charging mechanisms to implement may ultimately be dependent on the availability of appropriate data, and the particular drivers of marginal social costs in particular parts of the Community.

3.2.1.4 As explained above and set out in detail in sections 3.2.2 and 3.2.3 below, we believe that the full introduction of a charging system based on marginal costs would neither be practical nor acceptable to many stakeholders at the present time. We propose that the Commission should therefore review the potential for further reform of the charging to move towards the introduction of charges which reflected marginal social cost differentials, after a defined period. It will take at least three to five years for the proposals we have made for the first stage of reform to take effect and for airlines to make adjustments to their operating behaviour that reflect this. We have therefore proposed that this review, leading to a second stage of reform, should take place after three to five years.

3.2.1.5 This report therefore does not propose in detail what shape the second stage of reform should take, although it is important to understand, in broad terms, the directions in which charges would move as a result. This will ensure that the first, intermediate, stage of charging reform provides users with charging signals that are consistent with the longer-term direction of likely change. Decisions about whether to base the charging structure on long or short run marginal costs should then only be taken when the key issue of data

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<sup>16</sup> White paper on Fair Payment for Infrastructure Use, 1998

availability has been resolved by each ANSP given the particular delay and investment circumstances they face: this is discussed in more detail below. At present, it appears that it would be difficult to undertake fully accurate assessments of the short run social marginal costs of each flight across the Community. However, we believe that assessments of the average incremental costs of capacity expansion – to provide broad indicators of the corresponding long run marginal costs – should be possible. No such assessments have taken place as yet because there has been no regulatory or commercial requirement for ANSPs to undertake them.

3.2.1.6 In the long-term, charges based on long run and short run marginal costs will typically have similar effects: delays would fall to an efficient equilibrium level.

3.2.1.7 Nonetheless, at some airports, the costs of expanding capacity are prohibitive within the planning timescales of airlines and most ANSPs. For example, at London Heathrow airport, runway capacity is in effect fixed in the long term. Expanding terminal ANS capacity will therefore be linked to this constraint and could therefore require a reduction in aircraft separation: this would require very large investment in new ANS systems if it were to be achieved without a deterioration in either safety or delay. Investment lead times are such that, even if this were possible, capacity would not actually be expanded for some years. Therefore, at Heathrow airport, efficient pricing would imply reflecting short-run marginal social costs, in order to encourage the optimal use of the existing capacity.

3.2.1.8 At other airports, short and medium term capacity expansion is possible and therefore it should be also be possible to reach an equilibrium where capacity and delay are both at efficient levels. As a result, it is likely that different means of assessing marginal costs will be appropriate at different airports and therefore in some places a system based on short run marginal costs should be used but in other airports long run marginal cost pricing will be relevant.

## **3.2.2 Data requirements**

### **Short run marginal social cost pricing**

3.2.2.1 Since Europe's skies are currently saturated in many areas with existing levels of ANS capacity provision, the most significant short run marginal cost of a flight is its impact on the congestion in the system and hence on the delays on other users of the system.

3.2.2.2 EUROCONTROL's Central Flow Management Unit (CFMU) calculates delays by sector, but it does not distinguish delays caused by terminal ANS from delays caused by airport constraints. Therefore, for most of Europe, there are no reliable estimates currently available for the levels of average, let alone marginal, delay caused by terminal ANS. Although some ANSPs have attempted to quantify delay caused by terminal ANS, there has been no obligation on them to do so, and the majority of ANSPs have not. Without data for the marginal delays caused by users of terminal ANS, it would not be possible to develop a charging structure based on the corresponding short run marginal costs. Most ANSPs argued that terminal ANS is not itself a significant cause of delay: they considered that delays are usually caused by airport constraints and by en-route ANS. Some ANSPs disputed the

allocation of delay to their en-route sectors by the CFMU, and argued that a greater proportion of delay should be attributed to other en-route sectors, airline behaviour, airport constraints and poor weather. However, as discussed below, even if no delay can be directly attributed to terminal ANS by the measurement systems at present, this does not necessarily imply that there is no shortage of capacity in terminal sectors.

3.2.2.3 If data were to become available for the delays caused by terminal ANS, two further issues would have to be resolved before a system of charges related to the costs of marginal delays could be developed:

- it would be necessary to quantify delays that are ‘masked’ by delays elsewhere; and
- a quantification of marginal, relative to average, delays would be required.

3.2.2.4 At present, the delay suffered by each flight is attributed to the sector transited that causes the greatest delay. This sector is deemed the ‘most penalising’ sector, and the total delay for the flight is determined by this sector alone. No delay is allocated to the other sectors transited by the aircraft, even though these sectors might cause some delay which would be visible were the aircraft not transiting a more congested sector. Although this methodology can be an accurate means of assessing where marginal delays are currently caused, it means that delay is not an adequate proxy for planning ANS capacity in the longer term, as delays in each sector can be ‘masked’ by delays in other sectors.

3.2.2.5 The effects of this are illustrated when capacity in one sector is expanded: for example, when Greece introduced full radar coverage in 1999, there was a substantial reduction in delays in Greece, but delays increased elsewhere. ANS charges that incentivised efficient use of capacity in sectors that appear to be congested in any one period of observation would not result in the stable efficient use of the overall system, because some capacity shortages are not currently visible due to variations in the level of capacity underprovision.

3.2.2.6 Total unmasked delay is the best indicator of longer term capacity requirements and any system of short-run marginal social cost pricing should use this rather than visible, masked delay in an unbalanced system. However, we have been advised that it would be difficult to undertake an accurate assessment of unmasked delay at present.

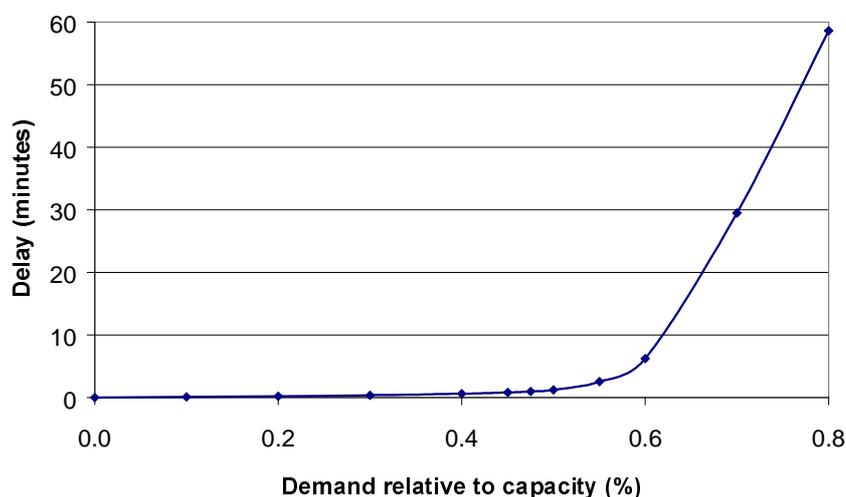
3.2.2.7 Nonetheless, it would be possible to undertake simulations to assess the total levels of delay. For example, simulations we have conducted using the PAMELA model for EUROCONTROL indicated that at the system level, unmasked delay was approximately three times the level of masked delay. For some centres, the congestion that would emerge if other constraints were removed could be almost completely masked by these other delays in adjacent centres. For example, although Geneva was estimated as highly congested, most of the flights through Geneva ACC also used Milan, Marseilles, Reims or Paris ACCs, all of which had worse delays: therefore most delays in Geneva were masked. However, capacity expansion in these ACCs would lead to a dramatic worsening of delays in Geneva.

3.2.2.8 A similar effect could apply between en-route and terminal ANS, and therefore even if delays appear to be caused by en-route control or airports, expansion of capacity in

these areas could reveal capacity shortages in terminal ANS. For example, in 1998 when Oslo Gardermoen airport opened, a significant airport constraint was alleviated, but the capacity of terminal control was not correspondingly expanded. As a result of this, and an increase in traffic, delays worsened despite what would have been expected to be an increase in capacity.

3.2.2.9 An efficient system of charges that was based on marginal social costs would not use the **average** levels of delay within a sector: it should be based on the **marginal** additional delay caused by an additional flight. It is unlikely to be possible to calculate this exactly, but again, it could be estimated through simulations. Figure 3.2.2.1 below plots a simulated relationship, also undertaken as part of the development of the PAMELA model, between demand, capacity and delay using data for Marseilles ACC. This demonstrates that when traffic is low, additional flights do not cause significant additional delays. However, as traffic increases, delays rise substantially.

**Figure 3.2.2.1: Relationship between demand, capacity and delay**



3.2.2.10 Different patterns of demand mean that the results of this simulation cannot necessarily be used for other centres or for terminal ANS. Although we would expect the broad nature of this relationship to be similar, we would expect some variation, which would be dependent on different patterns of demand at different airports. In principle, it should be possible to undertake a simulation such as this for each congested airport, and some ANSPs have already conducted simulations of the relationship between traffic and average delay at their airports. Nonetheless, we would expect this to be a major undertaking, and the calculation would have to be revised every time there were sustained changes in traffic volumes or capacity. In addition, although these simulations could be expected to produce a reasonable estimate of delay, any significant variation between simulated and actual delay would worsen the difficulties associated with gaining user acceptance for charging structures which included differentials based on these simulations.

3.2.2.11 A system of short run marginal cost pricing should also take into account the fact that the airlines operating flights in congested airspace suffer costs themselves due to the

delays they cause. Any charge differentials based on marginal delays would therefore have to reflect this.

3.2.2.12 Other than congestion, the main short run marginal costs of ANS use are environmental: the additional pollution and noise created by additional flights. A system of charges for ANS which sought to reflect these social costs would need them to be estimated. The estimation of environmental costs is regularly undertaken for road and rail schemes, although no such social cost analysis has been conducted as yet specifically for terminal ANS. In principle, it should be possible to calculate an estimate of these costs, to be applied as an overlay to the structure of the more dominant marginal delays costs, although the results would necessarily be somewhat broad and subjective.

### **Long run marginal cost pricing**

3.2.2.13 As we indicated above, estimates of long run marginal or incremental costs can provide indications of the equivalent levels of short-run marginal social costs at efficient levels of capacity. However, it is typically much harder to distinguish the relative marginal costs imposed by different types of user at different times, as most terminal ANS investment planning is based on broader and longer-term projections of incremental demand.

3.2.2.14 In Phase One of this study, we asked ANSPs what expansions to terminal ANS capacity were planned, and what these investments would cost. The intention was to see how practical it might be to quantify a relationship between investment spending and enhanced capacity for charging purposes. Unfortunately, no ANSP was able to provide the information requested in the timescales available. In most cases, the reasons given for this were that ANSPs did not know exactly what capacity improvement would result from a given investment, or that their investment proposals had not been categorised as being specifically related to aerodrome, approach or en-route control.

3.2.2.15 Our experience in other regulated sectors implies that quantifying this relationship is indeed difficult, even in more commercially-driven industries where more data is available than ATM, such as the privatised network operators<sup>17</sup>. However, most industries attempt to quantify the benefits of investment in advance of committing to expenditures, and examine the sensitivity of plans to variations in demand. Regulators have required the production of long run marginal and incremental cost models for charging purposes. We therefore do not believe that there is any reason why it should not be possible for ANSPs to do so in the long term. Where ANSPs offer terminal services on a contestable basis, this already happens: for example, if NATS proposes to invest in additional capacity at Manchester airport, it has to justify the costs and benefits of this to the airport management.

3.2.2.16 The lack of appropriate cost data presently available in the industry means that it would be difficult to construct LRMC-based prices that were effective, economically-efficient signals for ANS capacity provision and use in the short term. However, in the medium term, we would expect that ANSPs will come under greater pressure from airlines,

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<sup>17</sup> The UK water regulator has been unable to obtain consistent LRMC estimates for the different aspects of the water business due to problems disentangling the costs associated with the different parts of the business, differing methodologies applied by each water company, and errors of exclusion. (Ofwat MD 159, February 2000)

airports and governments to justify their investment plans – and in particular where they were investing to alleviate delays, and at what cost. Commercialised ANSPs, and ANSPs that provide services on a contestable basis, are likely to need to be able to quantify the relationship between individual items of investment spending and enhanced capacity. We would therefore expect that the introduction of a system of LRMC-based prices should become easier in the future, although it would require a significant amount of work to quantify a general and robust relationships between investment and capacity.

### **3.2.3 Stakeholders' views**

3.2.3.1 In Phase One of this study, we undertook consultation meetings with a number of organisations representing different users of European terminal ANS. Although these organisations expressed a range of opinions on many issues, reflecting the different economic interests of their members, all user groups were united in opposition to any kind of congestion related pricing. Although user organisations are not always successful in achieving their goals through the existing consultation procedures, we believe that it would be difficult to introduce congestion pricing in the face of opposition from both international user groups at the inter-state level and national airlines within Member States. This is particularly the case since most Member States and ANSPs are also themselves opposed to congestion-related pricing at the present time.

3.2.3.2 User opposition to peak related pricing stems both from a belief that it is impractical and from scepticism about both the impact on patterns of demand that peak pricing will have and the use of revenue from any peak “surcharges”.

3.2.3.3 In our view, only the first of these concerns is well-founded, which is why we have proposed that a co-ordinated programme of data collection in all members states should be the critical underpinning of any move towards fully marginal cost-based charges.

3.2.3.4 Regarding the potential for charge structure reforms to influence patterns of demand, users have expressed mixed opinions about whether peak-related prices would have any impact on behaviour. Most airlines will continue to operate flights at peak times because high-yield business passengers wish to travel at these times. Operational restrictions will also limit airlines' abilities to adapt flight times to less congested periods. However, some low-cost and charter airlines may operate flights at less congested times if peak pricing is introduced.

3.2.3.5 We therefore believe that users' assertions that peak charges would be ineffectual remain untested in the liberalised and over-congested environment in which they now operate: in reality, significant changes to the structures of ANS charges are likely to affect user behaviour at the margin. As the results for Marseilles ACC indicated above, relatively small changes in total demand, combined with additions to capacity, can result in significant changes in delay levels, and hence improve the allocation of resources in the Community. The excessive delays in the system at present create a compelling case for more charge structures that incentivise the more rational use of scarce resources.

3.2.3.6 Finally, a system of marginal-cost based charge structure differentials would operate within the constraints of financial cost recovery that most owners and regulators of

ANSPs are likely to continue to require in future. Eurocontrol does allow use of a price-cap mechanism, which leaves room for ANSPs to make a profit. At present, all states except the UK plan to continue to base ANS charges on financial cost-recovery, while the new regulatory regime in the UK is designed to ensure that an efficient ANSP is able fully to finance its activities. In many sectors, the long run marginal costs of capacity provision will continue to lie below the corresponding average costs (as indicated, on average for en-route services by the PPM). In these cases, the financial constraints on ANSPs will typically require efficient charge structures to retain an ability to pay component to recover ANSPs' residual fixed costs: there will be no "revenue surplus" from peak charges, just a reduction in the weight-based elements of charge.

3.2.3.7 In some congested sectors, there may be decreasing returns to scale as they become saturated, and in the extreme cases, charges that reflected short-run marginal social costs (including opportunity costs) would exceed an ANSP's financial revenue requirement based on the average costs concerned. In these cases, the "revenue surplus" from peak charges would, in the first instance, be used to reduce the revenue collected from the weight-related components of charges for other parts of the ANSP's total regulated terminal ANS service. In the limit, with no weight-based elements of charges to reduce, the ANSP would need to reduce the marginal cost-based charge elements to remain within a total revenue "cap", but this would only be a long term scenario for most ANSPs in the Community.

3.2.3.8 Opposition from states and ANSPs to congestion related pricing focussed on issues around the practicality of implementation of such a system. Issues that were raised included:

- There is no detailed information available on users' price elasticities of demand: without this, it is not possible to estimate the impact of any peak surcharges on demand;
- There was a concern that any system based on short run marginal social costs would be excessively complicated to calculate and would not be understood by users;
- Terminal ANS congestion is not always responsible for delays: for example, in the Netherlands, most delays are caused by government-imposed noise restrictions at Schiphol airport;
- In more remote regions where there are few delays, it is unlikely that a system of congestion-related prices would recover all fixed costs and therefore some Ramsey (weight related) pricing components would need to be retained. In contrast, in other regions where there were significant delays, charging based on congestion costs may over-recover total costs.

3.2.3.9 As discussed above, we believe that the introduction of peak components to charges should not be deferred simply because of imperfect knowledge of users' demand elasticities. This is a valid reason for introducing charge structure changes to the market gradually and progressively (as is typically undertaken by users themselves) – it is not a valid reason for complete inaction. Similarly the practical difficulties we have described in estimating the

relevant marginal costs should not be confused with the issue of how complex or simple a charging structure should be. Complex underlying marginal costs can be represented in simple tariff structures – while simplifications of marginal costs imply a loss in accuracy, they are by definition likely to be more efficient than the status quo where relative marginal costs are not signalled at all. Furthermore, no new tariff structure for terminal ANS charges is likely to be as complex as the structures the users impose on their passengers and shippers. Finally, the existence of binding constraints elsewhere in aviation infrastructure provision within the Community should not be a basis for inactivity in terminal ANS; rather it should be the stimulus for concerted policy action across a number of fronts. The Commission's initiatives in respect of slot constraints and the single skies should be viewed in this context.

3.2.3.10 Although states and ANSPs do not generally favour the introduction of marginal social cost pricing at present, this issue is under discussion in some states, and we do not find states' reasons for caution in the longer term to be any more persuasive than those of users. For example, Sweden and Finland are currently undertaking a joint study of the applicability of marginal cost pricing for ANS. Given this, we consider that it may be possible to gain acceptance for the introduction of social marginal cost pricing from some states and ANSPs in the future. However, a clear demonstration will need to be made of the benefits of such a reform, which can only be made once estimates of the underlying marginal costs concerned (and hence the charge structure changes that would eventuate) are available to stakeholders.

#### **3.2.4 Potential future structure of charges**

3.2.4.1 In order to assess the extent to which any interim reform of terminal ANS charge structures would conflict or be consistent with the longer term direction of reform indicated by Commission policy, it is necessary to be clear over the broad components of longer term structures. In the final part of this chapter, we therefore briefly sketch out the main dimensions of a charge structure that reflected short-run marginal social costs (using proxies estimated from analyses of long run marginal or incremental costs where appropriate).

3.2.4.2 In relatively congested airspace, we would expect the average level of terminal ANS charges typically to be higher than under the existing or any interim structures based on average costs. However, in these areas, a significant portion (probably above 50%, and in some cases up to 100%) of the total charge would not be weight-related at peak times. At these times, therefore, operators of aircraft of greater than average weight would see increases in their delay-related charges, offset by reductions in their weight-related components, relative to charges based on average costs and ability to pay. The net impact would depend on whether short-run marginal costs were above total average costs for the service concerned. Users with smaller than average aircraft would see increases in charges at these times.

3.2.4.3 In uncongested airspace (places and times), with low levels of marginal costs, there would be a continuing need to recover revenue from users in charges to make contributions to ANSPs' residual fixed cost recovery requirements, relative to their ability to pay. However, the introduction of marginal cost-based charges for congested airspace would typically be expected to reduce the average charges paid by users of uncongested airspace.

In addition, because the weight based components of charges would still be relatively large, these reductions would be particularly felt by operators of relatively small aircraft at these places and times.

3.2.4.4 In addition, the users of an integrated terminal ANS service should collectively pay for the directly avoidable costs of that service (at a specific TMA, or aerodrome) and should not be cross-subsidised by users of separate services (such as en route services or other aerodrome control services). This is because, in the long term, these avoidable costs are imposed by the users of the services concerned and signal the costs that would be saved if traffic did not need to use the aerodromes concerned.

3.2.4.5 Only if the provision of capacity at these aerodromes was sufficiently “lumpy” that the present value of these average avoidable costs was much lower than the corresponding short-run marginal costs would such a principle lead to potentially inefficient charge structures if left in place beyond an interim period. For example, at some smaller aerodromes the financial costs of capacity provided in a manned control tower could be of the nature of “all or nothing”, with no scope to reduce fixed costs with reduced demand. However, a significant increase in capacity could still be uneconomic (requiring, say, a new tower and equipment not justified by the expected increase in demand). In such cases, the marginal social costs of congestion could remain significantly above the average avoidable costs of capacity provision for a sustained period, but below the corresponding average incremental costs – charges which reflected the avoidable or incremental costs of capacity provision would remain inefficient.

3.2.4.6 In such cases, the ANSP’s total revenue requirements should be determined by the prevailing structure of economic regulation of the service. For example, while en route and airport services continue to be separately regulated, terminal ANS charges will need to recover the total financial costs of terminal ANS provision. Similarly, where aerodrome control was separately contestable, the revenue recovery requirement for individually aerodrome control services should be separately determined, and be not lower than the directly avoidable costs concerned. However, in cases where there was long term excess capacity in terminal ANS in some locations, the recovery of avoidable costs at these locations could lead to average charge levels **above** efficient marginal social costs. It is in this area that caution should be used in implementing average cost-based interim charge structures, to which we turn in the next section. If the converse applied (short run marginal costs well above the average avoidable costs), interim proposals based on the latter would, in effect, be a step towards a more efficient charge structure.

3.2.4.7 With this caveat, charges which recover, in total, the costs of terminal ANS provision, which collectively recover the directly avoidable costs of specific services, and which vary by no more than users’ relative ability to pay charges, are likely to represent appropriate interim steps toward the implementation of marginal cost-based differentials in the longer term. We have borne these considerations in mind in developing our Stage One proposals for reform, as set out in section 4.

## 4 Detailed proposals for reform

### 4.1 Introduction and summary

4.1.1 Our Phase 1 report highlighted a number of problems with the current systems of charging for terminal ANS in the EU, that were summarised in section 2.5 above. This section explains our proposals for undertaking an initial reform of the structure of terminal ANS charges.

4.1.2 A key aim in developing these proposals has been to ensure they are immediately practical – that is, that they could be implemented within the Community as soon as any necessary administrative, consultative and legislative processes are completed. However, we have highlighted several areas where even these initial proposals could be controversial. There may, in practice, be a trade-off between the aims of improving the efficiency of the charging system on the one hand, with the correct attribution of costs and improved incentives for the efficient use and provision of infrastructure, and with gaining the acceptance of stakeholders on the other. We believe that it is unlikely that substantial reforms could take place rapidly without the support of at least some of the stakeholders in the ANS system: airlines and other users, Member States and ANSPs.

4.1.3 Our Stage 1 proposals are designed to develop a system of charging that allocates costs in a fair way amongst users, and in particular would **ensure that users did not pay for the directly attributable costs of terminal ANS facilities and services they did not use**. This “user pays” principle is a central theme of wider Community charging policy.

4.1.4 Section 3 above set out the potential options for the longer-term (Stage 2) structure of terminal ANS charges, while highlighting that, in the short term, the introduction of full marginal cost pricing in terminal ANS would be both impractical, and unacceptable to users. Section 3 also explained that, in the medium term, the introduction of marginal cost pricing may become more practical. In the meantime, our initial (Stage 1) proposals would result in Member States being allowed to continue with charging systems that were based on the full recovery of costs by users (average costs), rather than being explicitly based on estimates of the marginal costs of ANS use. Nonetheless our Stage 1 proposals are intended to be consistent with a subsequent Community requirement for the relevant charges to be more explicitly reflective of marginal costs. Indeed, the implementation of many of the Stage 1 proposals would be a necessary **precondition** for the introduction of Stage 2 refinements.

4.1.5 Our Stage 1 proposals can be summarised as:

- Each aerodrome should have a **specific terminal ANS charge, set to recover aerodrome and approach ANS costs**. Where there is no separate approach control service at the aerodrome, or the services are provided by a single integrated ANSP without a Member State requirement for either service to be contestable, a single terminal charge could be used, otherwise separate elements of the charge corresponding to the approach and aerodrome services would be required to be identified to users;

- The current distinction between en route and approach services should remain for charging purposes. However, **separate en-route charging rates should be introduced for upper and lower airspace**, in order to reflect the different costs and cost drivers associated with the use of the respective ANSP resources concerned, and to reflect the trend towards organisational separation in service provision between upper and lower airspace;
- The **EUROCONTROL en route charging rule** exempting the 20km of flight closest to the airport from en route charges **should be amended to exempt the closest 80km of flight** in order to ensure users are not charged twice for service provision in the 20-80 km approach phase of flight. At airports where there is no separate approach control phase of service provision, 40km should be exempt upon agreement with the Member State and notification to EUROCONTROL;
- Charges at each aerodrome should **recover at least the avoidable costs** associated with providing services at the airport, but all terminal ANS costs which are not directly attributable to the provision of services to specific aerodromes may be recovered from the terminal ANS charges at fully co-ordinated airports;
- A uniform tariff formula relating terminal ANS charges in each Member State to an **exponent of no greater than 0.7 of Maximum Take-off Weight** should be adopted. This formula should ensure that the differences in charges paid by users of the same service are **no greater than the users' relative ability to pay charges**, consistent with ICAO principles. The use of ability to pay as a criteria for pricing is economically efficient for recovery of fixed costs, but not marginal costs; therefore, where Member States are able to distinguish the proportion of costs that are related to terminal service capacity provision (and hence estimate the average incremental costs associated with providing the service), a non-weight related element to charges may be introduced;
- **No flights, other than search and rescue flights, should be exempt from charges**, although Member States should continue to be entitled to pay the bills of some users. VFR flights should be charged, although Member States may allow ANSPs to sell season tickets in order to reduce billing and collection costs and to levy lower rates of charge on VFR users when a clear cost justification for the differential can be provided by the ANSP providing the services; and
- All Member States should ensure that **users have been properly consulted about the costs, charges and associated levels of service provision for terminal ANS services** at least once a year, and in good time before any decisions to change the rates of charge are made. Users should be able to make direct representations to the government or regulatory authority ultimately responsible for approving charges. Users should also have a right of appeal to an independent body, other than the government, when the government approving the charges has a controlling interest in the ANSP providing the services concerned if users believe that national or European laws on terminal charging have been broken.

4.1.6 These proposals, taken together, would tend to increase the charges levied on smaller aircraft operating short distance services within the Community. At present, these flights are cross-subsidised by other flights through a number of means including disproportionately low terminal ANS charges in many states, uniform charges across all airports and tariff formulae that benefit small aircraft at the expense of larger aircraft. Abolition of these cross-subsidies will result in fairer competition between airlines and between transport modes. However, we estimate that the net effect of our proposals might be to increase costs on such short-haul routes by €3-10 per passenger per sector<sup>18</sup>, depending on the existing charging structure of the Member State, the airport served and the type of aircraft used. Charges would be correspondingly reduced for larger aircraft, particularly those on longer haul routes within and to the Community, and those overflying the Community. We could therefore expect to see reductions in fares on these routes.

4.1.7 Table 4.1.1 below shows estimates of the net impact our proposals would have on four illustrative flights. This analysis assumed that the example flights would be across states where the system of charging for terminal ANS was broadly representative of the typical charging systems in Europe at present. It was therefore assumed that the states currently operated a uniform system of charging at all airports, recovered aerodrome ANS costs only through terminal charges, exempted a relatively high proportion of flights from charges and used a tariff formula with an exponent of 0.9. However, as the existing charging, financial, operational and traffic structures in practice vary significantly between states, these figures should not be applied to any specific route.

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<sup>18</sup> In this context, sector refers to a one-way flight involving one takeoff and landing

**Table 4.1.1: Estimated mid-case impact of reforms on example routes<sup>19</sup>**

Example route		Hub-Hub	Hub-Region	Region-Region	Hub-non EU
Nature of flight	Aircraft	Airbus A321	Fokker 100	Saab 340	Boeing 747-400
	Distance travelled within Europe (km)	800	600	250	2000
	European airports used	2 hub airports	1 hub and 1 regional airport	2 regional airports	1 hub
Proposal		Charge changed	Impact of proposal on charge		
Recovery of all terminal costs from terminal charges <sup>20</sup>	Terminal	+70%	+70%	+70%	+70%
	En-route	-20%	-20%	-20%	-20%
	Total	+10%	+10%	+25%	-7%
Change to exempted distance in en-route formula	En-route	-10%	-15%	-50%	+4%
	Total	-6%	-10%	-30%	+3%
Non-uniform airport charges	Terminal	-40%	+10%	+60%	-40%
	Total	-12%	+2%	+25%	-6%
Use of charge formula with exponent of 0.70, 50% not related to weight	Terminal	-30%	+0%	+90%	-40%
	Total	-10%	+0%	+40%	-6%
Removal of exemptions/discounts	Terminal	-2.5%	-2.5%	-2.5%	-2.5%
	Total	-1%	-1%	-1%	-1%
<b>Total impact of proposed reforms on charges</b>	<b>Terminal</b>	<b>-15%</b>	<b>+80%</b>	<b>+400%</b>	<b>-35%</b>
	<b>En-route</b>	<b>-30%</b>	<b>-30%</b>	<b>-40%</b>	<b>-15%</b>
	<b>Total</b>	<b>-25%</b>	<b>+5%</b>	<b>+150%</b>	<b>-20%</b>
	<b>Total euro</b>	<b>-250</b>	<b>+25</b>	<b>+150</b>	<b>-800</b>
	<b>Euro per passenger</b>	<b>-1.75</b>	<b>+0.40</b>	<b>+7.00</b>	<b>-3.00</b>

4.1.8 Table 4.1.1 demonstrates that long-haul flights will benefit most from any reform to the charging structure. This is because these flights are, through en route charges, effectively paying for much of the cost base of terminal ANS services within the Community that they do not use. The greatest increase in charges will be for flights with small aircraft operating between regional airports. These currently benefit from the uniform tariff structures by which users at major airports cross-subsidise the avoidable costs of providing terminal ANS services at regional airports, and pay at weight-based rates below the marginal costs of the services they receive.

<sup>19</sup> This table represents indicative estimates based on an assessment of the average impact. The size of any change, and in some cases even the direction of change, will in practice vary significantly between states.

<sup>20</sup> Note that the main category of flights that benefits from these reforms is overflights that do not land at any airport within the charging area.

## **4.2 Scope and structure of services and charges**

### **4.2.1 Summary of proposals**

4.2.1.1 We propose that, where separate services are provided (typically from different locations in busier parts of the system), there should be separate charges for aerodrome and approach control. These charges should recover all of the costs associated with the operational phases of aerodrome and approach ANS respectively. Where the provision of aerodrome and approach services is operationally integrated however, there should be provision for a corresponding integrated charge for aerodrome and approach services.

4.2.1.2 The principle of cost-reflective charges will imply that there should also be separate charges for upper and lower airspace where the relative unit costs of service provision (and/or the identity of the service providers) are significantly different. Within Europe, the majority of flights in lower airspace, although controlled by an en-route controller, are actually ascending or descending to/from an airport. The ascent/descent phase of flight thus extends significantly beyond the boundaries of terminal ANS we have used in this study. The division of charges within the phase of flight that is currently en-route control is, however, at present a matter being considered in parallel within the structures of EUROCONTROL, and is, strictly, beyond the scope of this study. Our proposal above for separate charges for aerodrome and approach ANS would not require introduction of separate charges for upper and lower airspace (although would be consistent with it).

4.2.1.3 We recommend that, in any event, the formula for en-route charges should be amended so that, instead of excluding the 20km of flight closest to the airport from en-route charges, 80km are excluded at those airports where a separate control service is provided for the approach phase of flight and 40km are excluded at all other airports. States, or the designated regulatory authority, should notify CRCO annually of which airports have separate approach control services, having consulted with the providers of en-route and terminal services and the airports.

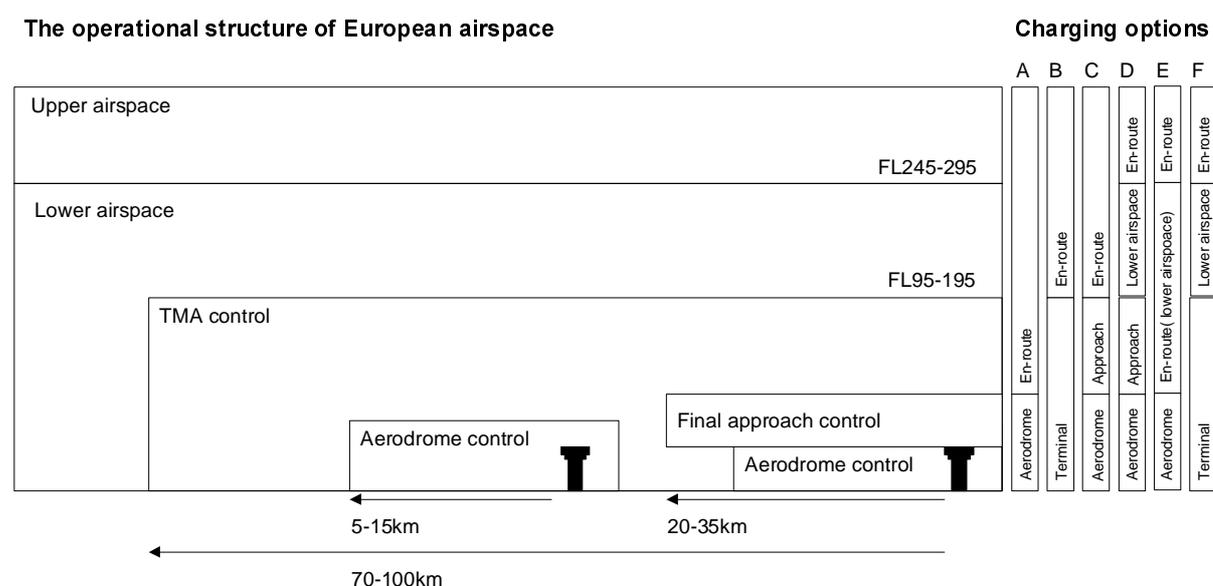
4.2.1.4 States should have the option of introducing separate charges or charge elements for MET, AIS and CNS services, the costs of which would then be excluded from the calculation of the core elements of terminal ANS charges. This would increase the transparency of the costs concerned to users and thereby facilitate the provision of these services on a contestable basis. Where Member States opted to continue to recover the costs of these services through other ANS charges, including terminal ANS charges, the allocation of the relevant costs to these charges should be transparent to users and consistent with the operational patterns of use of the services.

### **4.2.2 Detailed proposals**

4.2.2.1 Figure 4.2.2.1 below shows the operational structure of European airspace and sets out the broad options for reform. The figure is a simplification, because the structure of airspace varies significantly at different locations within the Community:

- at some airports, as illustrated, there is a separate **final approach** phase of control: this is specifically provided for services at one aerodrome and, for most purposes, we therefore consider this to be part of aerodrome control;
- at some smaller airports, particularly in more remote regions, aerodrome and approach control may be **integrated**, so that there is **no separate phase of approach control**;
- in some areas, there is a trend towards **integrating the provision of lower airspace** en route control with approach (TMA) control; and
- while the majority of flights within lower en route airspace in the Community are ascending/descending to/from an airport, many are not: smaller aircraft, particularly turboprops, are not designed to operate in upper airspace and use lower airspace for level flight.

**Figure 4.2.2.1: European airspace**



4.2.2.2 A prime purpose of our Stage 1 proposals for the reform to the structure of terminal ANS charges is to **minimise cross-subsidy and ensure fair competition** between airlines. This is not the case at present because:

- There is cross-subsidy between different phases of ANS, benefiting some users at the expense of others; and
- Different systems are applied in different states, resulting in unfair competition between airlines depending on the location of their hubs. Airlines based in states such as the Netherlands, which recover all terminal ANS costs through terminal ANS charges, are disadvantaged relative to airlines based in states such as France,

which recover a significant proportion of terminal ANS costs through en-route charges (of which the hub operators pay a relatively low proportion).

4.2.2.3 The implications of the different charging options are summarised in table 4.2.2.1 below.

Table 4.2.2.1: Implications of different charging options

Option	Summary	Implications
<b>A</b>	Separate aerodrome charges; all other costs recovered by en-route charges (the current system as applied in most states)	<ul style="list-style-type: none"> <li>• In effect, the terminal charge only recovers the costs of aerodrome control</li> <li>• Most of the costs of ascent/descent covered by en-route charges, resulting in a continued large subsidy from overflights to aircraft landing in a state</li> <li>• By applying this in all states, discrimination between European airlines is reduced</li> <li>• There is no economic justification for this, but it would probably be the least controversial means of achieving harmonisation</li> </ul>
<b>B</b>	Integrated terminal charge recovering all terminal ANS costs (the current system as correctly applied).	<ul style="list-style-type: none"> <li>• Integrated charge for aerodrome and approach services</li> <li>• Where approach and aerodrome control are provided separately, this distinction is not transparent</li> <li>• A cross-subsidy from overflights to ascent/descent will remain, although this will be wholly within en-route control and much smaller than that which takes place at present</li> </ul>
<b>C</b>	Separate aerodrome and approach charges, jointly recovering all terminal ANS costs	<ul style="list-style-type: none"> <li>• Approach (TMA) control will be charged for separately</li> <li>• This reflects the fact that the TMA may be shared between airports whereas aerodrome control is airport specific. This therefore aids transparency and is consistent with industry structures where aerodrome control is a contestable service but (say) other TMA services are not</li> <li>• The same cross-subsidy from overflights as in option B</li> </ul>
<b>D</b>	Separate aerodrome and approach charges and separate charges for lower and upper airspace	<ul style="list-style-type: none"> <li>• Most flights in lower airspace are ascending and descending, and this implies higher costs than overflights</li> <li>• It is not always possible at present to register when aircraft cross from lower to upper airspace – but this will be feasible in the future</li> <li>• This would be the most cost-reflective system in that it implies separate charges for each phase of control. However, an immediate increase to four charges would be a significant increase in complexity</li> </ul>
<b>E</b>	Separate charges for lower and upper airspace. Approach ANS recovered through lower airspace charge.	<ul style="list-style-type: none"> <li>• The trend is towards integration of approach (TMA) control and lower airspace, and therefore there may be case for integrating the charges for these when the costs become joint</li> <li>• There would be a strong case for this in the future, particularly if EUROCONTROL adopts separate upper and lower airspace charges or airspace redesign (as a result of the Commission's single skies projects) results in separate organisation of upper airspace</li> </ul>
<b>F</b>	Separate charges for lower and upper airspace, but with integrated terminal charge.	<ul style="list-style-type: none"> <li>• If option D was to be used at major airports, this should be applied at airports where approach and aerodrome control are integrated.</li> </ul>

4.2.2.4 We propose that, in order to avoid cross-subsidy between different phases of ANS, there should be separate charges for aerodrome and approach (TMA) control at airports where aerodrome and approach control are operationally separate and hence where the underlying costs of service provision are distinct and identifiable. At airports where these services are integrated, or there is no approach control, a single terminal ANS charge should be levied to cover the costs of the whole integrated terminal phase of control. In either case, all of the costs of terminal ANS should be recovered through the terminal ANS charge or charges. The application of this system in all Member States will address potential problems of unfair competition between airlines resulting from the current differences in terminal ANS charging systems across the Community.

4.2.2.5 We also propose that, if it is possible to reform the en-route charging structure to introduce upper and lower airspace charges, the overall structure of charging for European airspace should follow option D, with option F implemented at airports where approach and aerodrome control are integrated. If the introduction of separate lower and upper airspace en-route charges is not possible within the timeframes for implementing Stage 1 of terminal ANS charge reform, there would still be substantial benefits from introducing separate aerodrome and approach control ANS charges (option C). Once again, option B would then be implemented at airports where approach and aerodrome control are integrated.

4.2.2.6 In the longer term, the trend in some ANSPs towards integrating the provision of approach and lower airspace control services means that there may be a case for a joint charge for these services – Option E.

4.2.2.7 However, the imposition of an integrated charge to recover both lower airspace and approach control costs would mark the end of the current industry distinctions between en route and terminal services. This development may well require wider operational and institutional reform of ANS provision and regulation within the Community, and could therefore form a key thrust of the Stage 2 charging reforms. Without a proper analysis of the relative costs of ascent/descent and level flight within the airspace, a single charge structure could also risk imposing relatively high charges on overflights operating within lower airspace.

4.2.2.8 We therefore would expect that the proposed Stage 1 structure, of separate charges for the lower airspace (en route) and approach (terminal) phases, would be retained, unless or until the services become so integrated that distinguishing separate costs for charging purposes becomes impractical. In the event that Option E were then implemented, the lower airspace charge would need to be of the form  $\text{€}/\text{flight} * f(\text{MTOW}) + \text{€}/\text{km} * f(\text{MTOW})$ . The per flight components of the charge would be triggered by, say, handovers from/to aerodrome controllers.

4.2.2.9 The rationale for our proposals is discussed in further detail in the paragraphs below.

## **Separate charges for aerodrome and approach ANS**

4.2.2.10 At present, the majority of states apply the EUROCONTROL 20km rule to allocate costs between phases of ANS, as well as for charging purposes. This charging structure directly conflicts with the CRCO principles on cost allocation, which state that costs should be allocated in accordance with the operational boundaries of approach and en-route control. The **approach** phase of flight is much greater than 20km, but 20km is a reasonable proxy for **aerodrome** control at most airports where there is a separate approach phase. In effect, the current charging structure, applied in this way, therefore represents a separate charge for aerodrome control and a single integrated charge for approach and en-route ANS. This structure is represented as charging option ‘A’ above.

4.2.2.11 This type of charging structure results in a substantial, and unfair, cross-subsidy from overflights to/from aircraft operating to/from an aerodrome. Estimates of the scale of this cross-subsidy are made in section 4.2.4 below.

4.2.2.12 If the current CRCO principles on cost allocation are followed correctly, the charging structure is that represented as option ‘B’ above, although this also results in cross-subsidy:

- Under existing EUROCONTROL rules, only the 20km of flight closest to the aerodrome is exempt from en-route charges, but terminal ANS charges are levied for an operational phase of flight that can sometimes extend up to 100km from the airport. Therefore correct application of the EUROCONTROL principles results in a cross-subsidy from terminal to en-route control, and hence a subsidy from aircraft landing within a state to overflights; and
- Part of the ascent/descent phase of flight is under en-route rather than terminal control. Although ascending and descending aircraft use more controller time than overflights, they pay the same charge at present: this results in a cross-subsidy from overflights to aircraft landing within a state.

4.2.2.13 Aerodrome ANS could, in principle, be provided on a contestable basis, but there is a consensus that this is typically not the case for approach ANS. It is not within the scope of this study to propose reforms to the ownership or financial structures of European ANSPs, but our proposals are intended to be consistent with moves towards contestable services as and when Member States undertake such reforms. If aerodrome ANS services are to be provided on a contestable basis, and the costs of these services are to be transparent to users, there will need to be separate charges for aerodrome and approach ANS.

4.2.2.14 However, at some airports, these services are integrated or there is no separate approach phase. There would be no benefit in mandating the levying of separate approach and aerodrome control charges at these airports and we therefore propose that, at such airports, there should be an integrated terminal charge. Nonetheless, it should be the responsibility of each ANSP to justify the imposition of integrated charges at any airport. We propose that the ANSP responsible for en route service provision provides an updated list of these aerodromes to the CRCO each year, along with its cost data, following consultation with the Member State concerned. In this way, the appropriate charge and cost

boundaries between the en-route and approach phases of flight can remain consistent with the scope of terminal ANS provision at each aerodrome within each Member State.

### **Separate charges for upper and lower airspace**

4.2.2.15 It is not directly within the scope of this study to propose reforms to the en-route charging formula. However, we note that a significant proportion of flights within en-route sectors, particularly in lower airspace, are descending to or ascending from an airport. As the ascent/descent phase requires greater controller effort than the overflight phase, the current uniform charging rate for en-route control results in excessive charges for overflights and a cross-subsidy towards aircraft ascending and descending.

4.2.2.16 It is not practical at present to charge each aircraft individually for the effort they impose on controllers: it is necessary to find a proxy for this. In practice, a good proxy would be to impose separate charges for upper and lower airspace, as most aircraft in lower airspace are ascending or descending, whereas most flights in upper airspace are not. Furthermore, in a number of Member States in central Europe and Scandinavia the provision and cost structure of upper airspace is moving towards the transnational model pioneered at Maastricht, implying that the cost bases covered by these different phases of flight are being determined by different types of ANSP. This organisational trend strengthens the rationale for a charging boundary between upper and lower airspace.

### **20km rule**

4.2.2.17 We propose that the current EUROCONTROL en route charging rule exempting the 20km of flight closest to the airport from en-route charges should be amended to exempt the greater proportion that would reflect actual operational practice and costs. The 20km rule does not reflect operational reality and will thus inevitably result in cross-subsidy between phases of ANS. Although the charging formula for en-route control is outside the scope of this study, a change in the 20km rule would be a necessary precondition for the reforms to terminal ANS charging that we propose.

4.2.2.18 We have considered three alternative mechanisms for implementing a change to the 20 km rule of exemption from en-route charges:

- An exemption from en-route charges of uniform length, reflecting a broad average of current operational distinctions in phases of flight within the Community;
- 2-3 categories of airport, with exemption from en-route charges varying by airport, to reflect the diversity of different airspace and operational arrangements that is actually observed; and
- An exemption that varies by airport in order to reflect specific operational boundaries at each.

4.2.2.19 Terminal ANS usually provides control for a distance 70-100km from major airports, but often less at secondary airports. In our consultations with stakeholders, there was broad agreement that an exemption of 80km at all airports would represent a reasonable

proxy for operational practice, if a single figure had to be used. However, we note that there is a good case for a lower exemption at some secondary airports, where there may not be a separate approach phase of control and therefore en-route control provides services until the aircraft is closer to the airport. A similar system is currently used in Canada, where the exemption is 65km at airports with separate approach control and 35km at other airports.

4.2.2.20 Any of these options represents an imperfect proxy for a fully cost-reflective charge. Even an exemption from en route charges that varied by every airport, reflecting the unique characteristics of local operational practice, would be an imperfect proxy. This is because the proportion of flight covered by en-route and terminal control will vary depending on day-to-day operational circumstances and the route used by a particular flight. Users, states and ANSPs objected to an airport-specific exemption on the basis that it would be excessively complicated. Users also expressed a concern that granting states flexibility on this issue could lead to continued cross-subsidy between ANS phases unless there was an effective system of independent economic regulation, which it is outside the scope of this study to propose. Non-European states that apply separate approach charges usually exempt a fixed (national) distance of flight from en-route charges; no state uses airport-specific exemptions.

4.2.2.21 We therefore propose that there should be two categories of exemption: at airports with separate approach control (typically those embedded within TMA's and other more congested airspace), 80km of flight closest to the airport should be exempted from charges. At designated secondary airports without separate approach control, we propose the closest 40km should be exempt from charges. In most cases, we would expect the aerodromes where the exemption was reduced to 40km to be the same as the aerodromes where there is a single integrated terminal charge.

### **MET, CNS and AIS services**

4.2.2.22 At present, terminal ANS charges recover the costs of some services, such as MET and AIS, that could be provided independently and charged for separately. At present, the means of recovery of these costs varies between states: in some states, for example, all of these costs are recovered from en-route charges. As it is not within the scope of this study to propose reform to the overall structure of European ANS provision, we have not investigated whether, in principle, these services should be provided separately and on what basis. However, our charging proposals should be consistent with moves to greater contestability of service provision where this is technically possible and economically desirable. We therefore propose that states should have the option of approving separate charges for these services and should consider opening these services to competition. Where states decide not to levy separate charges for these services, the allocation and recovery of costs through other ANS charges should be rendered transparent to users, and should be consistent with the operational use of the services.

### **Apron management**

4.2.2.23 Where ANSPs undertake apron management activities and recover the relevant costs via terminal charges at present, we would expect these to be included in the cost base of the new aerodrome control charge. Where there is a separate apron management service,

the proportion of costs that are related to the provision of this service should be itemised within the bill to users for the aerodrome control charge. However, there is no need for a separate charge for this service. Where ANSP's provide these services under contract to airports, their costs will clearly not form part of the terminal ANS charges.

### **4.2.3 Stakeholders' views**

4.2.3.1 We would expect that the proposal to impose separate charges for aerodrome and approach ANS phases might face opposition from some Member States. This is because it would result in an increase in charges for European airlines, particularly those operating short distance flights, and a reduction in charges for non-European airlines. The estimated impact on charges is shown below. Opposition to this proposal may be partially mitigated by the fact that Member States have, by agreeing to the EUROCONTROL charging principles, agreed in principle that en-route charges should recover en-route costs only – our proposals are in large measure aimed at giving effect to principles to which Member States already subscribe.

4.2.3.2 Users have expressed support for the principle that terminal ANS charges should recover all terminal ANS costs, although they do not have strong opinions on whether there should be separate charges for aerodrome and approach control services. Users' primary concern is to end the current situation, by which the application of different charging structures in different Member States gives an advantage to one airline relative to others.

4.2.3.3 We would expect opposition from a wider selection of states, ANSPs and European airlines to the introduction of separate charges for lower and upper airspace, as (on average) this would further increase charges for European airlines and reduce charges for non-European airlines. These proposals would, however, be supported by non-European airlines. We note that these proposals would have a particularly severe impact on regional flights, as the distances travelled by these flights are too short for the aircraft to reach upper airspace. In addition, many of the aircraft used on these flights are not designed to operate in upper airspace.

4.2.3.4 If the charging structure is reformed in order to recover all terminal ANS costs through terminal charges, we would not expect states or ANSPs to oppose reform to the 20km rule in order to bring this into line with standard operational practice. If our reforms to the terminal charging structure were implemented **without** a change in this rule, the boundaries used for costs and revenues would remain misaligned. As a result, aircraft taking off and landing within each state would cross-subsidise overflights: we do not believe states would wish to see such a perverse outcome of reform proposals. During our consultations, we found that there was broad agreement that the 20km rule did not reflect operational practice. However, there was also opposition to moving to a system of exemptions that varied by airport: users, states and ANSPs were concerned that this would be excessively complicated. We have also taken into account the Commissions' concern to ensure that charges are as far as possible cost-reflective. As explained above, we have therefore proposed that there should be two categories of exemption, based on whether there is a separate approach control phase at an airport.

#### **4.2.4 Estimated impact of proposals**

4.2.4.1 We estimate that the proposal to recover all terminal ANS costs through terminal ANS charges could result in an increase in terminal ANS charges in the region of €0.50-1.50 per passenger, per takeoff/landing, in states which currently recover the costs of approach services provided more than 20km from the airport through en-route charges. This estimate assumes that the EUROCONTROL rule exempting the first 20km of flight was changed to a cost-reflective exemption of 80km for the airports accounting for the bulk of terminal ANS costs and revenues. For longer flights, this would be offset by a reduction in the unit rate for en-route charges; clearly, the shorter the flight, the lower this offset becomes.

4.2.4.2 We have calculated this by comparing states where all terminal ANS costs are allocated to terminal ANS with states where part of the costs of terminal ANS are recovered from en-route charges. Where all terminal ANS costs are recovered from terminal charges (as is the case in, for example, the Netherlands), we would expect terminal charges to raise approximately 40% of ANS revenue, and en-route charges to raise approximately 60%. By contrast, in France, terminal charges recover 18% of the total revenue from charges. We therefore estimate that the terminal ANS service receives a cross-subsidy from en-route charge revenues in France of over €200m per year, equivalent to €150 per flight or €2 per passenger<sup>21</sup>. A similar calculation for Italy implies a cross-subsidy of approximately [\*] per passenger. Unfortunately, the data provided by other states was not sufficient to enable us to undertake this calculation.

4.2.4.3 In contrast, if terminal charges in France recovered all terminal ANS costs, we estimate that the cost base on which en-route charges would be derived in France would be 27% lower than at present. The reduction in the cost base for charges in Italy would be [\*] However, this is partly offset by the fact that, at present, en-route charges are levied for a significant proportion of the flight that is in practice under terminal control, as a result of the EUROCONTROL 20km rule. En-route costs should, in practice, be recovered entirely from those flights operating under en-route control. We estimate that this would increase the unit rate for en-route by 9.8% (in France) and [\*] (in Italy)<sup>22</sup>. The net reduction in the en-route cost base resulting from introduction of a cost-reflective system would therefore be 19% (in France) and [\*] (in Italy). These costs should be recovered through terminal ANS charges. The net subsidy per passenger taking off or landing in France is therefore €1.43; the subsidy in Italy approximately [\*].

4.2.4.4 The recovery of a significant part of the costs of terminal control from en-route charges is of primary benefit to the airlines based within the state. We estimate that Air France benefits by approximately €75m per year as a result of the current charging system relative to that which is more consistent with current EUROCONTROL principles. Alitalia probably benefits by around [\*] per year.

4.2.4.5 We have not been provided with information that would allow us to estimate the relative costs of upper and lower airspace en-route control, and thereby estimate the broad

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<sup>21</sup> Average aircraft size in France 113 seats (source: DGAC – DNA annual report 1998); assumes a 65% load factor.

<sup>22</sup> Based on an estimate of average aircraft size of 50 tonnes.

\* Figures for Italy omitted from published version of report

magnitude of the impact of implementing a separation in the respective en-route charge rates. Indeed, the collection and analysis of the financial information concerned was beyond the scope of this study. Therefore, we are not able to estimate the change in charges for different types of en-route flights that would result from the introduction of separate upper and lower airspace charges.

4.2.4.6 Our discussions with ANSPs have however confirmed that, on a chargeable unit basis, upper airspace is generally less costly for ANS provision. Implementing separate charges would accordingly further increase the reductions in route charges paid by long haul flights in European airspace at the expense of short-haul operations. As a result, airlines with relatively greater reliance on using lower European airspace would be worse off.

### **4.3 Variation of charges between airports**

#### **4.3.1 Summary of proposals**

4.3.1.1 We propose that charges for the provision of terminal ANS at each airport should be set to recover at least the **avoidable** costs associated with providing services for the airport. In Stage 2, this principle would be extended to ensure that charges were not lower than the relevant **marginal** costs at each airport – so that, for example, charges were higher at busy places and times when the marginal costs of service provision were particularly high. In the meantime, during Stage 1, in order not to encourage further use of major airports unnecessarily, and thus potentially exacerbate congestion further, we would propose that costs which cannot be attributed to the provision of services to specific locations could if necessary be recovered via charges for the (relatively congested) fully co-ordinated airports.

4.3.1.2 Within this general principle, we would propose that where services are provided, and costs managed and incurred by the ANSP, jointly for two or more airports, these airports may be designated an airport group, and uniform charges may apply within this group. However, this should only be necessary for approach (TMA) control charges, where a coordinated service is typically provided from a single ACC (rather than individual aerodrome control towers). We would expect that aerodrome charges would always be airport-specific (so that uniform charges for different aerodromes would only be justifiable on the basis of transparently similar unit costs).

4.3.1.3 Where incremental facilities are provided, and costs incurred, at a secondary airport purely in order to enable the airport to handle flights that have been diverted from a major airport, the incremental costs of providing these diversionary facilities may be recovered from the aerodrome charges levied at the major airport.

4.3.1.4 Our proposals would probably result in higher charges at secondary airports. The scale of the potential increase would vary significantly between airports: we estimate that in most cases it would be in the range €1-5 per passenger per sector. Reviewing the scope of services provided for secondary airports, in the manner prompted by a similar policy move in the Netherlands, may mitigate this. As the majority of passengers on regional airlines are business passengers, we would expect them to have a relatively low price elasticity of demand, and hence for relatively modest cost changes to be passed through in fares adjustments with little impact on competitive behaviour, modal choice or transport demand.

Although there may be a case for the public funding of terminal ANS services to remote regions, the (national, regional and/or local) governments concerned would need to begin do so directly, rather than continuing the current practice of imposing the funding burden on international air passengers via uniform national tariffs.

### **4.3.2 Detailed proposals**

#### **Cost-reflective charges at airports**

4.3.2.1 We propose that terminal ANS charges at each airport should recover at least the avoidable costs associated with providing terminal ANS at that airport.

4.3.2.2 At present, terminal ANS charges in the majority of Member States are set at a uniform rate across all airports. Although the total costs of providing terminal ANS are higher at major airports, these costs can be recovered from a significantly higher charging base. As a result, average per flight costs tend to be lower at major airports. Uniform charges therefore tend to result in a cross-subsidy from users of major airports, who tend to be predominantly major and international airlines and their allies, to users of secondary airports, who are more likely to be regional and charter airlines.

4.3.2.3 In most cases, international airlines operate a relatively high proportion of flights at major airports; national flag carriers, and franchise carriers attached to them, operate a higher proportion of the services at secondary airports. For example, at the 15 largest airports in the Community by passenger numbers, flag carriers operate, on average, 51% of flights<sup>23</sup>. At a typical medium-sized airport, such as Dresden, the national airline (in this case Lufthansa) operates 66% of flights, and a further 13% of flights are operated by its partner airlines<sup>24</sup>. At many smaller airports, such as those in the Greek islands and regional airports in Scandinavia, all scheduled flights are operated by the same airline. Uniform charges therefore result in an indirect cross-subsidy of national flag carriers and their franchise partners by other international airlines not based in that Member State.

4.3.2.4 A particularly extreme example of this situation exists at the Spanish airports, which are divided into three groups for charging purposes. Charges are lowest at the smallest airports, which would be expected to have the highest costs. This results in a greater cross-subsidy of these airports.

4.3.2.5 As explained above, a charging structure that is based on average, not marginal, costs will tend to result in charges that are lower at major airports. In contrast, a charging structure that sought to reflect marginal costs, which included marginal social costs such as delay, would tend to result in lower charges at secondary airports and higher charges at the more congested major airports. Nonetheless, the use of uniform charging is not an efficient way of encouraging use of less congested airports because not all major airports are congested at all times, not all secondary airports are expected to have spare capacity indefinitely (and hence have permanently low marginal costs), and in many cases, the secondary airports do not serve exactly the same transport markets and are not alternatives

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<sup>23</sup> Source: *Airline Business*, 1999

<sup>24</sup> This example was calculated on an illustrative basis, but we believe this to be typical of secondary airports.

to hubs. For example, Manchester airport is unlikely to suffer significant congestion once it opens a second runway – but it is the 12<sup>th</sup> largest airport in the Community. Delays at Amsterdam Schiphol airport are primarily driven by government noise regulations in the short term and not airport or ANS capacity. In contrast the very small airport at Heraklion in Greece has some of the most severe capacity constraints, and delays, in southern Europe.

4.3.2.6 For these reasons, we have proposed that, whether the structure of terminal ANS charges reflects average (Stage 1) or marginal (Stage 2) costs, the total avoidable costs associated with the provision of specific services are recovered by charges paid by the users of those services, to ensure the removal of existing cross-subsidies.

4.3.2.7 However, in Stage 1, in order not to encourage further use of congested airports unnecessarily, and thus potentially exacerbate congestion further, the costs associated with providing the terminal ANS system as a whole, which are unavoidable and cannot be attributed to the provision of services at a specific airport, could be recovered by the charges for the fully co-ordinated airports. This would allow cross-subsidies to be removed while minimising the demand risks associated with potentially charging congested facilities at rates below their marginal costs at certain times during Stage 1. We would expect that charges at secondary airports, where service provision is at an efficient level, should not significantly exceed the short run marginal costs of ANS use.

### **Airport groups**

4.3.2.8 We propose that there should be limited scope for creating airport groups for terminal ANS charging purposes. The criterion for creating airport groups should be the extent to which shared operational resources are used to provide approach services. In many parts of the Community, some ANS facilities provide services to a number of airports: for example, the London TMA provides approach control services to Heathrow, Gatwick and several smaller airports in the London region. There would be no benefit in trying to allocate these costs to each airport individually. We would propose that in such instances there should be a uniform approach control charge at all the airports served by the TMA. We would expect that in virtually all cases aerodrome control charges would be airport specific (or included within airports' aeronautical charges, where the airport procures the service from the ANSP), but in many regions where there is more than one airport in receipt of a co-ordinated approach service, airport groups will be created with uniform approach charges.

4.3.2.9 We note that some states group airports by size and impose uniform charges within each size category, and some users supported this proposal for terminal ANS charges. The only benefit from this would be that it would improve simplicity. Costs can be different at airports of the same size and therefore creation of airport groups on this basis would result in the continuation of cross-subsidies between airports. Since landing charges also vary by airport in many states, we do not believe that there would be any substantial gains in terms of greater transparency or simplicity from the creation of airport groups based on size categories: the only criteria on which groups should be formed are operational.

## **Diversions airports**

4.3.2.10 We propose that, where additional facilities are provided at a secondary airport in order to enable the airport to handle flights diverted from a major airport, the additional costs of providing these facilities could be recovered from the users of the airport from which flights would be diverted. There are relatively few cases in Europe where airports are equipped purely in order to handle diversionary flights: on the whole, when aircraft divert from major airports, they do so to other major airports, not least because the runways at secondary airports are usually too short. However, there may be some cases, particularly in more remote regions, where additional facilities are needed for diversionary purposes.

4.3.2.11 Where the costs of facilities are to be recovered from users of other airports, we recommend that ANSPs should be obliged to verify that the incremental facilities are necessary. The attribution of costs should be undertaken in a way that is transparent to the users of the major airport from whom the costs are being recovered, and should be subject to challenge by those users through the consultation procedures we have proposed below.

## **Regional and social policy**

4.3.2.12 Our proposals are likely to result in an increase in charges at some regional airports. We make some estimates below of the likely scale of this increase. This is likely to attract opposition on the basis that regional airports provide an economically beneficial or socially necessary service, often as part of an integrated national system of air traffic control. However, uniform charges are not an efficient way of providing economically beneficial services at secondary airports:

- In a 100% cost-recovery environment, there is no incentive to provide an efficient level of service. This may lead to excessive service provision at regional airports, particularly if the costs of this service provision can be recovered from major airlines using other airports within the state. Essentially, the costs are decoupled from the customers and funders of the services concerned. We note that, in the Netherlands, a recent government review of subsidies to regional airports resulted in substantial cuts in the level of services provided at these airports;
- Many secondary airports cannot be considered to be providing a socially beneficial service. For example, London City airport and Stockholm Bromma airport are small city-centre commercial airports catering disproportionately for business passengers, for whose custom the airline users concerned compete vigorously in the market. There is unlikely to be any social case for subsidising these airport operations, particularly as they will typically add to the marginal costs of delays in the terminal control areas concerned;
- Many secondary airports are located in regions that are well served by rail services: for example, Norrköping airport in Sweden receives a financial cross-subsidy equal to over eight times the revenue from terminal ANS charges at the airport – but the city is less than 80 minutes from Stockholm by train. Subsidising these airports is therefore of limited social benefit and can result in unbalanced competition between transport modes; and

- Since, in most cases, other, cheaper, surface transport modes are available, and on the whole regional air services are short-distance and thus relatively less competitive against rail or road, users of regional air services tend to be price-inelastic higher income passengers. ERA estimates that 60% of passengers on regional air services are business passengers.

4.3.2.13 Nonetheless, some remote regions in the Community may be genuinely dependent on air transport. We would expect that such regions would include northern Scandinavia, the Greek islands, the Azores and the Scottish Highlands and Islands. It would be reasonable for government authorities (regional, national or European) to subsidise services at these airports directly. We note that some regional air services already receive government subsidies, subject to European Commission rules on state aid. However, any subsidies to these airports, or to air services operated to them, should be transparent. If any subsidy has to come from general tax revenue, rather than being an indirect and opaque levy on other passengers, many of whom are not residents of the state, there will be substantially greater pressure for it to be set at the efficient level necessary to achieve the socio-economic objectives concerned. We note that the Council has defined a procedure for aid to regional air services<sup>25</sup>. As explained in Appendix 3, funding of regional air services through the current system of terminal charging does not appear to be consistent with this procedure.

### **4.3.3 Stakeholders' views**

4.3.3.1 The introduction of cost-reflective terminal ANS charges at each airport is likely to face strong opposition, although our proposal to allow the recovery of the relevant central/administrative costs from users of fully-coordinated airports may partially mitigate this. Nonetheless, on the basis of our consultation meetings during Phase 2 of this study, we would expect opposition from:

- Some ANSPs, as the proposals will probably result in a reduction in the scale of services at some regional airports; and
- Governments concerned about the political impact of increasing charges, and thus possibly reducing services, at regional airports.

4.3.3.2 In principle, user groups support the use of cost-reflective charging. The introduction of cost-reflective charges would be supported by IATA, as IATA members tend to be those that are, at present, funding the cross-subsidies to services at regional airports. ERA declined to express an opinion on this matter, as it felt that while some of its members would be disadvantaged by reform, others might not be. Regional airlines would, however, be unhappy for cross-subsidy funding to be withdrawn from regional air services on the basis that surface alternatives were available, as they argue correctly that surface competitors (particularly InterCity rail services) themselves receive substantial government capital funding and operating subsidies. We would also expect representatives of general aviation to oppose this reform, as their members primarily use secondary airports.

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<sup>25</sup> Council Regulation 2408/92, Article 4

#### **4.3.4 Estimated impact of proposals**

4.3.4.1 Our proposals may result in an increase in charges at secondary airports in those states where uniform charges are imposed at all airports. A number of ANSPs agreed that charges at regional airports could be increased by 3-5 times if more cost-reflective charges were introduced. Charges at major airports could correspondingly be reduced by approximately 50%. However, our analysis suggests that cost-reflective charges should not necessarily result in substantially increased charges at secondary airports, because ANSPs will then be under greater pressure to provide services in a cost-efficient way, and only the genuinely avoidable efficient costs need form the floor for charges at these airports. If current levels of service provision at secondary airports were not adapted, the charges might be of the order of 100% more than current levels, although the increase could be higher at some airports. This could increase fares by €1-5 per journey on regional routes, although clearly the exact impacts would depend on the combinations of smaller airports (typically with charge increases) and larger airports (typically with offsetting charge reductions) involved in different routes.

4.3.4.2 We would expect the increase in charges at secondary airports to be reduced by our proposal that non-avoidable costs can be recovered from users of fully co-ordinated airports. We would also expect reviews of services provided at regional airports, which would be likely to follow from the introduction of a requirement that charges be cost-reflective, to result in a reduction of costs, and therefore charges, at these airports.

4.3.4.3 We have used two methodologies for estimating the impact of non-uniform charges on secondary airports. Neither methodology is perfect; the purpose of the analysis is to give an indication of the impact of reform rather than to quantify it exactly. An exact quantification of the impact of reform at each airport would be impossible given the limited nature of the data that has been made available to us by ANSPs for this study.

- We have compared terminal ANS charges at secondary airports which are cross-subsidised at present as a result of uniform charges with secondary airports which have to levy charges that recover costs in full; and
- Using data supplied by the states that gave a breakdown of costs by airport, we have made estimates of the proportion of terminal ANS costs that could be considered to be central costs and allocated to larger airports. We then assessed the level of charges at secondary airports that recovered all avoidable costs.

4.3.4.4 We compared charges at airports that levy cost-reflective charges with airports of similar size that do not. At some airports, the costs of terminal ANS services are recovered in the airport landing charges; comparisons for these airports can only be made using airports in states where the landing charges themselves are cost-reflective.

4.3.4.5 Our ability to undertake comparisons is limited by the fact that we need to use airports where the nature of the services recovered by the terminal charge is broadly similar – inevitably, this means that we must compare charges levied by different ANSPs which may differ for other unrelated reasons.

4.3.4.6 Table 4.3.4.1 below demonstrates the results of this comparison. This demonstrates that cost-reflective charges would not necessarily be higher than uniform charges, and could sometimes be lower. We have compared charges for a Fokker 100 aircraft, representing a typical size aircraft at regional airports.

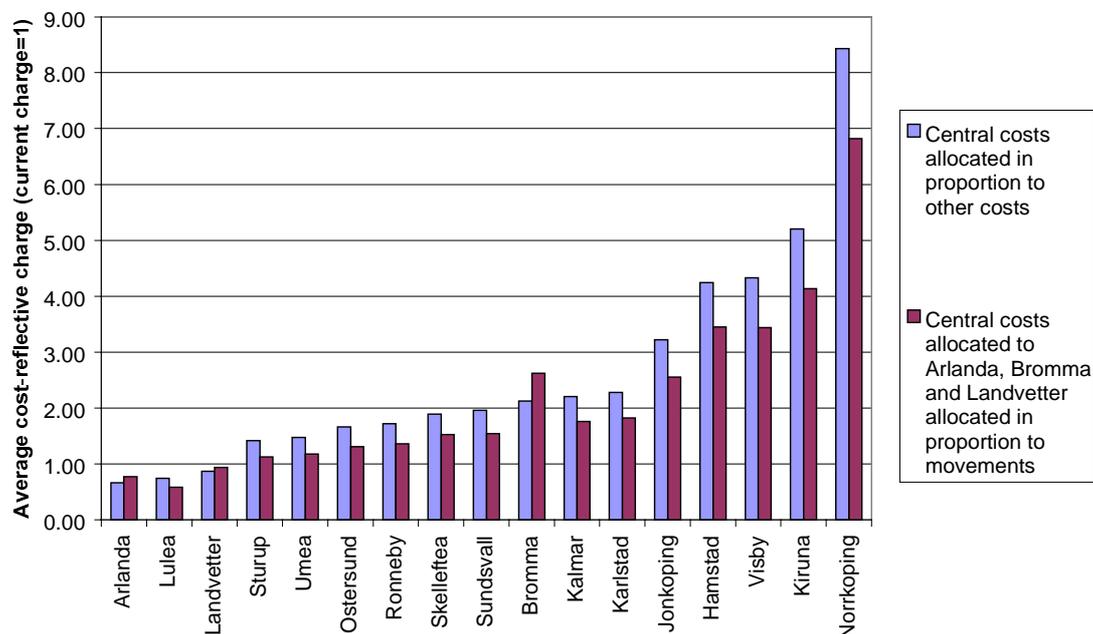
**Table 4.3.4.1: Comparison airports with cost-reflective and non-reflective charges**

Airport with cost-reflective charges			Comparison airport in state with uniform terminal charges			Increase in charge at cost reflective airport
Airport	Item compared	Charge (€)	Airport	Item compared	Charge (€)	
Prestwick	Terminal ANS charge	148	Bastia	Terminal ANS charge	148	0%
Billund	Landing fee (includes terminal ANS)	387	Bremen	Terminal ANS charge + landing fee	631	-39%
East Midlands	Landing fee (includes terminal ANS)	767	Leipzig-Halle	Terminal ANS charge + landing fee	604	27%
Aberdeen	Terminal ANS charge	250	Bordeaux	Terminal ANS charge	148	68%
Edinburgh	Terminal ANS charge	132	Toulouse	Terminal ANS charge	148	-11%
Glasgow	Terminal ANS charge	152	Köln-Bonn	Terminal ANS charge	207	-27%

4.3.4.7 The table demonstrates that cost-reflective charges at secondary airports do not necessarily exceed charges at similar airports in Member States that currently apply uniform charges. We would expect this in part to be as a result of the fact that, where charges are already more cost-reflective, there will (other things being equal) already be a greater pressure for services to be provided in a cost-efficient way.

4.3.4.8 Luftfartsverket, the Swedish ANSP, has provided us with data for costs and revenues at each airport. This included a pro rata allocation of central costs, covering training, operational support, management etc, to airports in proportion to the airport specific costs, with a variant based on relative number of movements for busier airports. The impact of moving away from uniform tariffs on terminal charges at Swedish airports, under both systems for allocation of central costs, is demonstrated in figure 4.3.4.1 below.

**Figure 4.3.4.1: Impact of cost-reflective charges under different systems of cost allocation**



4.3.4.9 This analysis implied that, if Luftfartverket's allocation of central costs, in proportion to local costs at an airport, is used, the arithmetic average increase in different airports' terminal ANS charges at secondary airports that would result from the introduction of cost reflective charges would be 196%. The increase in charges would vary by airport at would be substantially greater at some – particularly, in this example, Norrkoping. Using our proposed methodology, by which the ANSP's central costs are allocated to Arlanda, Bromma and Landvetter (Gothenburg) airports only, in proportion to movements at these airports, the average increase in charges would be 134%.

4.3.4.10 Although the removal of uniform charge structures would result in substantial changes to terminal ANS charges, it would not have a major impact on fares. For example, the terminal ANS charge for a 737-300 at Swedish airports is €124<sup>26</sup>; a 134% increase would raise this to €290 at the smaller airports, but this remains less than €3 per passenger<sup>27</sup>. The cheapest single fare we were able to find for an average length Swedish domestic route was €200<sup>28</sup>. Therefore, the expected increase in terminal charges, if fully passed through to the passenger, would imply an increase in fares of around 1-1.5% on a standard fare for journeys excluding Stockholm, Landvetter and Bromma, although the average increase might be greater than this as many fares are, in practice, discounted. However, we also note that the increase in charges would vary significantly between regional airports: at some, it would be significantly greater than 134%. If the service provision at some of these airports were not reduced, terminal ANS costs could increase to around €10 per passenger, implying an increase in fares of at least 5%.

<sup>26</sup> Based on system of charges introduced at Swedish airports from October 2000.

<sup>27</sup> Assumes 70% load factor

<sup>28</sup> Source: travelocity.co.uk

4.3.4.11 In a state such as Austria, where terminal charges are relatively high for smaller aircraft as a result of the tariff formula used, the terminal charge at regional airports could be expected to increase to around €6 per passenger, assuming a similar proportionate increase in charges as in Sweden. This would imply an increase in fares of 2-3%. Again, it would be likely that the increase in charges would vary between airports, and would therefore exceed this at some.

4.3.4.12 As most regional flights are operated to or from a hub airport, these increases in charges would be partly offset by corresponding reductions in charges at the hub. However, this reduction in charges would be spread between a much larger number of flights: we estimate that charges at major airports might be reduced by around 25%. At present, the average terminal charge for an average sized aircraft (737-300) is approximately €160. This implies a reduction in fares of less than €0.40 per sector.

## **4.4 The tariff formula**

### **4.4.1 Summary**

4.4.1.1 We propose that charges should be partially based on ability to pay and that maximum takeoff weight (MTOW) should continue to be used as a proxy for this. We propose that charges should be related to MTOW on the basis of a uniform exponent at all airports within the Community. We have calculated that MTOW would be best related to ability to pay through use of an exponent of 0.70. The use of a uniform relationship between charges and MTOW will reduce the risk of charging formulae being set by ANSPs in different Member States in ways that had the effect of benefitting particular airlines or groups of users, such as national flag carriers.

4.4.1.2 Where ANSPs were able to identify the proportion of their total chargeable terminal ANS costs that is related to the provision of capacity in the long run, no more than that proportion of total chargeable costs would be permitted to be recovered through an element of terminal ANS charges that was not related to weight. However, we note below that it is not simple to calculate the proportion of costs which are related to capacity in the long run: this calculation should therefore be subject to approval by the appropriate regulatory authorities.

4.4.1.3 ANSPs, again subject to approval by the appropriate regulatory authorities, should be able to amend charges to take into account the impact of installing certain types of technology on aircraft where the installation of such technology benefits the ANS system as a whole.

### **4.4.2 Detailed proposals**

4.4.2.1 At present, although all states relate the charges that recover the costs of terminal ANS to MTOW, the relationships used are not consistent. Exponents used vary between 0.50 and 1.00; in some, the unit rate is also dependent on the weight; and some other states have charges that only relate to weight over part of the range of aircraft weights. The relationships are in most cases historical and are not intended to reflect either costs or a detailed quantification of ability to pay. In the absence of a consistent relationship, it is

possible that the relationship in a state could benefit airlines with a fleet structure of a particular kind at the expense of other airlines. This is particularly the case if the relationship includes ‘kinks’ or threshold levels rather than being a smooth function of MTOW.

4.4.2.2 In the short term, the direct costs incurred by ANSPs in providing terminal ANS services are almost entirely fixed. The only direct short run marginal cost is staff time, but the majority of air traffic controllers work on fixed-time contracts and do not work overtime. In the medium to long term, a higher proportion of costs are related to capacity provision: the EUROCONTROL Possible Pricing Mechanisms (PPM) task force has assumed that 50% of en-route costs are capacity related, based on estimates made in the early 1990s. Although we would expect a similar proportion of terminal ANS costs to be capacity related, no specific cost causation research on this area has been undertaken as yet, and the data provided to us by ANSPs were insufficient to enable more concrete estimates to be made.

4.4.2.3 If marginal **social** costs, principally the costs of delay to other users imposed by additional users of congested airspace, are also taken into account, then short run marginal costs are substantial at congested places and times. Indeed, at some congested airports the revenue collected from charges related to these marginal costs could reach or exceed the total direct costs incurred by ANSPs in providing the service. However, for reasons set out in section 3 above, we have not proposed the introduction of full marginal social cost pricing in the short term, and therefore other means will have to continue to be used to recover ANSPs’ fixed costs. In principle, fixed costs should be recovered through charges which reflect users’ relative ability to pay (Ramsey pricing) in order that departures from marginal cost pricing least disturb the efficient allocation of scarce resources. In the event that marginal social cost pricing is introduced in Stage 2, a degree of pricing based on ability to pay would also continue to be necessary, particularly to meet revenue recovery requirements in less congested parts of Europe.

#### **Available metrics as proxies for ability to pay**

4.4.2.4 We have considered various metrics that could be used as proxies for ability to pay within a harmonised terminal ANS charging framework. Table 4.4.2.1 sets out the advantages and disadvantages of these options. Taking into account the pros and cons of these alternative options, we propose that MTOW should be retained as a proxy for ability to pay. The principle advantages of MTOW are that it is an easily available and widely used metric in the international industry that is easy to verify, does not discriminate between users based on the type of their particular equipment or commercial strategies and is accordingly accepted by airlines. At present, in accordance with EUROCONTROL practice, some states base charges on the MTOW of a specific aircraft, as recorded in the aircraft manual or flightworthiness certificate; other states use the highest MTOW of the aircraft type. We recommend that, in order to simplify calculation of charges, and to avoid any incentive to under-record aircraft weight, the latter should be used.

Table 4.4.2.1: Alternatives to ability to pay

Metric	Advantages	Disadvantages
<b>MTOW (maximum takeoff weight)</b>	<p>Easy to verify (particularly if metric used is highest MTOW for the aircraft type)</p> <p>Accepted by states and users</p> <p>Widely used internationally</p> <p>Treats passenger, cargo and mixed flights fairly</p> <p>Recommended by ICAO</p>	<p>Relationship to aircraft revenue potential is indirect</p>
<b>Number of seats</b>	<p>Closely related to revenue potential of many flights</p> <p>Relatively easy to verify (seating numbers usually standard per airline per aircraft type)</p>	<p>Unfairly penalises airlines operating low-service flights with high seating density (and usually lower fares); benefits airlines providing a higher proportion of business/first class accommodation</p> <p>Inappropriate for charging cargo flights and does not take into account potential cargo revenue on larger (particularly widebody) passenger aircraft</p>
<b>Number of passengers</b>	<p>Closely related to revenue potential of many flights</p> <p>Relatively easy to verify if charge is levied through the airport as part of the airport passenger service charge</p>	<p>Unfairly benefits airlines operating with low load factors – for example, airlines operating business routes where they opt to operate at a low load factor in order to provide high frequency and ensure there is always space for passengers whose journey plans are unpredictable. Correspondingly, penalises airlines operating with high load factors.</p> <p>Inappropriate for charging cargo and mixed flights</p>
<b>Maximum speed at takeoff</b>	<p>Treats passenger, cargo and mixed flights fairly</p>	<p>Not consistently related to aircraft revenue potential</p> <p>Unfairly favours certain aircraft types, eg. those designed for short takeoffs (eg. BAe 146)</p> <p>Not a widely accepted or available metric</p> <p>Not closely linked with ability to pay</p>
<b>Design payload</b>	<p>Easy to verify</p> <p>For passenger aircraft, design payload is closely correlated with seating capacity</p>	<p>Relationship to aircraft revenue potential is indirect</p> <p>Penalises cargo aircraft (which are usually designed to carry greater payload)</p> <p>Not a widely accepted metric</p>

### **Relationship between MTOW and ability to pay**

4.4.2.5 MTOW does not correlate linearly with seats and hence more direct proxies of ability to pay: as a result, ICAO guidance recommends that it should not be used in direct proportion, as this will overcharge large aircraft and result in inefficient use of capacity<sup>29</sup>. We propose that charges should be related to MTOW using an exponent of 0.7.

4.4.2.6 The best metric for ability to pay is the standard seating capacity of an aircraft, rather than the actual number of seats or passengers on a particular aircraft. Airlines will select the number of seats, or aim for a particular load factor, in accordance with their particular commercial strategy for the specific routes being operated. For example, an airline wishing to attract business passengers is likely to offer greater seat pitch, more business class seating, and operate at lower load factors as a result of the need to operate high frequency and guarantee the availability of capacity to passengers on flexible tickets. It will therefore have both fewer seats and fewer passengers than a low-cost or charter airline operating an equivalent aircraft type, but there is no reason why it should pay a lower charge as its yields per ASK<sup>30</sup> could be higher.

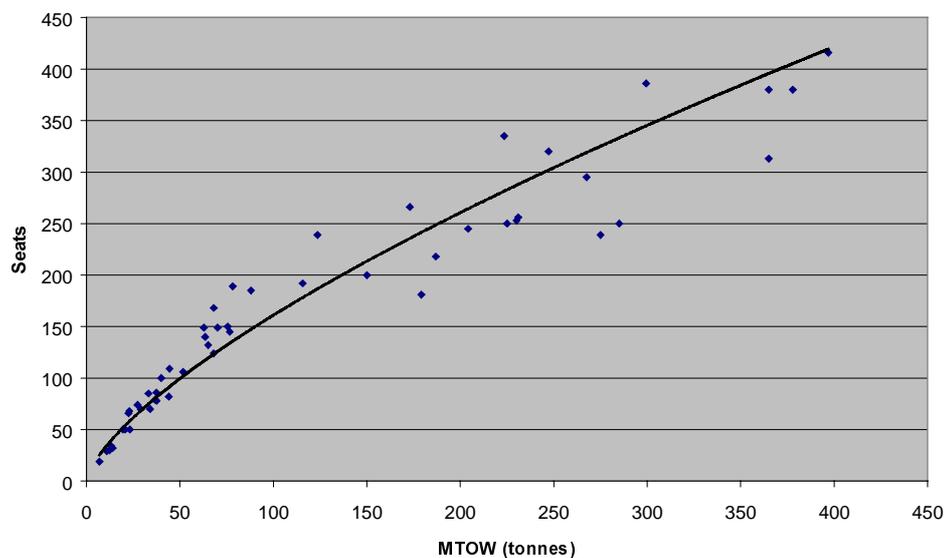
4.4.2.7 We do not consider that any relationship between aircraft size and sector length should be taken into account in determining relative ability to pay for charging purposes. The operators of long haul flights are likely to be less sensitive to the levels of terminal ANS charges at the airports at either end of the route, but total ANS charges could still be a similar proportion of operating costs. Any relationship between aircraft type and sector length is also becoming less clear as a result of the increased use of regional and twin engined jets on longer routes and the use of larger jets on high density short routes between major hubs.

4.4.2.8 Figure 4.4.2.1 demonstrates the relationship between MTOW and standard seating capacity for most aircraft types currently in operation in Europe. Seating capacity is closely correlated with MTOW, subject to an exponent of 0.70. We have therefore proposed use of this as the exponent for the tariff formula.

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<sup>29</sup> Document 9161/3, paragraph 5.12 and document 5082/4

<sup>30</sup> Available Seat Kilometres

**Figure 4.2.2.1: Relationship between MTOW and seating capacity**

4.4.2.9 We investigated an adjusted version of this relationship, which took into account the fact that smaller aircraft tend to operate at lower load factors. However, data for load factor by aircraft type is not available: the only way of estimating this is to perform a regression based on average load factor by airline, taking into account the structure of each airline's fleet. Taking this into account implied a slightly higher exponent (0.74). However, the relationship was by no means clear: for example, low-cost and charter airlines operate relatively small aircraft but have very high load factors. Since target load factor represents a commercial decision for each airline, and the difference is small, we have not amended our proposed exponent in order to take this into account.

#### **Adjustment to take into account capacity related costs and congestion**

4.4.2.10 A high proportion of the average costs of ANS infrastructure use is fixed, and Ramsey pricing is an economically efficient way of recovering fixed costs. However, the incremental costs of capacity provision should, in principle, be recovered through non-weight related charges rather than Ramsey pricing. When socially efficient capacity levels are being provided, these costs will be less than or equal to the corresponding short-run marginal social costs of infrastructure use which should ideally underpin an efficient charge structure. In practice, these capacity-related costs could be recovered in charges either:

- By the use of an explicit non-weight related component in the charge structure; or
- Use of a lower exponent for the MTOW term in the charge structure than that implied by a close relationship to ability to pay.

4.4.2.11 In practice the second, indirect, option would inevitably imply different exponents depending on the relative balance of incremental and fixed costs in different parts of Europe, and the different types of equipment using the airspace concerned. This would imply further complexity, and perpetuate differences in the charge relativities across Europe. We therefore

propose an explicit non-weight related element in the tariff formula should be included at the discretion of Member States, while retaining the common exponent of 0.7 for the MTOW component of terminal ANS charges in any event.

4.4.2.12 Although the use of a lower exponent than that which can be justified on the basis of ability to pay would inevitably be a less accurate option, it may be more acceptable to users and other relevant stakeholders. We have found that use of an exponent of 0.50, with no non-weight element, would typically be a close proxy for use of an exponent of 0.70 with a non-weight element sufficient to recover 50% of total costs. Although use of an exponent of 0.50 is not a perfect proxy for this, it is far closer than, for example, use of an exponent of 1.00 (the current practice in some states). In order to demonstrate this, we have conducted simulations using timetable data from example airports to establish the necessary unit rates under different charging formulae in order to recover a given total level of costs. The results of a simulation using data for Munich airport is illustrated in figure 4.2.2.2 below. We recommend that the Commission should consider use of an exponent of 0.50 as a ‘second best’ alternative to our proposals if it considers that, given the potential strength of opposition, it is unlikely that non-weight elements can be introduced.

4.4.2.13 Any proposal to include a non-weight element should be based on an assessment of the proportion of costs that is related to capacity provision. This should ideally be based on the long run marginal costs of additional capacity, which should be the difference between the discounted capital and operating costs of meeting future demand with and without a marginal demand increment. However, calculation of long run marginal costs has proved difficult in other regulated industries, and in any case ANSPs do not have investment planning models that are advanced enough to estimate the best-value efficient investment plan at different demand levels. We therefore suggest that capacity-related costs could be assessed from the average incremental cost of planned investments in ANS capacity at each airport. The average incremental cost equals the discounted value of the capital and operating costs of the new investment required to increase capacity, per additional unit of demand that can be accommodated, over the economic life of the investments concerned.

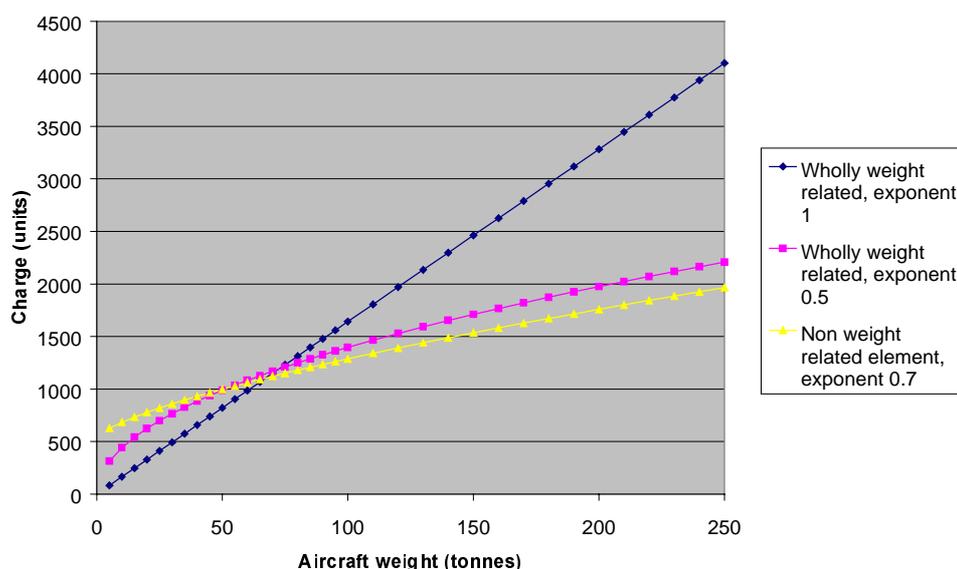
4.4.2.14 The proposal to introduce a non-weight element should be subject to approval by the appropriate regulatory authority and should be subject to appeal by users through our proposed mechanisms, as set out in section 4.6 below. It may not be practical for an ANSP to undertake this assessment for the terminal ANS facilities at each airport within a state, and therefore, for smaller airports, a calculation of the *typical* average incremental cost could be undertaken. However, we would expect an airport-specific calculation to be undertaken at the largest hub airports (over, say, 15 million passengers per year).

4.4.2.15 At some fully co-ordinated airports, expansion in ANS capacity to meet growing demand cannot take place even in the long term due to external constraints. At such airports, we propose that Member states should also be able, in Stage 1, to recover a higher proportion of costs through non weight-related charges as a proxy for full congestion-related charging, in order to encourage the efficient allocation of existing scarce capacity in the meantime. This would improve “gate to gate” charge signals, as some congested airports have already introduced similar flat or minimum landing charges at peak times. A decision to introduce a non-weight related element on this basis at such airports should, again, be made by Member States and should be subject to consultation with, and appeal by, users.

4.4.2.16 Such a non-weight related element should only be levied at fully co-ordinated airports where there is no prospect of expanding capacity. At airports where capacity can be expanded, the mechanism suggested above (of capping the revenues recovered from non-weight related components of terminal ANS charges to the proportion represented by capacity-related costs) should be sufficient.

4.4.2.17 The Commission should consider the need for EU legislation requiring all states to review the need for non-weight related elements at major airports within a defined period, although this would probably need to be at least five years. Such reviews could reasonably find no need for the use of a non-weight related element at some airports where capacity expansion is not likely to be required even in the long term and the airport is not currently congested. In such circumstances the relevant charges would continue to be solely weight-related, on the grounds that marginal costs are not sufficiently significant to warrant their being reflected in the tariff structure.

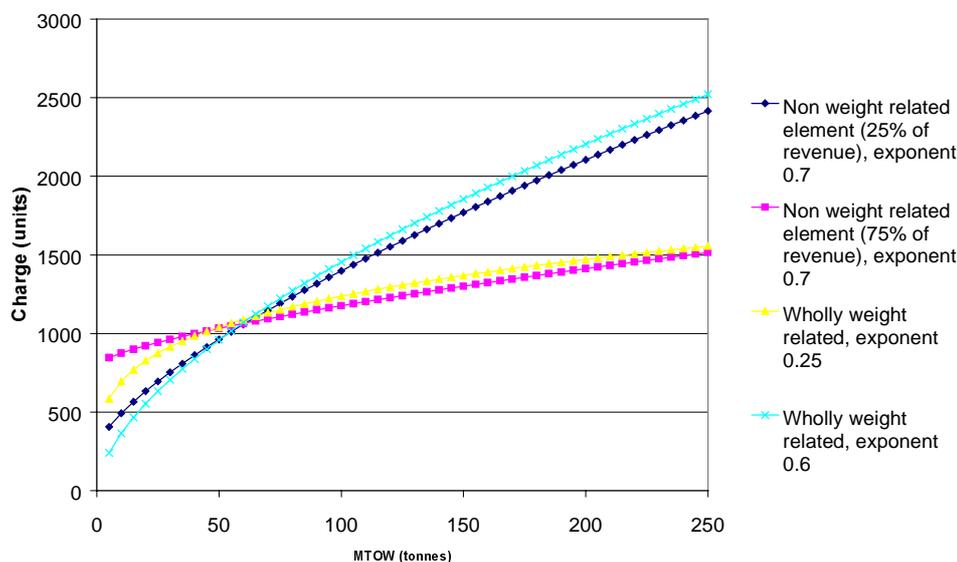
**Figure 4.4.2.2: Relationship between charges and aircraft weight under different charging formulae, assuming 50% of costs are capacity-related<sup>31</sup>**



4.4.2.18 We have also tested the implications of higher and lower proportions of costs that are capacity related. If 25% of costs are capacity related, 25% of revenue should be raised from non-weight related charges. Use of an exponent of 0.60, with no non-weight element, represents a reasonable proxy for this. This is demonstrated on figure 4.4.2.3 below. If 75% of costs are capacity related, 75% of revenue should be raised from non-weight related charges; figure 4.4.2.3 also demonstrates that use of an exponent of 0.25, with no non-weight related element, is a reasonable proxy for this for most aircraft types.

<sup>31</sup> The results are similar for other airports tested, because the different charging formulae will have to levy similar charges on the most common aircraft types at an airport

**Figure 4.4.2.3: Use of different exponents as proxies for a non-weight related element equivalent to 25% and 75% of total revenue**



4.4.2.19 We recommend that, if the Commission wishes to pursue the option to use different exponents as an alternative to use of a non-weight related element, states should be granted flexibility to amend the exponent from the default of 0.7 only once and if the relevant cost data to support the change have been made available to users. This would be based on a local assessment of the relative costs of expanding capacity and congestion at the airport. This should be subject to consultation with and appeal by users in the same way as the introduction of non-weight related elements. Under no circumstances should the exponent exceed 0.70, which would be the level justified by ability to pay if there were no capacity-related costs.

#### **Adjustments to the tariff intended to influence user behaviour**

4.4.2.20 Charges could be adjusted in order to incentivise the installation of on-board equipment that reduces ANS costs or improves the capacity of the ANS system by requiring less controller effort. Any such discount should be based on an assessment of the system cost saving or additional capacity that is provided. Since the costs of the discount will be recovered from other users that do not install the relevant equipment, its introduction should be subject to consultation with and appeal by users in accordance with the means specified in section 4.6 below. We note that the use of the charge structure as an incentive mechanism may be appropriate to encourage the more widespread adoption of some types of equipment (such as that necessary for use of datalink services for ANS). However for many types of equipment - particularly equipment necessary for the safe operation of the ANS system - it would be more appropriate to mandate installation through a compliance-based regulatory framework.

4.4.2.21 We have also investigated the possibility of using charges to incentivise the use of particular routes or aircraft types but, following discussions with users and ANSPs, have concluded that this is impractical. The marginal costs imposed by individual aircraft types

on the system do vary, but are primarily a consequence of other aircraft operating at the same time into the same airport. This is dependent on decisions of other airlines and may in any case vary from day to day.

### **Use of charges to incentivise efficient service provision**

4.4.2.22 The overall level of charges may be set in order to incentivise efficient provision of services, to the extent that the broader economic regulatory and financial framework applied to ANSPs enables this. However, this is incompatible with a charging structure based entirely on full cost-recovery and would therefore require a commercialised ANSP that is subject to some form of incentive based economic regulation. Although Eurocontrol does allow states to develop a charging system based on independent economic regulation, only the UK is planning to institute such a system at present. Proposals for the economic regulation of ANSPs are outside the scope of this study, but we note that the Commission has initiated parallel work in this area.

### **4.4.3 Stakeholders' views**

4.4.3.1 Airlines, states and ANSPs support the use of MTOW as the best proxy for ability to pay in the tariff formula. It is considered to be an internationally accepted metric, practical to implement and (with the correct functional form) the basis of a reasonable proxy to ability to pay.

4.4.3.2 Regional airlines will strongly oppose the introduction of a non-weight related element in terminal ANS charges. Regional airlines also complain that the existing en-route charging structure unfairly discriminates against small aircraft and therefore also oppose the use of the lower 0.5 exponent used for en route charging in terminal ANS charges. Although the introduction of such an element would benefit airlines using larger aircraft, IATA said that it would prefer use of a lower exponent to the use of a non-weight element: specifically it would support the use of an exponent of 0.5 (equivalent to the current charging formula for en-route).

4.4.3.3 We found that ANSPs were not able to justify the exponents that they used at present in their tariff formulae and indeed expressed some support for the introduction of a harmonised relationship using a justifiable exponent. We would expect some opposition from ANSPs and Member States to the introduction of non-weight related elements on the basis that this would increase the costs of operating regional air services, which may be perceived as being of social or political benefit.

### **4.4.4 Estimated impact of proposals**

4.4.4.1 The impact that our proposals will have on the terminal ANS charges paid by different types of user at each airport is dependent on the existing charging structure at the airport concerned. For most aircraft types, the impact will be relatively low, assuming that the total revenue from terminal ANS charges at that airport was held constant. The largest increases tend to would apply to small aircraft using larger airports: at these airports, charges could increase by €2-5 per passenger, depending on the existing charge structure. The impact would be greater if uniform charging within all airports within a state is retained,

because changes to the tariff would then change the relative contribution to total costs for each airport. If this were the case, charges may increase by €5-10 per passenger for small aircraft at all airports.

4.4.4.2 Where charges are, at present, directly proportional to MTOW, or are proportional to MTOW with a relatively high exponent (0.90 or 0.95), charges for smaller aircraft will be increased under all of our proposals, and charges for larger aircraft will be reduced correspondingly. However, in Germany and Austria, where terminal charges are, at present, related to MTOW using an exponent of 0.50, the impact of our proposals would be reduced and would be dependent on the other elements of the charging option that was implemented. If, as we propose, a harmonised exponent of 0.70 is used but these states decided not to include a non-weight related element, the reform would result in a reduction of charges for small aircraft and an increase in charges for larger aircraft. However, in our simulations of the impact of our proposed amended tariff formula, we have assumed that states introduce a non weight-related element sufficient to recover half of total terminal ANS revenue requirements.

4.4.4.3 Figure 4.4.4.1 demonstrates the impact of our proposed reform using the results of a simulation of charges at Munich airport, based on an assumption that total revenue at the airport was to remain constant. The introduction of a non-weight related element, combined with a switch from an exponent of 0.50 to an exponent of 0.70 for the weight related element, would only substantially change the charges for the smallest aircraft using the airport. As shown in table 4.4.4.1, the largest proportional change would be the charge for a very small aircraft, the Saab 340, which would increase by 41% (approximately €2 per passenger). Charges for aircraft of average size at the airport, such as a Boeing 737 or Airbus A320, would not change significantly. The change in charges at Munich airport is relatively small because of the existing formula used by Germany for terminal charges.

Figure 4.4.4.1: Estimated charges at Munich airport under different formulae

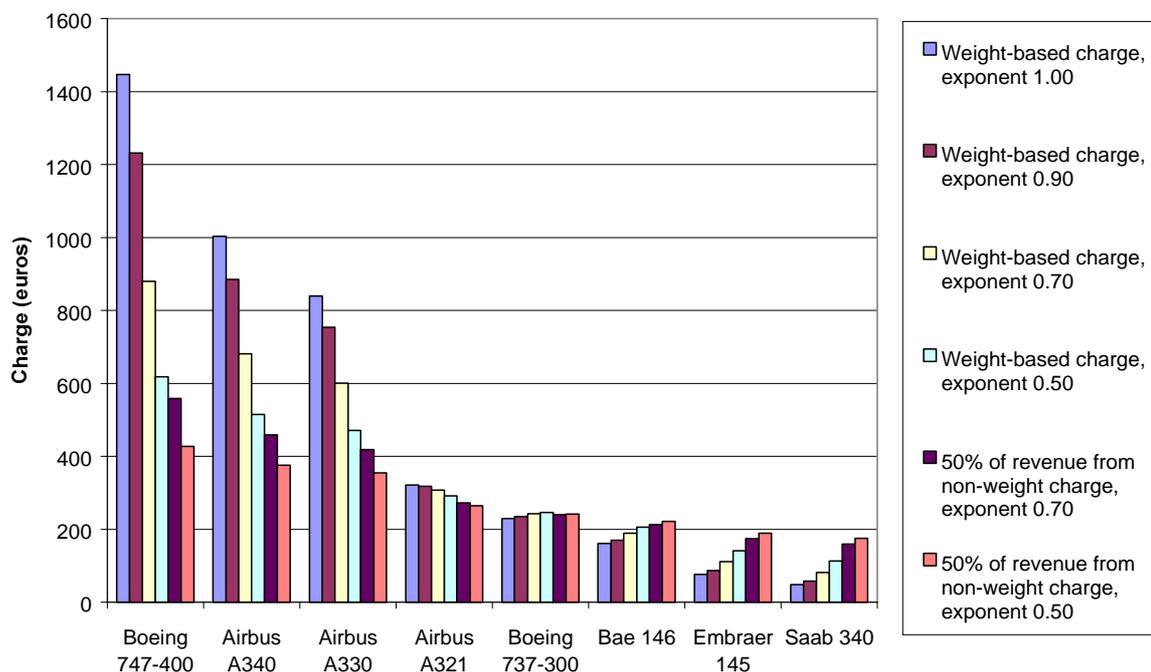
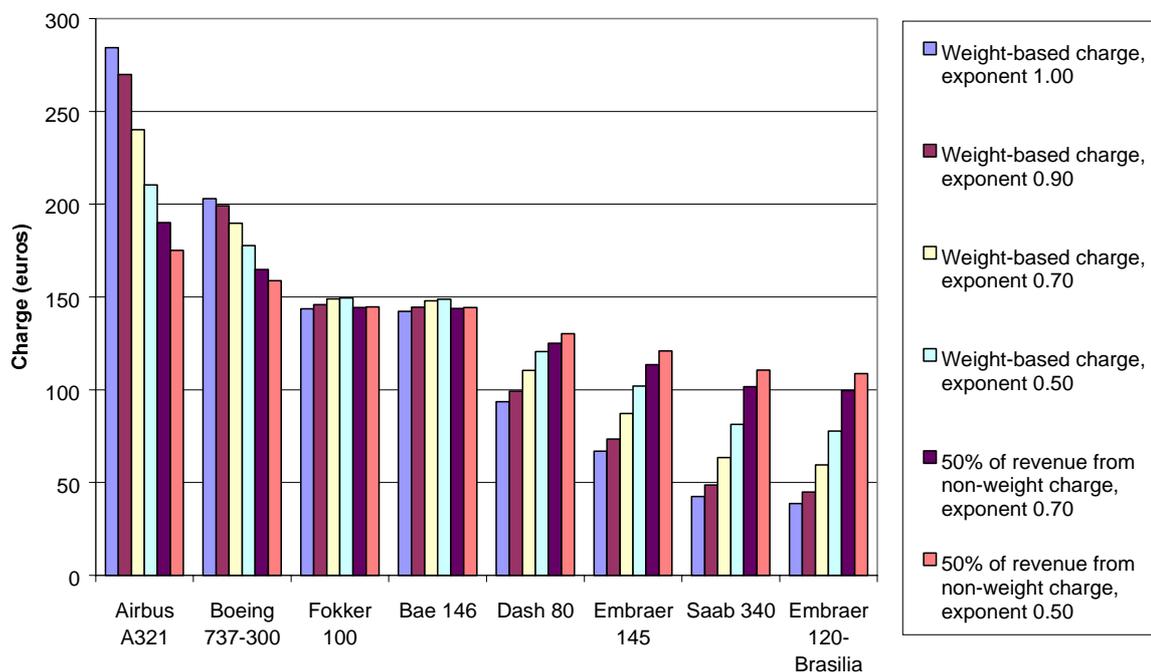


Table 4.4.4.1: Impact on charges at Munich airport

	Airbus A340	Boeing 737-300	Saab 340
Current charge €	514	245	112
Charge under proposed system €	458	239	159
Increase €	-55	-6	46
Increase per occupied seat €	-0.33	0.06	+1.95
Increase %	-11%	-2%	41%

4.4.4.4 We have conducted a similar simulation for Strasbourg airport, again assuming that total revenue from terminal ANS charges for the airport was held constant. At present, terminal charges in France are related to MTOW with an exponent of 0.90. Our proposal would hence result in a significant increase in charges for the smaller aircraft at the airport (table 4.4.4.2).

**Figure 4.4.4.2: Estimated charges at Strasbourg airport under different formulae****Table 4.4.4.2: Impact on charges at Strasbourg airport**

	<b>Airbus A321</b>	<b>Fokker 100</b>	<b>Saab 340</b>
Current charge €	270	146	48
Charge under proposed system €	190	144	110
Increase €	-80	-2	52
Increase per occupied seat €	-0.60	-0.02	2.20
Increase %	-29%	-1%	108%

4.4.4.5 The impact of reform would thus be relatively small for most aircraft types other than aircraft that are much larger or smaller than the normal types used at an airport. There would be significant relative increases for small aircraft, but even these would, in absolute terms, have a small impact on total costs and thus on the fares levied on passengers. For the majority of aircraft types at any airport the change would be small, as long as the total revenue from terminal ANS charges for the airport remains constant. But if uniform charging at airports within states was retained, our proposed reforms to the charge formula would change the relative contribution from each airport, and the impact of the reforms would therefore be greater.

4.4.4.6 In order to demonstrate this, we have simulated a hypothetical airport system of thirteen airports, in which there is one hub airport with equivalent traffic to Munich, four medium sized airports with equivalent traffic to Strasbourg, and eight secondary airports with equivalent traffic to Salzburg. The proposed changes to the charge formula would result in a greater increase in charges for small aircraft and a larger reduction in charges for large aircraft. Table 4.4.4.3 illustrates the impact the proposals would have on charges

relative to various existing tariff formulae. The greatest increase in charges would occur in states which currently use an exponent of 1.00. If a uniform charge across all airports within the state were retained, our proposed amendments to the tariff formula would increase charges by 190% in such states. However, we estimate that this would still represent an average increase in fares of less than €5.

**Table 4.4.4.3: Impact of proposed tariff formula on an airport system**

<b>Increase in charges if existing tariff formula is</b>	<b>Airbus A340</b>	<b>Boeing 737-300</b>	<b>Saab 340</b>
Exponent 1.00	-57%	-5%	190%
Exponent 0.90	-51%	-6%	146%
Exponent 0.50	-10%	-5%	33%

## **4.5 Exemptions and discounts**

### **4.5.1 Summary of proposals**

4.5.1.1 We propose that all exemptions and discounts from terminal charges should be removed, unless the exemptions or discounts reflect different levels of costs, or the exemption of a flight confers clear benefits on other users of the airspace. The only flights that could be entirely exempt from charges, on these criteria, are search and rescue flights. Exemptions for some categories of flight would however be permitted to continue if the national government of the state, or another government organisation, reimburses the ANSP in full for the charges that would otherwise have been levied on the exempted aircraft.

4.5.1.2 Volume discounts on terminal charges benefit the carriers based within a state at the expense of other carriers, and therefore represent unfair discrimination against smaller and international carriers. We propose that all such discounts should be removed from the terminal ANS charge structure in the EU. We note that such discounts may breach existing Community legislation, and that legal action is currently underway in an effort to end similar discounts offered for airport charges in some states. However, we believe that this restriction need not be enforced in the relatively rare circumstances where:

- terminal ANS services are provided to airports by ANSPs (and not directly to users) on a contestable commercial basis; and
- there is genuine competition between the commercialised airports procuring the terminal ANS services concerned.

In such cases, the offering of discounts by a commercial airport to some specific carriers may represent a legitimate commercial decision on the part of that airport, subject only to broader competition law and regulation.

## **4.5.2 Detailed proposals**

### **Military and government flights**

4.5.2.1 The majority of Member States currently exempt military and some government flights from terminal ANS charges. In some states, the costs of providing services to these flights are not included in the cost base for charges levied on other flights. In many cases this is because the government directly refunds the ANSP for the charges that would have been levied. A similar mechanism applies for en-route services: EUROCONTROL charging principles prevent the inclusion of military flights in the cost-base for route charges<sup>32</sup>. However, in a number of states, there is no such mechanism for terminal ANS, and therefore the costs of providing services for exempt flights are recovered from other users via cross-subsidy.

4.5.2.2 The exemption of any category of flight results in the operator of that flight having an inefficient pricing signal, as they face marginal costs of zero in deciding when and where to use airspace. An efficient charging structure would in principle impose the same charges on all flights. However, because any charges levied on government or military flights would in practice be funded by the government concerned in any event, exempting the direct users from paying charges will typically make no practical difference to the behaviour and decisions of the users concerned. Therefore we propose that states should continue to have the option of exempting military and government flights from paying terminal ANS charges directly, so long as these charges are instead reimbursed in full by the government, and are not recovered directly or indirectly (for example, through passenger charges) from other users.

4.5.2.3 Payments from the government to the ANSP to cover the cost of exempting military and government flights from charges would therefore need to be transparent under our proposals. The number of service units and the total revenue should therefore be published, and users should have a right of appeal, along similar lines to the procedures discussed in section 4.6, if they believe that the costs of exempt flights are being recovered from them.

### **Training flights**

4.5.2.4 We propose that, under most circumstances, states should not have the right to exempt training flights from charges. We propose limited exemptions to this general rule, although where states use these exemptions, the relevant charges for these flights should be reimbursed in full by the government, in the same way as charges for military and government flights would be.

4.5.2.5 This would mark a departure from existing practice in a number of states, where training flights are exempted from charges, but where the costs of providing terminal ANS for these flights are recovered from other users. The operation of a number of training flights

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<sup>32</sup> Principles for establishing the cost-base for route facility charges and the calculation of the unit rates, Eurocontrol, 1999

is a necessary requirement for the operation of a safe air transport system. However, this does not provide a *prima facie* case for the exemption of these flights from charges:

- training is a commercial activity. Other aspects of aircraft training, and other airline safety-related operations (such as the use of simulators) are not funded by the state, and there is no clear reason why just the terminal ANS charge component of these training costs should be;
- The provision of training should be a competitive activity. However, competition between training institutions based in different states would be skewed by exemptions from charges in some states, but not in others; and
- The majority of airlines are likely to organise at least some training in their home state. The exemption of training flights from charges therefore results in an unfair cross-subsidy to the national airlines from other airlines operating services to the state. If the government reimburses the costs of exemption of training flights from terminal ANS charges, the national airlines receive, in effect, state aid.

4.5.2.6 The case for maintaining charge exemptions for training flights is therefore not compelling. However, we propose that states should be able to continue to exempt training flights from charges, so long as the charges are reimbursed in full by the government, as set out above, in cases where the state attests that guaranteeing adequate safety requires the exemption of training flights. This should only be the case where the safety enforcement and inspection regulatory mechanisms in the state are temporarily inadequate – which should of course be a source of broader concern. The exemption should also be restricted to registered flying schools and should apply only for a limited period; we suggest that this period should be 5 years.

#### **Flights with small aircraft and VFR flights**

4.5.2.7 We propose that exemption of small aircraft and VFR flights from charges should be terminated. However, states may require ANSPs to offer these flights discounted unit rates if a lower standard of service is provided for these aircraft, and/or to offer these flights season tickets which imply lower average unit rates if this will improve revenues net of billing and collection costs.

4.5.2.8 There are three main arguments in favour of exempting small aircraft completely from charges:

- In the absence of a system of marginal cost pricing, the majority of the charges paid by these users are likely to continue to be based on ability to pay, using the maximum takeoff weight as the best available proxy. The charges for VFR aircraft will therefore be low, and the revenues may therefore not offset billing and collection costs;
- Most ANS infrastructure is provided for the benefit of larger aircraft operating commercial flights. Although there is little difference in the infrastructure and terminal ANS required to handle a small regional jet (such as an Embraer-145)

and a large jet, most infrastructure would not be needed if these aircraft were not in operation. Therefore, small and VFR users have argued that most terminal ANS costs should be recovered from larger and IFR aircraft only; and

- The fuel used by small aircraft is subject to tax in some states, such as France; in contrast, the fuel used by large aircraft is generally not subject to tax. The revenue from this tax may exceed any charges that would be levied. Although fuel taxes are an imperfect means of recovering transport infrastructure costs in many cases, they have been put forward as a more practical method of recovering costs in this area.

4.5.2.9 However, there are a number of counter arguments against exempting small aircraft from charges. Although, as explained in section 3, we do not propose a switch to a system of full marginal social cost pricing for terminal ANS charges at the present time, exemption of small aircraft from paying any charges to use congested infrastructure could exacerbate congestion. Simply banning flights of certain types from using the facilities at certain times would in general be inequitable and inefficient. A specific exemption of VFR flights, or a discount for these flights, would also create a charge “cliff edge” and hence tend to encourage the operation of flights with small aircraft as VFR rather than IFR at the margin, which conflicts with the overriding objective of maintaining or enhancing safety.

4.5.2.10 We therefore propose that states should not have the option of exempting small aircraft from charges completely. Instead we propose that states should have the option of either charging these aircraft in full, offering discounts to these flights (as in Germany), or selling season tickets. Any discounts offered should reflect the lower standards of services received, and costs imposed, by these flights, but should also take into account any additional controller time that these aircraft use as a result of the fact that some facilities, such as ILS, are not used. The level of any discount should be transparent, justifiable and subject to review by users.

4.5.2.11 Where a state opts to sell season tickets to small aircraft, it should decide the conditions that should be attached to such season tickets. We suggest that season tickets should be subject to limitations on time of use, and, at the discretion of states, place of use, in order to discourage small aircraft from using major airports at peak times. This is already the case in Finland, where season tickets are offered to small aircraft, but are not valid at Helsinki airport at peak times. The season ticket should be set at a level that ensures:

*revenue from season ticket  $\geq$  revenue from billing at standard charge – saving on collection cost*

4.5.2.12 If season tickets are introduced, operators of flights with small aircraft should have the option of paying the normal charge on a per-flight basis instead of buying a season ticket. Small aircraft that wish to operate at times and places that are not covered by the season ticket should pay the full charge for those times and places.

4.5.2.13 Where terminal ANS charges or season tickets are introduced for small aircraft, states that currently levy taxes on the fuel used by these aircraft may wish to consider

reducing these taxes at the same time, to ensure that the users pay at the point of use, in line with Community charging principles, but do not then pay again through their taxes.

4.5.2.14 We propose that season tickets should only be available for aircraft with an MTOW of less than 2 tonnes.

#### **Search and rescue flights**

4.5.2.15 Search and rescue (SAR) flights represent a very small proportion of the flights operated. The principle of cost-reflective charges implies that all flights, including SAR flights, should pay terminal ANS charges. However, operation of those SAR flights that are necessary is of wide social benefit and the introduction of charges for these flights would be highly controversial. We propose that states should continue to have the option of exempting SAR flights from terminal charges and may, at their discretion, pass on the costs of these exemptions to other users. Governments should also retain the option of refunding the ANSP directly for the charges that would have been levied on SAR flights (as for government, military and training flights as discussed above).

#### **Volume discounts**

4.5.2.16 Volume discounts on terminal ANS charges, as offered by the Portuguese ANSP, discriminate unfairly in favour of airlines based in the state. We propose that all such discounts should be abolished.

4.5.2.17 Some commercialised airports are able to procure terminal ANS on a contestable basis. Where airlines have a genuine choice of airports, and terminal services are provided on a commercialised, contestable basis to these competitive airports, the airport operators should have the ability to offer negotiated incentives to carriers on charges including elements to recover ANS costs, in the same way that they, or other commercial organisations, might offer such discounts on other services. However, we believe that these circumstances will only apply in a small number of cases in terminal ANS provision in Europe in Stage 1, because services are in most cases not yet contestable and there are only limited cases where airlines have a genuine choice of airport. The only cases where this might arise would be when an airline is choosing between two airports for development of a new service or hub.

4.5.2.18 Volume discounts should therefore only be permitted where:

- The service is charged for an airport procuring it from ANSPs competing to provide it;
- Users have a genuine choice of airports with sufficient availability of slots: for example, Hahn airport might offer a genuine alternative to Frankfurt airport, but Dusseldorf airport does not, and therefore volume discounts might be acceptable at Hahn airport but could not be at Dusseldorf; and
- The requirements of the applicable economic regulatory framework (including general competition law) are satisfied.

### **4.5.3 Stakeholders' views**

4.5.3.1 In our discussions with ANSPs and regulatory authorities, few strong opinions were expressed about exemptions. All states that we spoke to considered that volume discounts for monopoly services were unacceptable and discriminatory, although the UK Civil Aviation Authority suggested that, where services were contestable, airports and ANS providers should be able to make commercial decisions to offer volume-related incentives. The exemption we have proposed above would allow these to continue. Many states noted that there was already a trend towards a reduction in the number of exemptions. Some states, including France and Germany, considered that a season ticket for small flights might be a good idea in principle, but noted that it would not be compliant with their national laws at present.

4.5.3.2 IATA, IACA and ERA, representing the major scheduled, charter and regional airlines, expressed concern that the costs of exempt flights were being recovered from their members and supported the cessation of most exemptions from terminal ANS charges. The user groups stressed that any payments made by governments to reimburse ANSPs for the charges that would have been levied on flights that are exempt should, in their view, be transparent.

### **4.5.4 Estimated impact of proposals**

4.5.4.1 Unfortunately, few ANSPs were able to inform us how many flights were exempt from terminal charges, and therefore any estimates of the potential impact of ending exemptions must necessarily be indicative.

4.5.4.2 In a state where a significant number of flights are exempt, and the costs of exemptions are passed on to other users, we estimate that ending exemptions would reduce terminal charges by approximately 2.5%<sup>33</sup>. Flights that are currently exempt would, under our proposals, pay the normal rate, which varies substantially within the Community.

4.5.4.3 Season tickets for VFR flights are currently offered in Finland only. The cost of an annual season ticket is €4,568 at Helsinki Vantaa airport and €1,015 at other airports<sup>34</sup>. However, as terminal charges in Finland are relatively low, we would expect that, if season tickets were offered in other Member States, the rate would usually be higher than this.

## **4.6 Regulation and consultation procedures**

### **4.6.1 Summary**

4.6.1.1 Terminal ANS charges should be set only after consultation with users. Users should also have the right to make direct representation to the government or regulatory authority that is responsible for approving charges, and should have a right of appeal, if

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<sup>33</sup> Based on data supplied by DGAC (Calcul des Taux Unitaires des Redevances de Navigation Aérienne 2000); note that DGAC does not charge other users directly for the cost of exemptions, but no state that did was able to give us details of the number of flights exempted.

<sup>34</sup> The higher cost at Vantaa does not reflect higher costs, but is intended to encourage smaller aircraft to use other airports.

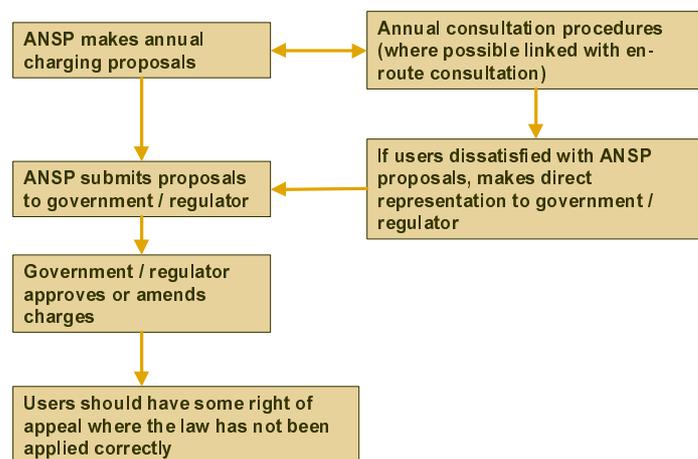
necessary through the courts, if the national laws on terminal ANS charges have not been applied. Where an ANSP is privatised or fully commercialised, charges should be subject to approval by an economic regulator within the broader framework of economic regulation applied to such ANSPs. As noted above, the specification of the details of such frameworks is beyond the scope of this particular study.

#### **4.6.2 Detailed proposals**

4.6.2.1 We propose that all ANSPs should consult with users before setting terminal charges. This consultation should take place alongside the regular process of consultation for en-route charges. This would minimise the administrative burden on users and would facilitate comparison of the cost-bases for terminal and en-route ANS. Users should be supplied with an adequate explanation of all costs that terminal ANS charges are to recover. We would therefore expect users to be provided with a full breakdown of each cost item (staff, operating and maintenance costs, interest, depreciation etc) by airport or centre, with the costs of distinct services (such as MET and AIS) separately identified.

4.6.2.2 If users are not satisfied with the outcome of the consultation procedure with the ANSP, they should also have the right to make direct representations to the government or regulatory authority that is responsible for approving charges. Users should also have a right of appeal to the courts or an alternative independent authority in the Member State if European or national laws on terminal ANS charges have not been applied. States should decide what form the independent authority should take: it could either be the national courts or competition authority.

**Figure 4.6.2.1: Summary of consultation procedure**



4.6.2.3 It is not within the scope of this study to recommend reforms to the overall ownership structure of European ANS. However, where ANSPs have been privatised, or provide services on a commercial basis rather than a cost-recovery basis, or services are provided on a contestable basis, charges should be subject to approval by an economic regulator that is independent of the controlling shareholder of the ANSP.

### **4.6.3 Stakeholders' views**

4.6.3.1 User groups support the improvement of consultation procedures and the introduction of a right of appeal where it is not available at present. Most ANSPs already have in place some form of consultation procedure for terminal ANS charges, and we found during our Phase One discussions with ANSPs that those ANSPs that did not have a consultation procedure at present were considering the introduction of one. Most ANSPs and regulatory authorities also agreed that there should be a right of appeal, although some have expressed concern that a right of appeal to the courts could result in unnecessary and expensive legal actions. We have therefore proposed that the right of appeal should be limited to cases where the laws applicable to the determination and approval of terminal ANS charges have not been upheld.

### **4.6.4 Estimated impact of proposals**

4.6.4.1 By improving the transparency of the terminal ANS charging structure and improving communication between ANSPs and users, we would expect these proposals to result in a reduction in terminal ANS charges in the long run. However, these proposals will not themselves have a significant immediate effect on the overall level of terminal ANS charges; other complementary mechanisms, such as the benchmarking processes being examined within EUROCONTROL's PRC framework, and structures of incentive-based economic regulation, would be needed to exert effective pressure on efficiency. In turn, such mechanisms will need to be fully compatible and consistent with a robust and effective framework of safety regulation.

## **4.7 Accounting procedures**

### **4.7.1 Summary**

4.7.1.1 We recommend that ANSPs should be required to provide detailed accounts, disaggregated by airport and by ACC. The accounting principles used for the producing the cost base for route charges should also be used for terminal charges, although ANSPs should also publish a reconciliation of this with national GAAP. Where there are separate charges for separate phases of ANS, accounts should also be disaggregated by these phases of flight. This would ensure that the cost bases of the separated charges are transparent to both users and the authorities responsible for approving charges. We suggest that these accounts should be independently audited.

4.7.1.2 Charges should recover capital costs as well as operating costs, and the return on capital should be reasonable.

### **4.7.2 Detailed proposals**

4.7.2.1 We recommend that ANSPs should be required to provide accounts that give a breakdown of expenditure in sufficient detail to allow the reconciliation of costs to the charges being set to recover them from users. In order to establish the different costs associated with each part of terminal ANS, accounting data should therefore be broken down by airport and by ACC.

4.7.2.2 ANSPs expressed concern that it would be difficult to provide accounts that were disaggregated by phase of flight. There is typically considerable sharing of resources between ANS phases and as a result the existing need for ANSPs to split costs between those recovered by terminal and en-route charges requires some costs to be divided in accordance with broad percentage allocation rules. However, without costs that are disaggregated by phase of ANS, it would not be possible to have a transparent cost basis for separate charges for separate phases. We therefore propose that, where there are separate charges for an ANS phase, accounts should be published showing the disaggregation of costs. However, where an integrated charge applies (for example, between aerodrome and approach ANS), ANSPs should produce a breakdown for the entire phase covered by the charge, but should not have to produce a breakdown for the separate phases.

4.7.2.3 Statutory accounts are produced in line with national GAAP (generally accepted accounting principles), but these differ significantly between countries and therefore each state uses a uniform system, determined by EUROCONTROL, when preparing the cost base for en-route charges. We propose that an equivalent system should be used in preparing the cost base for terminal charges. However, in order to facilitate reconciliation with statutory national accounts, ANSPs should also produce a breakdown of accounts produced in accordance with national GAAP and provide an explanation where there are significant differences between these. This proposal is in line with current PRC proposals on information disclosure<sup>35</sup>.

4.7.2.4 Charges should allow ANSPs to make a reasonable return on investment. For ANSPs that are not partly or wholly privatised, this should reflect their cost of capital in public ownership. In partly or wholly privatised ANSPs, an appropriate economic regulator should determine what constitutes a reasonable rate of return, given the efficient funding structures and risk allocations assumed in setting charges.

### **4.7.3 Stakeholders' views**

4.7.3.1 Users would strongly welcome any improvement in the financial information provided by ANSPs. However, we note that users have expressed some scepticism about the financial information provided by ANSPs at present, and in this context we note that there could be substantial benefits from having ANSPs' disaggregated accounts independently verified, as an adjunct to their existing statutory audit processes. Users have also expressed concern that the returns on capital sought by ANSPs are not reasonable at present.

### **4.7.4 Estimated impact of proposals**

4.7.4.1 By improving the transparency of ANSP's accounts, we would expect these proposals to result in a reduction in terminal charges in the long run. However, we would not expect these proposals to have any impact on terminal charges in the short term.

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<sup>35</sup> Draft Specifications for Information Disclosure, October 2000

## **4.8 Billing and collection**

### **4.8.1 Summary**

4.8.1.1 The provision of billing and collection services for terminal ANS charges to ANSPs should be a contestable activity, as third party providers can and do provide these services on a contracted out basis. Where billing and collection of charges is the responsibility of the ANSP rather than the airport, it should market-test the efficiency of its own service delivery at least once every five years. The format of bills for terminal ANS charges should be standardised, in order to minimise the administrative burden on users dealing with ANSPs across the Community.

### **4.8.2 Detailed proposals**

4.8.2.1 The CRCO provides an established system for the centralised billing and collection of en-route charges. However, there is no equivalent centralised system for terminal ANS charges. Billing and collection is currently undertaken by either:

- the airports;
- the ANSP directly; or
- the CRCO on behalf of the ANSP.

4.8.2.2 In principle, centralised collection of terminal charges could often be more efficient, and reduce the administrative burden on users. However, some users commented that the cost-efficiency of the CRCO and its effectiveness in handling bad debts could be improved: for example, one airline recently went bankrupt owing the CRCO €18m, which will presumably eventually be recovered from other airlines. Therefore we do not propose that use of CRCO, or any other alternative central process or provider, for the billing and collection of terminal ANS charges should be mandated.

4.8.2.3 Hence, although both airports and the CRCO should have all the data needed in order to bill the structure of terminal ANS charges that we propose for Stage 1, and both already issue bills to the airlines (for landing charges and en route charges respectively), ANSPs should not be compelled to contract out their billing and collection activities. Where ANSPs bill charges directly, we would expect this often to result in unnecessary duplication of resources and an increased administrative burden on users – but there may be instances where in-house billing and collection is efficient (e.g. where the ANSP also operates airports). We therefore propose that, except where billing and collection is the responsibility of the airport, ANSPs should market-test their procedure for billing and collection by putting the functions out to open tender at regular intervals. We propose that this should happen every 5 years. CRCO, IATA, airports and possibly other organisations could bid for such a tender. The ANSP should only continue to bill and collect directly if its avoidable billing and collection costs are lower than the bid submitted by external organisations, so that in-house service provision represented the best value for money option for users.

4.8.2.4 In order to reduce the administrative burden on users, bills for terminal ANS charges should follow a consistent format. The details of such a format should be agreed between user groups, the CRCO and other organisations that bill and collect terminal ANS charges.

### **4.8.3 Stakeholders' views**

4.8.3.1 Small users have expressed concern about the administrative burden associated with the proliferation of different bills for ANS services, which would potentially increase with any vertical unbundling of the industry. Both users and ANSPs expressed a concern that central billing (e.g. through the CRCO, as with en route charges) should not be mandatory. However, ANSPs in those states which already used the CRCO for billing and collection of terminal ANS charges noted that it did so at significantly lower cost than they would be able to.

### **4.8.4 Estimated impact of proposals**

4.8.4.1 Our proposals should reduce the administrative costs of billing and collection over the longer term. The adoption of a common format for bills would reduce the administrative costs incurred by users and would aid the transparency of the system. However, it would be difficult at this stage to estimate the cost savings that would be associated with contracted-out provision of billing and collection services, or the speed with which they could be realised following the introduction of our Stage 1 proposals.

## **5 Next steps**

5.1 This represents our final report on developing a harmonised structure of terminal ANS charges for the European Union. It takes into account initial comments from the Commission further to our presentation of our main proposals and written comments from the Commission on a draft version of this report.

5.2 We note that many of our proposals will require legislation in order to take effect. The Commission is currently developing legislative proposals for the reform and regulation of European airspace as part of the Single Skies programme. We believe that these proposals could be included in this legislation although this would require the development of detailed legislative proposals within a relatively short timescale, as development of such proposals was not within the scope of this study.

5.3 However, we note that the Higher Level Group envisaged the implementation of proposals for reform of European airspace in 2005<sup>36</sup>; our proposals for the first stage of reform to the charging structure are designed to be implemented as soon as all legislative, consultative and administrative procedures have been completed. We therefore expect that, assuming the legislative process is completed in sufficient time, they could also be implemented well before 2005. However, some of the reforms we have proposed, such as the amendments to the en-route charging formula, would require reform to be undertaken by EUROCONTROL rather than the Commission, and it may be easier to pursue this once the Commission has become a member of EUROCONTROL.

5.4 Although we expect that implementation of our proposals in full would require legislation, it may be possible to make progress within existing legislation on some of the issues that we have highlighted. For example, a key example of unfair discrimination in the terminal charging system is the volume discounts offered on charges in Portugal: we note that the Commission is undertaking legal action in order to eliminate similar discrimination on airport charges. If this were to be successful, we would expect that similar action could be taken in terminal charges. The Commission could also consider whether legal action could be taken concerning other examples of indirect discrimination between airlines resulting from cross-subsidy between phases of flight and between airports. In this context we note that a complaint has been received from one European airline with respect to the revisions to the terminal charging structure in Germany.

5.5 Section 4 provided indicative estimates of the impact of our proposals for the first stage of reform. We note that these proposals may have a significant impact on the viability some air services. We therefore propose that the Commission should consider phasing in some of these proposals over a three-year period in order to allow airlines sufficient time to adjust their route structure and fleet plans. Table 5.1 lists where we expect our proposals to require some delay before they take effect.

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<sup>36</sup> Final report of the Higher Level Group, November 2000

**Table 5.1: Proposals where a phase-in period may be required**

<b>Proposal</b>	<b>Phase in period required?</b>
All terminal ANS costs to be recovered through terminal (rather than en-route) charges	No
Separate aerodrome and approach charges	No, although some ANSPs may require additional time to implement this
Revision to 20km rule	No
Charges at each aerodrome to recover at least the avoidable costs of services at the aerodrome	Yes, in particular to ensure that resulting average charge levels were not significantly in excess of likely short-run marginal cost levels with efficient long run levels of capacity provision
Tariff formula with uniform exponent of 0.70 and non weight related element	Yes (particularly if non weight related elements to be introduced)
Abolition of exemptions and discounts	Termination of exemption for training flights only may be phased in
Revised accounting, regulation and consultation procedures	No, although some ANSPs may require additional time to implement this

5.6 As explained in section 3 above, we propose that after a defined period, the Commission should review the system for terminal charging again with a view to introducing a pricing system that is better related to the marginal, rather than the average, costs of ANS use. This review should take place after there has been sufficient time for the stage one reforms to the charging structure to take effect, and for airlines to adjust their fleet plans and operational strategies accordingly. Sufficient time should also be allowed for the Commission, ANSPs and EUROCONTROL to work to meet the data requirements set out in section 3 above. We therefore propose that this review should take place at least three to five years after implementation of these proposals. We propose that the Commission should commit to undertaking this review in the initial legislative proposals; the review team would then advise on whether sufficient data had become available to enable progress to a second stage of reform.

5.7 Prior to the development of detailed legislative proposals, we suggest that our proposals should be circulated amongst stakeholders, including ANSPs, Member States and user groups. In order to explain the rationale for these proposals and to improve communication with stakeholders, we have agreed with the Commission's suggestion that we could participate in a joint workshop with stakeholders.

## **Appendix 1: Glossary**

ACC	Air traffic Control Centre; each ANSP divides control of airspace into one or more ACCs
ACI	Airports Council International
AEA	Association of European Airlines
AENA	Aeropuertos Españoles y Navegación (Spanish ANSP)
Aerodrome control/ANS	Services provided for the phase of flight directly associated with takeoff and landing at a particular airport, after handover from an approach or final approach controller. Usually applies until the aircraft leaves the taxiway.
AIS	Aeronautical Information Services
ANS	Air Navigation Services
ANSP	Air Navigation Service Provider
APP	Approach control
Approach control/ANS	Services provided for the phase of flight between handover of control from an en-route controller and handover to an aerodrome controller. Approach control operates within the boundaries of the TMA; however, the TMA can serve more than one airport.
Apron management	Control of aircraft on the apron, including parking
ATC	Air Traffic Control
ATFM	Air Traffic Flow Management
ATM	Air Traffic Management
Avoidable costs	Costs that would not be incurred if a particular service were not provided. The scale of avoidable costs typically depends on the period of time a service is not provided, with permanent cessation implying higher avoidable costs

Capacity costs	Incremental/decremental costs associated with the variation in the level of ANS capacity provision in the medium/long term
Central costs	Costs associated with providing central ANS facilities (finance, personnel, billing etc) that are not directly associated with any particular aerodrome or TMA
Centre	See ACC
CFMU	Central Flow Management Unit (EUROCONTROL)
CNS	Communications, Navigation and Surveillance
CODA	Central Office of Delay Analysis (EUROCONTROL)
CRCO	Central Route Charges Office (EUROCONTROL)
DFS	Deutsche Flugsicherung (German ANSP)
DGAC	Direction Generale de l'Aviation Civile (French Civil Aviation Authority, part of the French Ministry of Transport; also the ANSP for France)
EBAA	European Business Aircraft Association
ECAC	European Civil Aviation Conference
ENAV	Ente Nazionale di Assistenza al Volo (Italian ANSP)
En-route control/ANS	Services provided for the phase of flight associated with level flying and descent prior to handover of control to an approach controller.
ERA	European Regional Airlines Association
EU	European Union
Final approach control/ANS	Additional phase of services provided at a small number of airports, applicable on landing only: the phase between handover from an approach controller and handover to an aerodrome controller.
FIS	Flight Information Services
Fixed ANS costs	Costs which are not directly related to variations in the level of ANS capacity provision and which would

	therefore not be expected to increase with incremental traffic or additional long-term capacity provision
FL	Flight level (altitude measure in feet divided by 100)
IACA	International Air Carriers Association
IAOPA	International Council of Aircraft Owner and Pilot Associations (representatives of general aviation)
IATA	International Air Transport Association (representatives primarily of major international airlines)
ICAO	International Civil Aviation Organisation
Lower airspace	Airspace below (typically) FL245, but not including the TMA. ANS provided by an en-route controller, but a higher proportion of aircraft within this phase are ascending and descending than in upper airspace.
LRMC	Long run marginal costs
Marginal ANS costs	Costs associated with additional ANS demand
MET	Meteorological services
MTOW	Maximum Take-Off Weight
NATS	National Air Traffic Services (UK ANSP)
PPM	Possible Pricing Mechanisms [task force]
PRC	Performance Review Commission
PRU	Performance Review Unit
PwC	PricewaterhouseCoopers
SAR	Search and Rescue
Social marginal ANS costs	Additional social costs associated with an increase in ANS use (incremental congestion, air pollution and noise)
Sector	<b>EITHER (depending on context)</b> Sector of airspace, usually controlled by 1-3 controllers. An ACC is divided into one or more sectors.

**OR** one-way flight involving one takeoff and landing only (eg. a flight that stops once en route has two sectors)

SRMC

Short run marginal costs

Terminal control/ANS

Jointly describes ANS facilities associated with approach, takeoff and landing, including approach control, aerodrome control, final approach control where a separate phase exists and apron management where this is provided by the ANSP

TMA

Terminal Management Area, the area in which approach control services are provided

TWR

Tower (aerodrome) control

UAC

Upper Airspace Control Centre (used to describe ACCs that are responsible for upper airspace only, eg. Maastricht)

Upper airspace

Airspace above (typically) FL245. ANS provided by an en-route controller. Most aircraft in upper airspace are level flying.

## Appendix 2: Tariff structures

State	Separate terminal charge	Volume discount	Variation between airports	Tariff formula
Austria	Yes	No	No	Proportional to $(MTOW/50)^{0.50}$
Belgium	No – landing fees	Yes <sup>37</sup>	Yes	Rate per tonne, subject to minimum and maximum
Denmark	Yes, at certain airports	No	Yes <sup>38</sup>	Rate per tonne, lower unit rate over 100 tonnes
Finland	Yes	No	No	Proportional to $(MTOW/50)^{0.50}$ , lower unit rate under 35 tonnes
France	Yes	No	No	Proportional to $MTOW^{0.90}$
Germany	Yes	No	No	Proportional to $(MTOW/50)^{0.50}$
Greece	No – landing fees	No	No	Rate per tonne which increases as MTOW increases
Ireland	Yes, at major airports	No	No	Rate per tonne
Italy	Yes	No	No	Proportional to $MTOW^{0.95}$ 50% discount for domestic flights.
Luxembourg	No – landing fees	No	N/A	Rate per tonne
Netherlands	Yes	No	Charges expected to vary after current review	Rate per tonne, flat rate over 100 tonnes
Portugal	Yes	Yes	No	Rate per tonne
Spain	Yes	No	Charges vary by airport group (variation not related to costs)	Proportional to $MTOW^{0.90}$
Sweden	Yes	No	No	Rate per tonne which decreases as MTOW increases; flat rate over 100 tonnes
UK	Yes, at most larger airports	Not at major airports <sup>39</sup>	Yes, although London airports one group	Varies by airport. At London airports rate per tonne with lower rate over 100 tonnes; other airports rate per tonne

<sup>37</sup> Structure under review. Volume discounts available under current charging structure, but not under proposed charging structure

<sup>38</sup> Kastrup and Roskilde airports form one airport group, but airport-specific terminal ANS charges to be introduced at Billund

<sup>39</sup> It is possible that volume discounts are offered by airports on charges including terminal ANS charges where airports procure these services on a contestable basis; however, any such discounts would be confidential..