



# Global Market Forecast

2003-2022





December 2003

The Airbus Global Market Forecast  
may also be found on the Internet at  
<http://www.airbus.com>



**AIRBUS**

---

*AIRBUS S.A.S.  
31707 BLAGNAC CEDEX, FRANCE  
REFERENCE CB 390.0008/02  
DECEMBER 2003  
PRINTED IN FRANCE  
© AIRBUS S.A.S. 2003  
ALL RIGHTS RESERVED*

---

*AN EADS JOINT COMPANY  
WITH BAE SYSTEMS*

The statements made herein do not constitute an offer. They are based on the assumptions shown and are expressed in good faith. Where the supporting grounds for these statements are not shown the Company will be pleased to explain the basis thereof.

## Contents :

1. Forecast highlights	4
2. Introducing the Global Market Forecast	8
3. Impact of the crisis	10
4. Demand for air travel	13
5. Air transport operational evolution	17
6. Passenger fleet renewal	19
7. World passenger fleet development	21
8. Demand for passenger aircraft deliveries:	23
• Mainline single-aisles	26
• Small twin-aisles	28
• Intermediate twin-aisles	30
• Large aircraft	32
9. Air cargo forecast	35

### **Appendices**

A. Airlines & cargo carriers studied	46
B. Detailed passenger traffic forecast	50
C. Detailed passenger fleet forecast	53
D. Detailed cargo traffic forecast	55
E. Freighter fleet forecast	58

# 1. Forecast highlights

This edition of the Airbus Global Forecast covers the evolution through 2022 of the fleet of mainline passenger jets with at least 100 seats and freighters operated by airlines outside the Commonwealth of Independent States.

Following the rapid termination of major conflict in Iraq, the faster-than-expected recovery from the SARS outbreak should open the way to a rapid worldwide recovery of air travel, which has been severely affected by these events.

Even as traffic recovers, creating a need for additional capacity, airline revenues – eroded by deep price discounting – are likely to lag. Nevertheless the potential for further growth in demand for air travel, especially among citizens of the developing world, is such that, absent another major crisis, Airbus forecasters continue to predict a bright long-term future for the civil aircraft manufacturing and support industries.

Increasing cost and competitive pressures, generated partly by a new generation of aggressive “no-frills” carriers, are driving airlines to consolidate their networks so as to exploit economies of scale, minimise environmental impact and provide smaller communities with more service choices.

Despite the impact of the worst crisis ever suffered by the world’s airlines, carriers have continued to place orders for the very large and economical A380, reflecting a vote of confidence not just in this exciting new aircraft but also in the very future of air transport itself.

The major predictions of the 2003 GMF are that during the period 2003-2022 :

## Worldwide demand for air travel will grow strongly

After three years of negative or at the best weak growth triggered by the current crisis, traffic will rebound powerfully to resume a more normal growth trend averaging just over 5% per year. Traffic growth will vary substantially between different air travel markets. Some - including the US domestic market - have matured, but revenue passenger-kilometres (RPKs) will grow strongly on routes serving the dynamic Asia-Pacific region as well as on those operated by low-cost “no-frills” airlines. By 2022 global RPKs will be at two-&-two-thirds times their current level. During the same period freight tonne-kilometres (FTKs) will more than triple, growing at a strong average annual 5.7%;

## Price will remain the #1 demand driver

Until recently, air travel demand has been driven largely by convenience. But in the harsh new airline world travellers (or those who buy their tickets) now base their travel decisions primarily on price. In response, airline managers have modified their route networks in such a way as to improve efficiency, and the total number of city-pairs served by mainline jets has stagnated. This has established a clear trend for the future;

### The capacity of both passenger and freighter aircraft will more than double

The number of seats in service will increase from 1,944,992 to 4,527,891 while the capacity of the active dedicated freighter fleet will increase from 75,630 to 196,948 tonnes;

### The number of flights offered on passenger routes will double

Despite current levels of congestion and delays, this represents a more rapid rise than in the past, and will present a major challenge to the world's airports and air traffic management systems. If the infrastructure proves unable to accommodate so many flights, airlines will have to acquire larger aircraft;

### The airlines will offer more seats per flight

Infrastructure capacity constraints mean that the numbers of flights will be unable to keep pace with the growth of traffic. Consequently average seats per departure will have to increase from 163 to 200;

### The active passenger fleet will increase by 90%

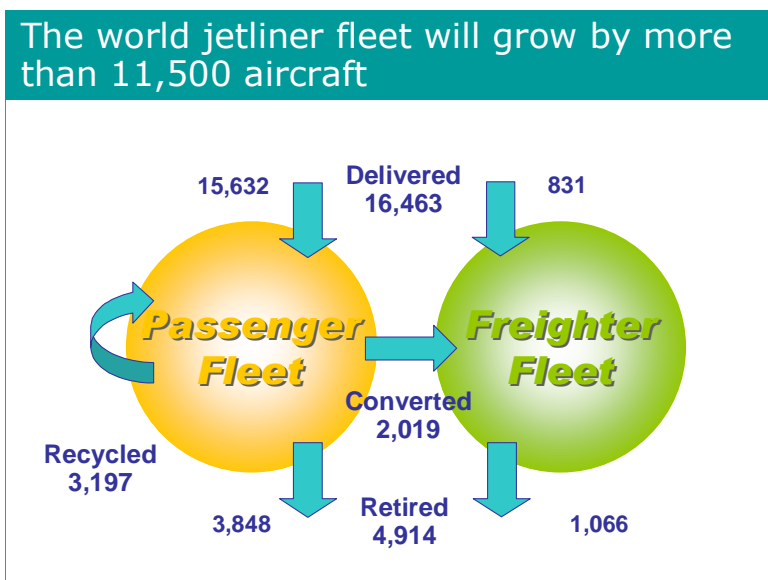
To provide the required increase in departures, the number of passenger aircraft in service will increase from 10,789 to 20,554;

### 40% of the current active fleet will be retired from commercial service

Having already stored many of their superfluous aircraft, airlines will still retire 4,914 of their older, noisier and less efficient passenger and cargo jets;

### Traffic growth and fleet renewal will require delivery of 15,632 new passenger aircraft

Almost two thirds of these will be single-aisle types in nominal size categories from 100 to 210 seats;





## Forecast highlights

### North America first in fleet size, Europe first in deliveries

The frequency-driven airlines of North America will continue to operate more aircraft than all other regions' airlines, but less mature markets will grow more strongly and the airlines of Europe will take the greatest number of deliveries;

### Asia-Pacific airlines will dominate the market for large aircraft

By 2022 60% of the world fleet of very large passenger aircraft will be operated by the airlines of the Asia-Pacific region alone;

### The active world freighter fleet will grow to 3,283 aircraft with an average capacity of 60 tonnes from 1,499 aircraft with an average 50.4 tonnes capacity

This increase of 1,784 aircraft, coupled with the need to retire 1,066 aircraft when they reach the end of their lives, will create a need for acquisition of a total of 2,850 freighters, of which 831 will be factory-built freighters and 2,019 passenger-to-freighter conversions;

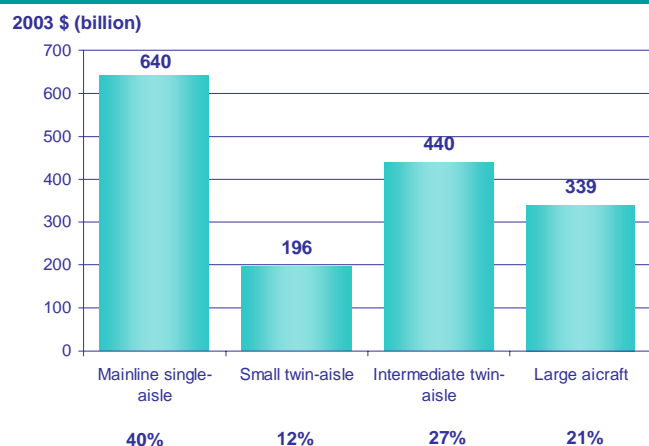
### Nearly 16,500 new aircraft will be delivered

20-year deliveries	
Mainline single-aisle aircraft like the Airbus A318, A319, A320 and A321	10,184
Small twin-aisle aircraft like the Airbus A330-200	1,782
Intermediate twin-aisle aircraft like the Airbus A330-300 and A340	2,962
Very large and economical aircraft like the Airbus A380	1,535
<b>Total aircraft</b>	<b>16,463</b>

The 16,463 new passenger aircraft and freighters represent a business volume of approximately \$1.6 trillion\*

The largest volume of business will be generated by single-aisle aircraft. Large passenger aircraft and freighters will account for almost 20% of the total business ;

### A business worth \$1.6 trillion



\* Terminology used throughout this report: billion = 10<sup>9</sup>, trillion = 10<sup>12</sup>

### Top Ten end-user nations

Passenger aircraft delivered			By \$ value (billion)	
1.	United States	5,211	United States	388.5
2.	People's Republic of China	1,530	People's Republic of China	175.5
3.	United Kingdom	1,115	United Kingdom	113.3
4.	Germany	853	Japan	95.5
5.	Japan	682	Germany	77.4
6.	Canada	514	France	52.0
7.	France	485	Republic of Korea	46.7
8.	Brazil	464	Canada	44.9
9.	Spain	411	Singapore	43.9
10.	Italy	380	Brazil	42.5

The greatest demand for passenger aircraft will come from airlines in the United States, the People's Republic of China and the United Kingdom

Almost half of all the new passenger aircraft delivered, accounting for 45% of the total dollar value, will be needed by airlines in these three nations alone.

### Key forecast parameters

Passenger a/c 100 seats and above	End 2002	End 2022
World RPKs (billion)	3,165.7	8,473.1
World ASKs (billion)	4,514.2	11,407.3
Number of aircraft	10,789	20,554
Number of installed seats	1,944,992	4,527,891
Number of departures (000)	15,864.8	31,510.0
Seats per departure	163	200
Average flight distance (km)	1,437	1,516
Block hours per aircraft per year	3,450	3,739

Key forecast parameters attest the reasonableness of the forecast's results

To facilitate understanding of the GMF and comparison with other forecasts, the table presents the values of eight key parameters at the beginning and end of the forecast period. From these, the corresponding values of other operational parameters (such as average speed and size) can be easily derived. These numbers and the relationships between them also give a useful test of the reasonableness of this (or any other) forecast's results.

# 2. Introducing the Global Market Forecast

The 2003 edition of Airbus' Global Market Forecast (GMF) predicts the numbers and capacities of passenger jets and dedicated freighters that will be needed to accommodate traffic growth and allow fleet renewal by airlines and cargo carriers outside the Commonwealth of Independent States during the twenty-year period 2003-2022. Recognising the potential business opportunity represented by the airlines of the CIS, Airbus continues to work towards developing a reliable forecast for these airlines, and looks forward to including it in future editions of the GMF.

## The GMF is a "bottom-up" forecast

In order to avoid the errors inherent in calculating from global averages, the GMF projects the year-by-year evolution of passenger traffic, flight frequencies and aircraft capacity on each of a total of 9,188 individual one-way airport-pair route sectors in 140 distinct domestic, regional and intercontinental submarkets. Similar projections are made for a total of 145 directional air cargo submarkets. These route-by-route projections are then consolidated into the regional and global fleet forecasts presented in this summary document.

## The GMF is a pure forecast of demand

It projects demand for aircraft and seats in a total of 14 "neutral" seating and four "neutral" cargo capacity categories. These may be thought of as "buckets" of seats (or tonnes of lift). Any particular passenger aircraft, with its own specific seating arrangement, will fall between two

categories and contribute seats to each on a basis inversely proportional to its distance from that category. A 160-seat A320, for example, would contribute 96 (60%) of its seats to the 150-seater category and 64 (40%) of its seats to the 175-seater category.

This ensures that at every point in the forecast the numbers of aircraft exactly match the projected flight frequencies, and the numbers of seats provide exactly the forecast capacity. Freighters are assigned to the different categories according to their payload/range capability.

**The GMF is a "bottom-up" forecast of pure demand for aircraft in 18 size categories.**

## Demand is forecast in 14 passenger categories ...

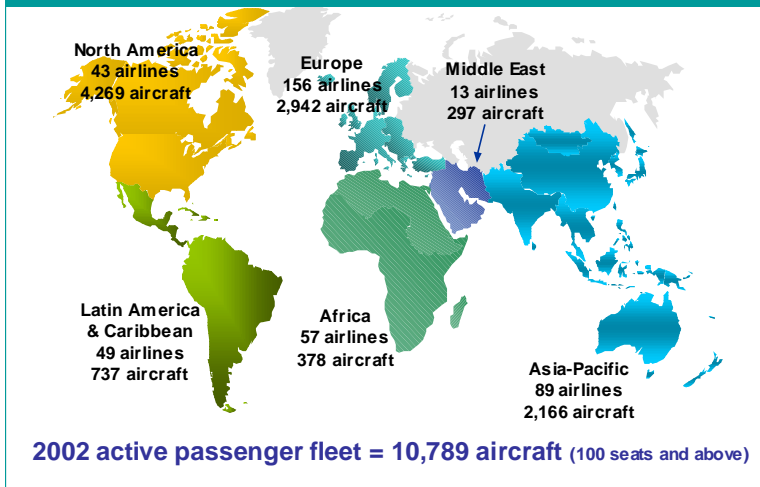
- Mainline single-aisle (100-, 125-, 150-, 175- & 210-seaters <sup>(1)</sup>)
- Small twin-aisle (250-seaters)
- Intermediate twin-aisle (300-, 350- & 400-seaters)
- Large (450-, 500-, 600-, 800- & 1,000-seaters)

---

<sup>(1)</sup> This category covers the majority of mainline single-aisle aircraft, although at the bottom part of the forecast some demand will be satisfied by 90+-seater regional jets.



## The GMF covers 407 passenger airlines ...

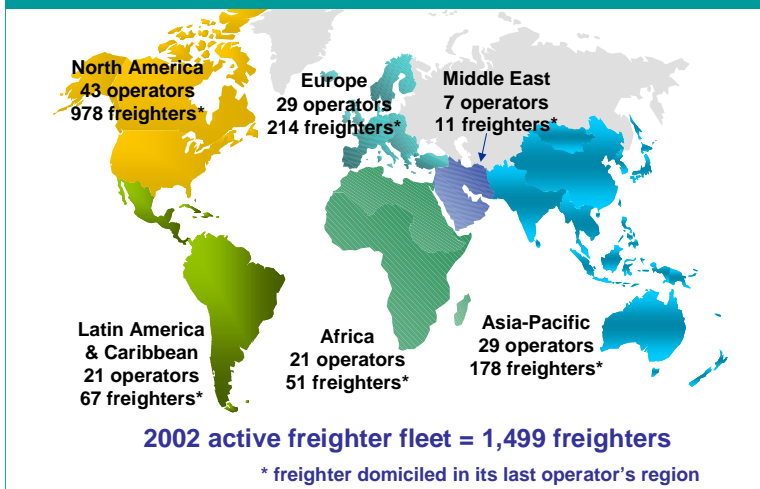


The GMF applies this approach to the active jet fleets of a total of 407 individual passenger airlines and 150 cargo carriers.

## ... and in 4 freighter categories

- Feeder : payload < 30 tonnes (typically 22 tonnes)
- Regional : payload 30-60 tonnes (typically 45 tonnes)
- Long-range : payload 30-80 tonnes (typically 60 tonnes)
- Large : payload > 80 tonnes (typically 120/110 tonnes, new/converted)

## ... and 150 freighter operators



These airlines and cargo carriers, grouped into six consolidated geographical regions, are listed in Appendix A. The regions in this summary are groupings of the sub-regions listed in IATA reports. Individual forecasts are developed for the 278 larger airlines, and the GMF also includes a less detailed forecast at the lower end of the passenger market, covering a total of 129 smaller airlines. This allows a better understanding of the potential market penetration by aircraft like the widebody single-aisle 100-seater A318, and increases the number of airlines covered by the GMF to 407 which between them account for 96% of total world mainline capacity.

# 3. Impact of the crisis

## This summary of the GMF provides results only for the long term

It presents Airbus' vision of how the world's air transport system will have evolved by 2022. However following recent events it would not be complete without some comment on the anticipated impact of the crisis.

Historical precedents are of limited use in assessing the extent and timing of the recovery in demand for air travel to be expected after the unprecedented sequence of events which has occurred during the past three years, including the "dot.com" collapse, the terrorist attacks in the US and elsewhere, the Afghan and Iraq conflicts and the SARS epidemic. However by studying the pattern of recovery following previous crises – notably that following the previous Iraq war – and reviewing the evolution of successful efforts to contain the SARS virus, Airbus forecasters have developed their prediction of the likely profile of the subsequent recovery.

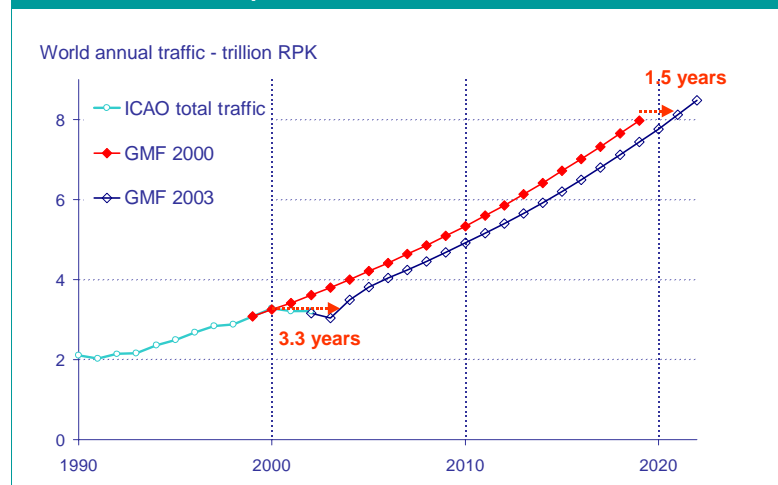
As inputs to its traffic growth models Airbus uses projections of economic growth and other indices supplied by the Global Insight (previously DRI•WEFA) Forecasting Group. Following the crises of 2001 and 2003, Global Insight's projected long-term growth rates have in general changed very little from the levels they were predicting prior to 2001. The question is to what extent, and how rapidly, will demand for air travel climb back to the previously forecast levels. Some loss appears inevitable, as more irksome security

measures at airports, especially in the USA, have diverted very short haul passengers to other modes of transport, and business travellers (or, rather, those who make their travel decisions) as well as leisure travellers have become increasingly sensitive to the price of the ticket.

This has led airlines the world over to discount their prices in an effort to stimulate demand, and yields have suffered accordingly. At the same time travellers' increasing sensitivity to price has contributed to the gains in market share obtained by a new generation of aggressive low-cost carriers at the expense of the traditional full-service airlines. In response to these increasingly severe cost pressures and competition, airlines are being driven even further to improve the efficiency of their route networks and to use low-unit-cost aircraft.

**The question is to what extent, and how rapidly, will demand for air travel climb back to the previously forecast levels.**

### The crisis will shift long-term demand by one & a half years



### The residual impact of the crises will delay traffic recovery to pre-crisis (i.e. 2000) levels

Airbus forecasters predict that total world revenue passenger-kilometres (RPKs) carried by major airlines in 2003 will be as much as 7% below those carried in 2000.

Still, the markets worst affected by the Iraq war and the SARS epidemic in 2003 have accumulated a huge pent-up demand which will inevitably trigger a very strong traffic recovery during the next two years.

As the world economy recovers intensifying airline competition with more efficient aircraft will make air travel affordable by more and more people. The resurgence of the pent-up demand combined with a much more favourable climate will drive the industry into an exceptional short-term growth period and the GMF anticipates that world RPKs will increase by 15% from 2003 to 2004, and by 9% from 2004 to 2005.

### The SARS epidemic, too, has changed people's perception of air travel

The collapse in travel demand has been a psychological, not a medical, phenomenon, so traffic will take a while to recover even after all WHO travel advisories have been lifted.

However, historical evidence shows that demand for air travel is extraordinarily resilient, and Airbus forecasters anticipate that, with demand stimulated by heavy price discounting, the impact of the Iraq war will continue to be felt over no more than a one-year period while the impact of SARS will last for two years. Thereafter - absent any other catastrophes - traffic will resume its historical growth path.

### Growth will be particularly strong in travel to and from Asia

The GMF predicts that Asia-US RPKs will grow by 23% from 2003 to 2004 and by 18% from 2004 to 2005, while Asia-Europe traffic will increase by 26% and 20% respectively. But even with such a powerful rebound, world RPKs will not recover to their pre-crisis 2000 levels before some time in 2004, representing an observed shift in the near-term air travel demand curve to the right by some 3.3 years.

## Impact of the crisis

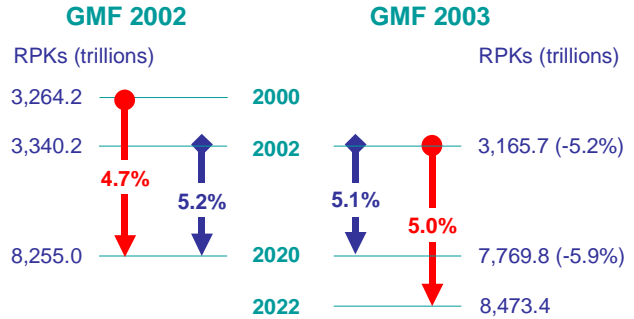
After this strong rebound, global passenger traffic will follow a more normal long-term growth trend, with growth averaging marginally more than 5.0% per year over the twenty-year period 2002-2022.

Comparisons with Airbus' previous forecast of 4.7% per year growth from 2000 to 2020 are distorted by the actual reduction in world RPKs between 2000 and 2002. In fact, the previous forecast showed average RPK growth of 5.2% from 2002 to 2020, compared with 5.1% for the same period in the latest forecast; Airbus forecasters estimate that the events of 2003 will effectively reduce long-term growth in air travel by approximately 0.1% per year.

Airbus' current forecast of world RPKs in 2020 is 5.9% lower than its previous projection, representing a long-term "loss" due to the crisis of 1.5 years' traffic growth. Especially in the US, more irksome security procedures and stricter control of travel expenditure have caused a reduction in travel volume that will never be recovered.

### Long-term passenger traffic growth rates compared

The **highlight number** is up, but the growth forecast is in fact slightly down



## Airfreight traffic has been hit by the crisis less than passenger traffic

Air cargo has been less affected by the crisis than passenger traffic. Because airfreight has become such an important driver of industrial growth, Airbus believes the cargo market will recover strongly, and that in the longer term the air cargo transport system will prove to have benefited from the accelerated retirement of older, inefficient and noisy aircraft triggered by the crisis.

Global Insight's current long-term forecasts of import and export volumes are generally more optimistic than their forecasts issued in 2002. Consequently, Airbus has increased its predicted 20-year average annual freight tonne-kilometre (FTK) growth rate by one quarter of a percentage point.

# 4. Demand for air travel

## History shows that demand for air travel is remarkably resilient

Although some markets have largely matured the prospects for long-term air travel growth remain bright; especially in developing markets. The current usage of air transport by the citizens of India and the PRC is respectively just 1% and 2½% of that by citizens of the US. Air travel worldwide will continue to grow strongly as the wealth of these developing nations grows and it becomes affordable by more and more of their huge populations.

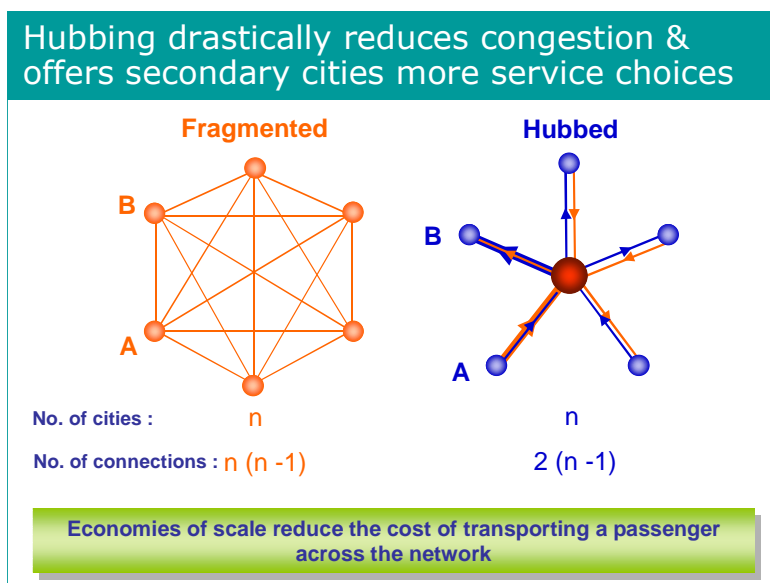
## Demand will be increasingly driven by affordability

In the past, growth in RPKs has been very tightly correlated with economic (GDP) growth. But in recent years the causality of this relationship has become weaker and other demand drivers have become more important.

In particular more and more travel decisions are now based on the availability of tickets at an affordable price. This has been brilliantly exploited by a new generation of “low-cost” carriers so that the full-service airlines now find themselves under unprecedented cost pressures. This will have profound implications both for the way in which the route system is structured and for the types of aircraft which are needed.

## A hub system reduces congestion & costs as well as expanding service choices

Compared with a point-to-point route system, a hub-&-spoke system can significantly reduce costs and congestion as well as the environmental impact of air transport. By consolidating traffic loads between different origins and destinations it allows more passengers to be transported through a congested air traffic system at a reduced cost which has become probably the single most important economic factor driving airline profitability. In addition, hub systems can provide smaller communities with a greatly increased number of service choices.

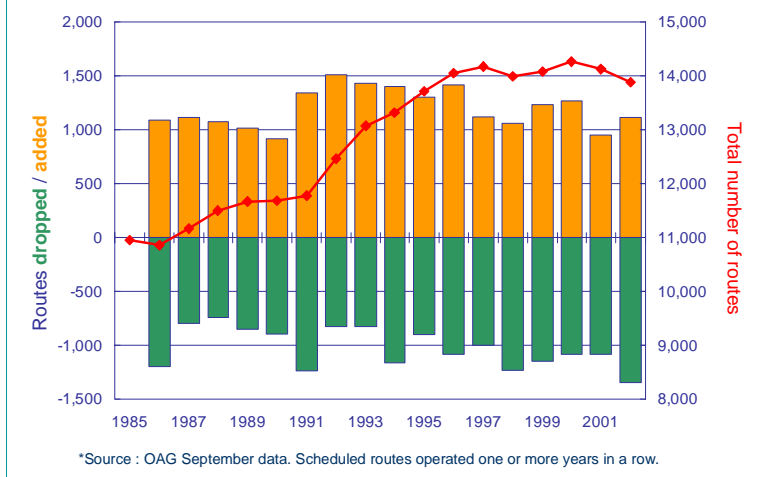


## Demand for air travel

### The number of non-stop services has reached a saturation point

Major airlines have recognised these advantages. As a result since 1996 fewer non-stop services have been opened than have been closed after proving unprofitable. After a period when airlines experimented with services linking almost all possible combinations of cities, the global route network seems to have reached a point of saturation. Moreover, the bulk of air travel will continue to be generated by the concentrations of population, business and industry in and around the major cities, and the great majority of passengers will be carried over and through the major hubs.

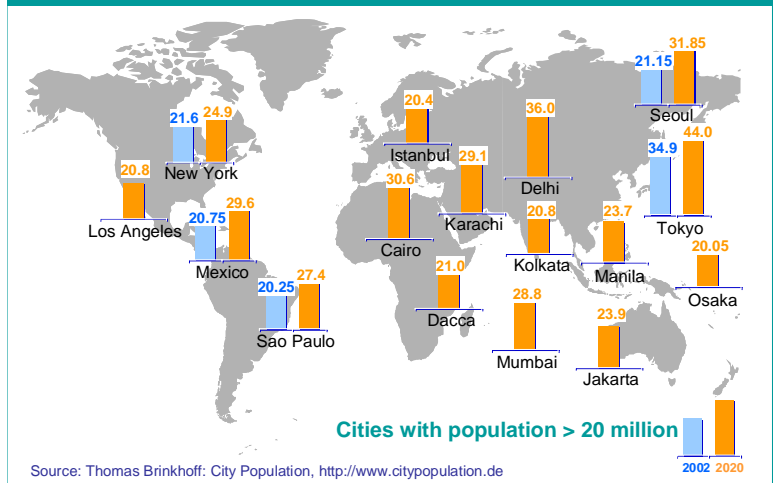
### Number of city pairs served has stagnated



### Air travel demand will become increasingly concentrated

As urbanisation increases, the numbers of people living in major cities and agglomerations is increasing more rapidly than the general growth in population. Today just five cities or agglomerations worldwide have more than 20 million inhabitants; based on current projections, by 2020 this number will have grown to 16 – including 10 in the dynamic Asia-Pacific region.

### Growing urban populations will need more A380s





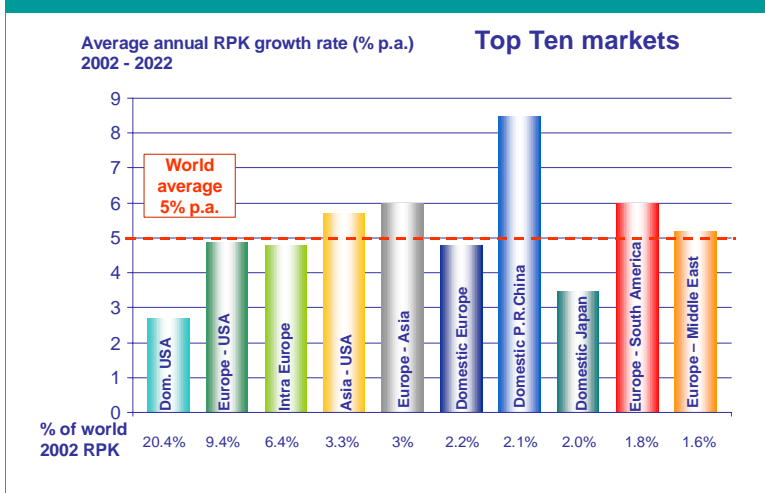
## Other developments will have little impact

The GMF growth projections reflect the expectation by Airbus forecasters that high-speed rail systems will continue to take a substantial share of some highly-travelled short-haul markets, but that their proliferation will be severely constrained by the huge infrastructure investment required as well as by growing environmental constraints.

Airbus also anticipates that the impact on air travel of improved electronic communications will be neutral, as the stimulus they provide to business and personal contacts will counterbalance any direct substitution.

Airbus does not anticipate that air travel will be significantly affected by unavailability of conventional hydrocarbon fuels during the next twenty years, although in the long run increasing price and environmental pressures will rightly provide strong incentives to improve fuel efficiency.

### Travel growth will vary widely between different markets



## World air travel will recover from the crisis & continue to grow strongly

The twenty-year RPK growth projections for each of the 140 travel markets studied are listed in Appendix B. Overall, the result is a prediction that the RPKs carried by the world's major airlines will grow at an average annual 5.0% to reach just under 8.5 trillion by 2022, compared with some 3.2 trillion in 2002.

## Demand for air travel

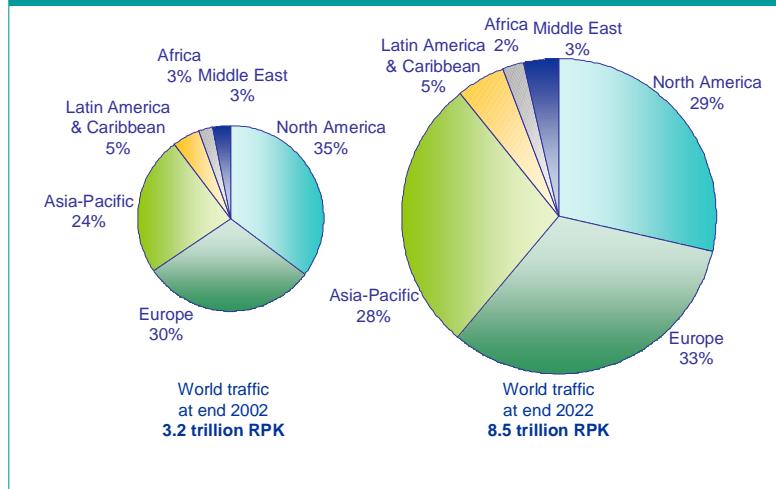
### Lower-than-average growth in the US market means it will lose its historical dominance

Obviously this global average covers a wide variety of growth rates in different air passenger markets, largely reflecting their varying degrees of maturity. Airbus forecasters project twenty-year average annual growth ranging from 2.7% for the mature domestic US market to 8.5% for domestic routes in China, which will be one of the great dynamos for future growth in air travel. As a result, by 2022 the North American domestic market will have lost its historical dominance, having been overtaken by the dynamic Asia-Pacific region as the world's largest air travel market. At the same time the share of world RPKs carried by the airlines of North America will have been surpassed by that of airlines based in Europe.

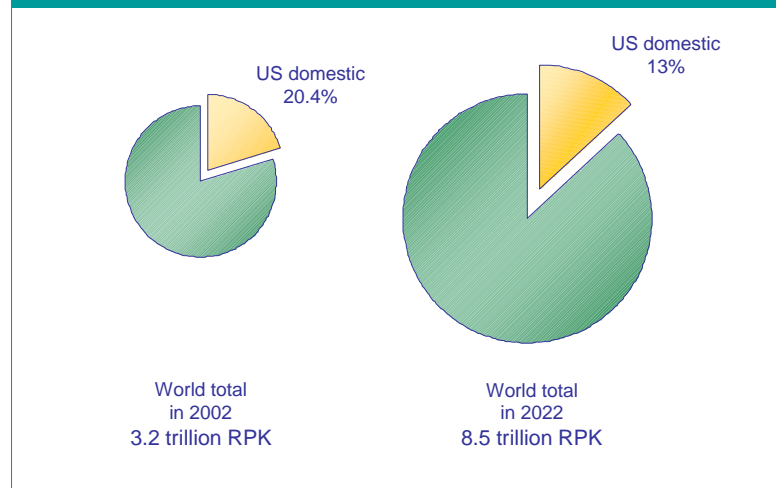
### Despite declining growth rates, the annual traffic increment will continue to increase

Between 2021 and 2022 world annual RPKs will increase by 360 billion. This single year's incremental traffic will be greater than the total of 351 billion RPKs reported by the world's airlines in 1969 when the 747 entered service, and helps explain why the A380, larger than anything flying today, is already recognised as an essential part of the world's future air transport system.

### Europe's airlines will take the largest share of world traffic



### US domestic share of world traffic will decrease



# 5. Air transport operational evolution

Higher growth on longer routes will help improve seat productivity

The numbers of aircraft and seats required to generate the forecast volume of RPKs at the projected level of service frequencies will result from the forecast evolution of a variety of parameters, which are projected year-by-year for each of the 9,188 individual airport-pairs studied. Airbus forecasters predict that, within the constraints of available airport and ATC capacity, these factors will continue to evolve along historical trends:

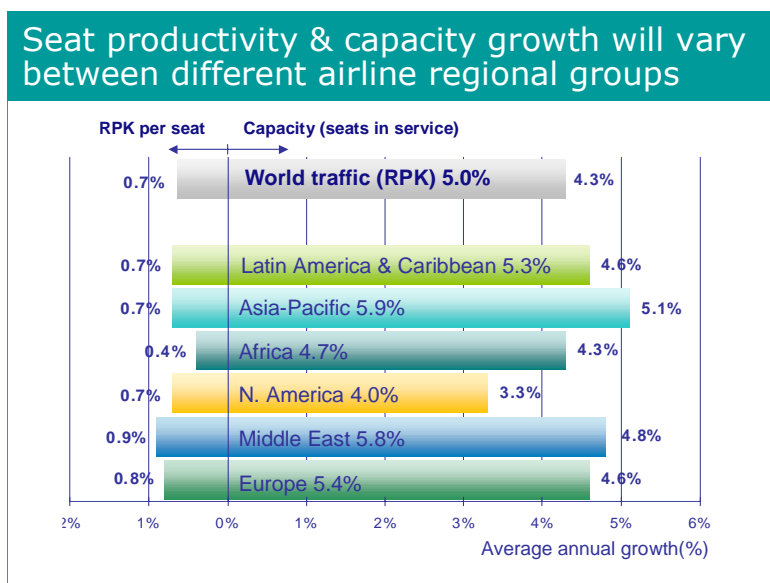
- **Flight distance:** reflecting generally higher growth on longer rather than shorter routes, the average distance flown will increase from 1,437 km in 2002 to 1,516 km in 2022;
- **Block speed:** in consequence, average speed will increase slightly from 612 km/h in 2002 to 622 in 2022;
- **Aircraft utilisation:** also reflecting the increasing flight distance, average utilisation will grow from 3,450 block hours per aircraft in 2002 to 3,739 in 2022;

- **Passenger load factor:** after a decline from 70.1% in 2002 to 68.8% in 2003 as airlines did not manage to reduce capacity in line with the drop in traffic, average load factors will then resume their historical trend, growing progressively to reach 74.3% in 2022.

All these figures are global averages, embracing wide variations between the groups of airlines based in different geographical regions, but the overall impact is such that in 2022 each installed seat in service will generate 1.87 million RPKs per year, compared with just 1.63 million in 2002; an average increase of 0.7% per year in seat productivity.

Consequently, to accommodate the forecast average annual 5.0% increase in traffic, the world's major airlines will have to increase the number of mainline seats they operate at an average annual 4.3%.

The additional seats will be provided partly by an increase in the number of aircraft operated, and partly by an increase in the number of seats per aircraft. The number of aircraft operated depends, of course, on the number of departures offered and the average number of departures per aircraft. Under intensifying cost pressure, airlines will manage to squeeze a few more flights per year out of each of their aircraft. From 1,470 in 2002, this number will increase to 1,533 in 2022; broadly equivalent to one more flight per aircraft per week representing an average rate of increase of 0.2% per year.



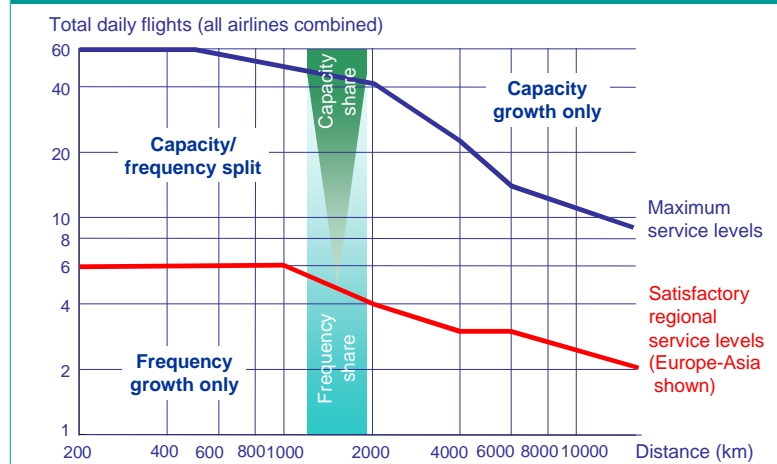
## Air transport operational evolution

To determine the future number of departures, Airbus forecasters use a unique approach based on the observed distribution of flight frequencies between airport-pairs worldwide as a function of flight distance. Obviously, the longer the flight the fewer the number of departures required to provide an “acceptable” level of service.

At the same time the observed behaviour of airlines shows that – again as a function of distance – there is a “maximum” level of frequency beyond which any further increase will not in itself generate any more travel demand. As traffic grows on any particular route, the extent to which it will be accommodated by an increase in aircraft seat capacity as opposed to an increase in frequency will depend upon where it is situated between these two thresholds.

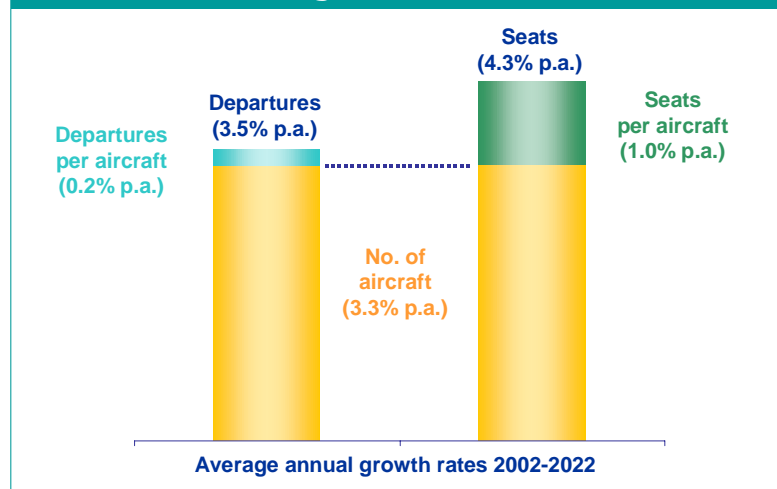
This analysis for each airport-pair leads Airbus to predict that overall, assuming that the infrastructure is able to cope with the increased volume of flights, airlines worldwide during the next twenty years will increase the number of departures they offer at an average annual rate of 3.5%. This is significantly higher than the increase achieved during the past 25 years, and will present a major challenge to the world’s airports and ATC systems.

### The GMF assumes liberal frequency development



Coupled with the forecast 0.2% increase in departures per aircraft, it leads to the prediction that in order to provide the forecast 4.3% average annual increase in seats, the number of seats per aircraft will have to increase by 1% per year. This means that the average 180 seats per aircraft installed in the world mainline fleet in 2002 will have to grow to 220 seats by 2022. This represents an acceleration of the historical trend which has seen average mainline seat capacity grow from 166 seats per aircraft in 1982.

### Despite a doubling in departures, aircraft size will have to grow

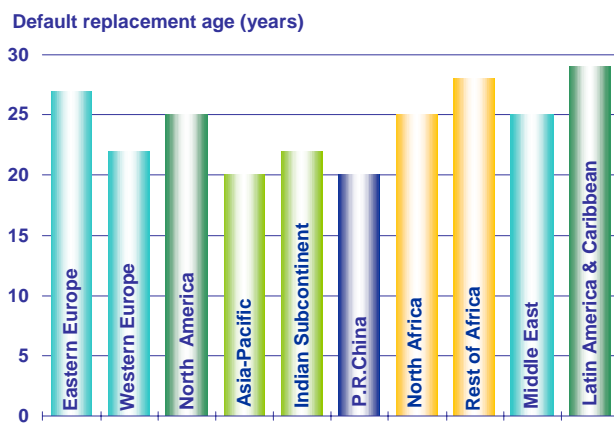


# 6. Passenger fleet renewal

Airlines will need to acquire aircraft not only to accommodate the traffic growth described in Chapter 4 but also to replace their older, noisier and less efficient aircraft as their age increases, utilisation falls and maintenance costs rise.

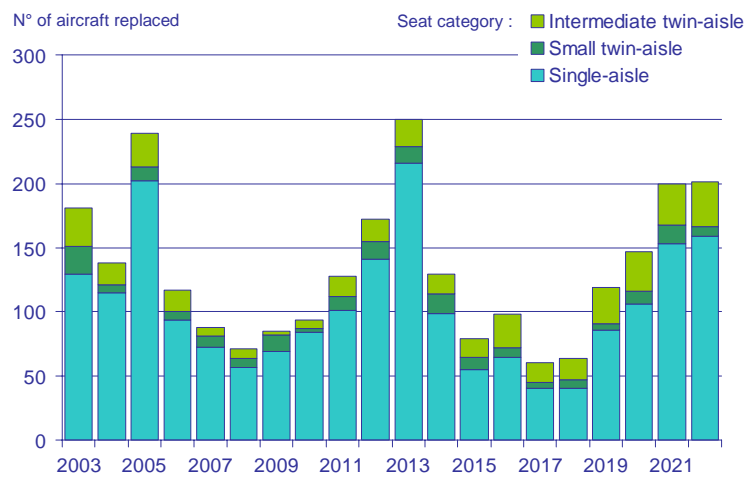
More and more airlines, including the new breed of “no-frills” carrier, recognise the value of maintaining a young attractive fleet, not merely to enhance their market image but also to improve traveller acceptability and exploit the economic advantages of new, more advanced aircraft.

## Airlines will continue to replace passenger aircraft before the end of their economic life



Airbus forecasters reflect as far as possible each individual airline’s approach to fleet renewal. Where no clear policy is evident, they assume the airline will replace an aircraft when it reaches a default age which reflects the general behaviour in the region in which the airline is based. This varies from 20 years for airlines in Asia-Pacific or the People’s Republic of China to 29 years for airlines in Latin America and the Caribbean.

## European fleet replacement waves reflect past delivery cycles



As a result, aircraft replacement is largely driven by the historical patterns of aircraft delivery, and tends therefore to take place in a series of “waves”, with each “wave” – as it occurs – creating new business opportunities for aircraft manufacturers and associated suppliers of equipment and services.

The GMF year-by-year forecast of the numbers of aircraft replaced by the airlines of Europe, with clearly-defined peaks in 2005, 2013 and 2021/22, exhibits a classic “wave” pattern and implies that the region’s airlines behave in a more or less homogeneous manner.

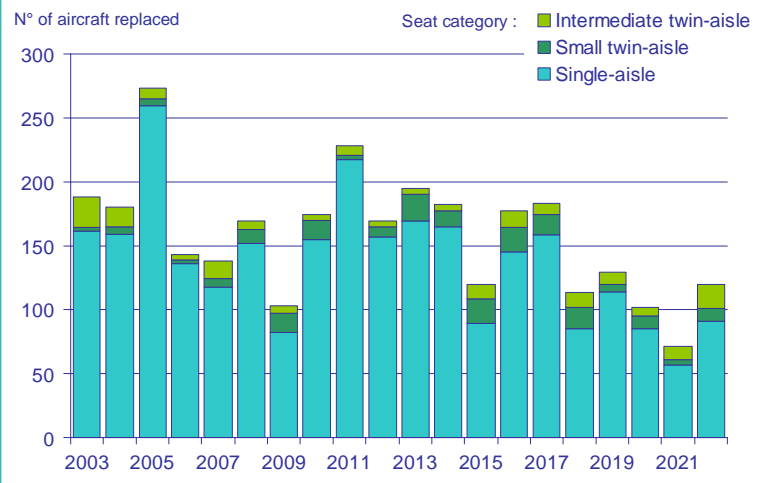
In contrast, the forecast for the North American airlines suggests a much more heterogeneous behaviour by the airlines.

For the world as a whole, the picture is one of high replacement activity through 2005, followed by a lull before the next “wave” starts to build from 2010 onwards.

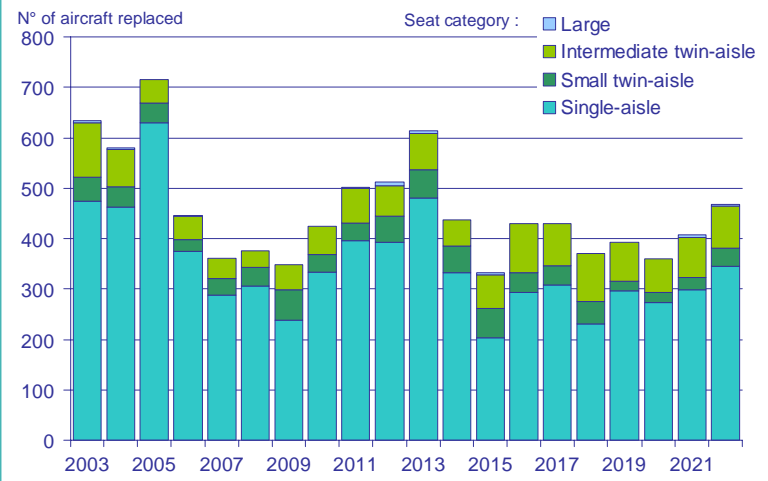
Occasionally, as in the case of the past three years, a slowdown in traffic may drive airlines to reduce capacity by definitively retiring aircraft or parking them with a view to reintroducing them when growth resumes. In practice, only a small fraction of the parked aircraft will in fact return to service.

Based on their best estimates, Airbus forecasters predict that by 2022 only 16% of the end-2002 active fleet will still be in service with their current operators.

**North American fleet replacement activity will be less cyclical**



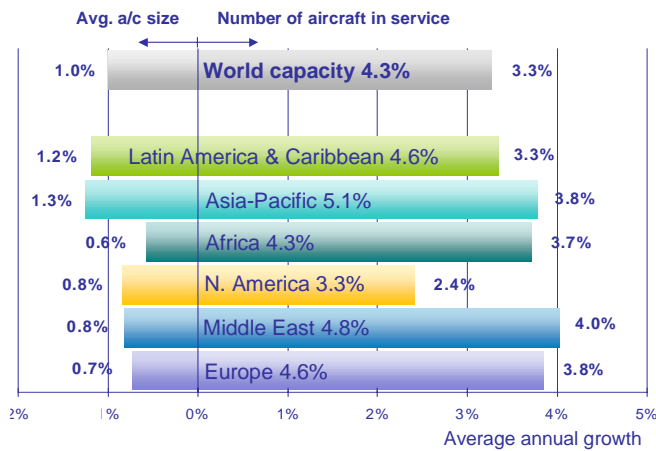
**High worldwide fleet replacement activity through 2005**





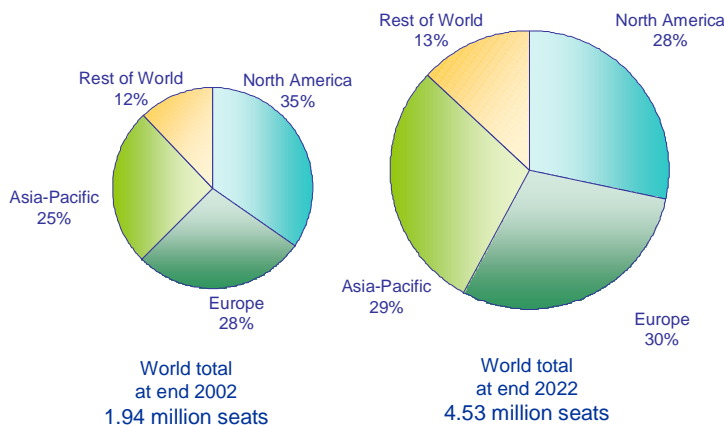
# 7. World passenger fleet development

## High aircraft size and fleet growth in Asia-Pacific



At the end of 2002 the airlines in the GMF were actively operating some 10,800 passenger jets with 100 seats or more. With an average of 180 seats per aircraft, this provided a little more than 1.9 million installed seats. Through 2022, the number of aircraft will increase by 90% to about 20,500 while the number of installed seats will reach more than 4.5 million.

## Airlines in Europe & Asia-Pacific will operate more seats than in North America



These numbers represent global average rates of growth of 3.3% per year in numbers of aircraft and 4.3% per year in installed seats. The airlines domiciled in the different regions show considerable variation around these global averages. High traffic growth on routes to, from and within the region will drive the dynamic Asia-Pacific airlines based there to achieve the most rapid increase in both average seat capacity and installed seats. The most rapid increase in fleet size will be achieved by airlines in the Middle East. In contrast the airlines of North America, with their high exposure to the mature US domestic market, will have the slowest growth in installed seats.

Consequently the North American airlines will become progressively less dominant. By 2022 they will be operating fewer seats than the airlines of Europe or of the Asia-Pacific region.

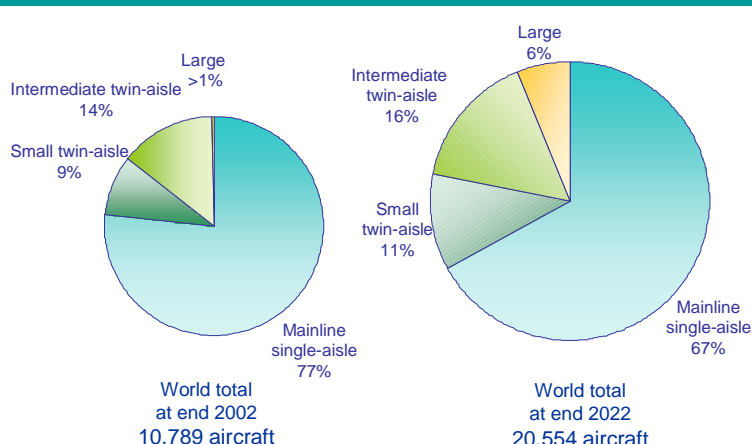
## World passenger fleet development

As an inevitable response to intensifying cost pressures and infrastructure capacity constraints, the composition of the world fleet will shift towards larger aircraft. By 2022 mainline single-aisles will make up just two-thirds of the fleet, compared with three-quarters in 2002. At the same time very large aircraft will account for 6% of the world passenger fleet; the same percentage as represented by 747s in the current fleet.

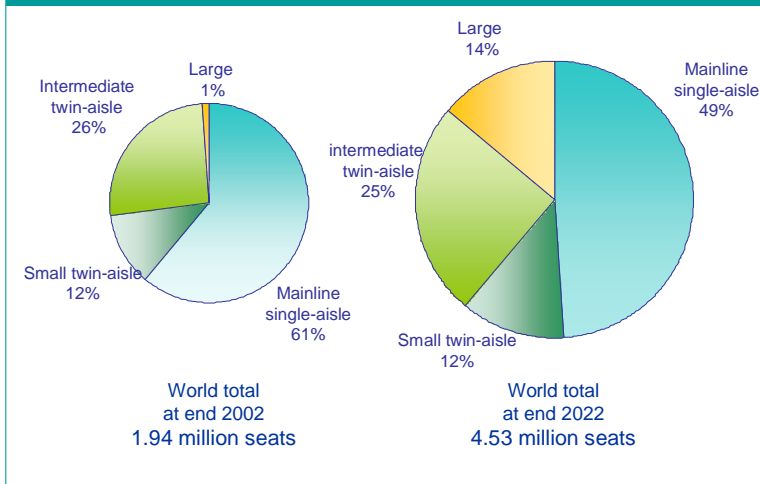
However the role played by very large aircraft is seen more clearly in terms of capacity. By 2022 these aircraft will provide 14% of all seats in service.

*Some care is needed when reading the results of the fleet forecast in Appendix C. The GMF does not, for example, forecast delivery of just 484 A320s through 2022; the figure of 484 represents the number of A320s already in Airbus' firm order backlog at end 2002. In addition, the A320 will of course compete to supply part of the forecast "open" demand for 10,467 single-aisle types for which firm orders had not been placed at end 2002.*

### The trend is towards widebodies



### Very large aircraft will provide a significant share of world airline capacity



# 8. Demand for passenger aircraft deliveries

## Global summary

During 2003-2022, to accommodate traffic growth and renew their fleets, the world's major airlines will require delivery of a total of 18,829 passenger jets with 100 seats or more.

Of these deliveries, 3,197 represent demand that will be satisfied by aircraft replaced by their initial operator and recycled back into the fleet of another airline. The remaining 15,632 will be new aircraft; an average of 782 per year.

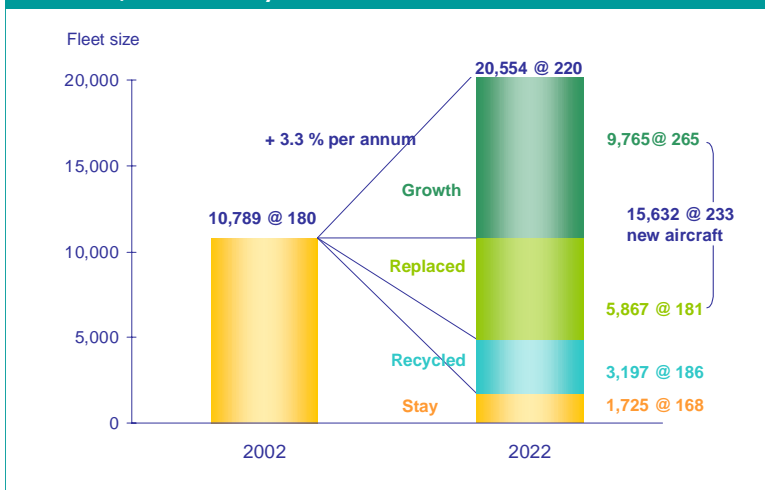
Five-eighths of the new aircraft delivered will be for growth and three-eighths for fleet renewal.

Of the 5,867 aircraft replaced, 2,019 will be converted to freighters (see Chapter 9) and 3,848 will be definitively withdrawn from airline service.

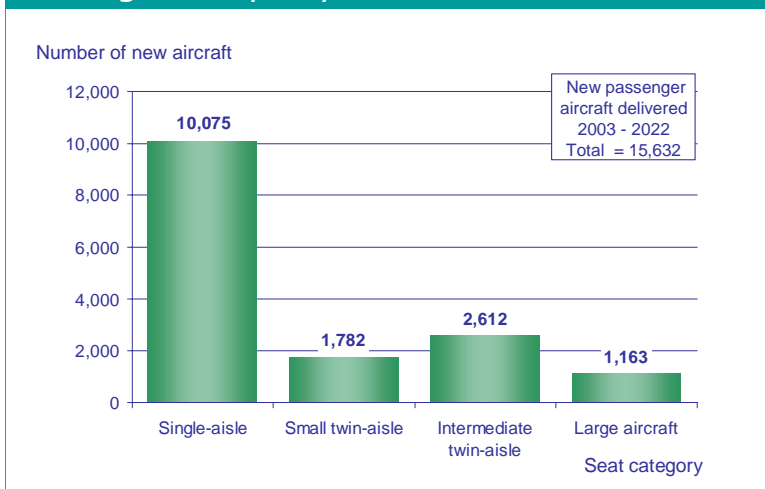
The new aircraft will include approximately :

- **10,000 mainline single-aisle** aircraft; a market where the A320 family has built up a leading position;
- **1,800 small twin-aisle** aircraft; a market where the A330-200 is setting new standards which cannot be cost-effectively superseded in the foreseeable future;
- **2,600 intermediate twin-aisle** aircraft; a market where the larger A330/A340 family offers an unmatched combination of capability and efficiency, and;
- **Nearly 1,200 very large and economical aircraft**; a market which it now appears the highly successful A380 will have to itself when it enters service in 2006.

Total demand will be met by 15,632 new and 3,197 recycled aircraft

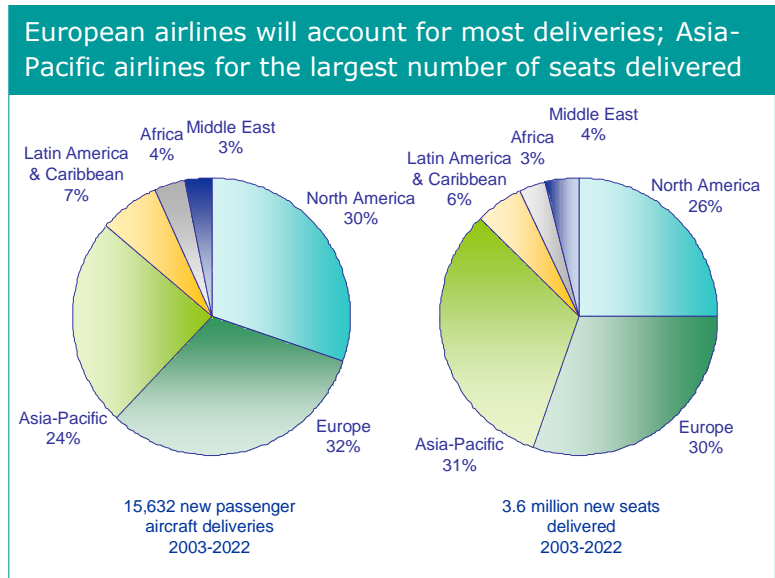


New passenger aircraft deliveries will average 782 per year



## Demand for passenger aircraft deliveries

The European airlines will constitute the largest single regional market in terms of numbers of aircraft delivered during the next twenty years, but their greater appetite for very large A380-type aircraft means that the airlines of Asia-Pacific will account for the largest share of seats delivered.



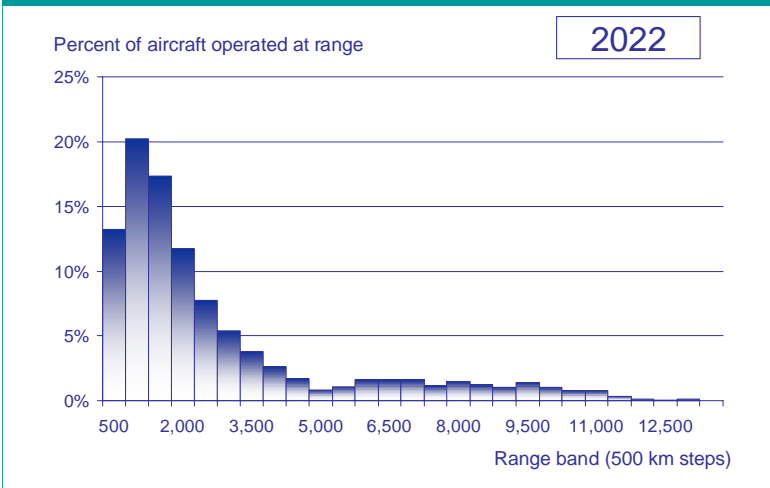
## Demand for passenger aircraft deliveries

### Most aircraft will fly from airports in the US & Europe – with Tokyo’s Narita also in the Top Ten



By 2022 the world’s active mainline fleet of 20,554 passenger jets will be operating at 1,511 airports, linking a total of 9,125 airport-pairs with more than 82,900 daily one-way flights. Operations will remain largely focused on flights to, from and within North America, Europe and Asia-Pacific. Flights from just the Top 25 airports – led by London Heathrow and Chicago O’Hare – will absorb the productive capacity of 28% of the aircraft, while half the aircraft will be used on flights from just the Top 75 airports.

### Most aircraft will be used on short flights



Five of the Top Ten airports worldwide (measured by aircraft utilisation) will be in the US, and four in Europe, with Tokyo Narita in 9th place the sole representative from Asia-Pacific.

By 2022, 62% of the active world mainline fleet will be deployed on flights of no more than 2000 km (roughly equivalent to Frankfurt to Moscow).

# Demand for passenger aircraft deliveries

## Results by size category :

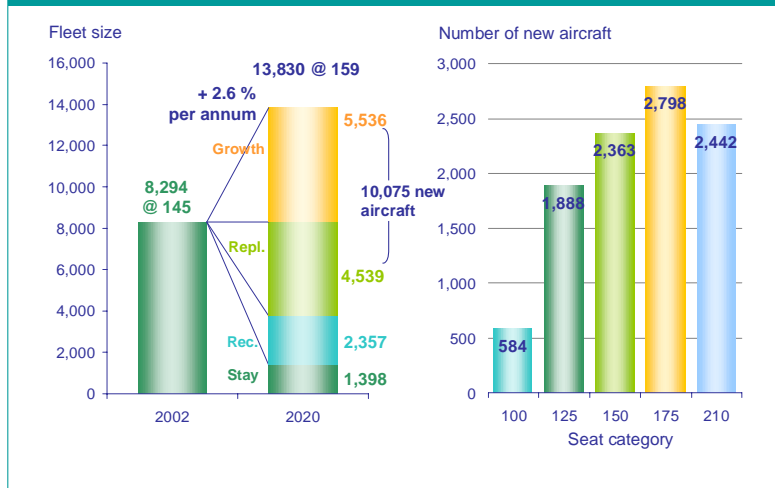
- **Mainline single-aisles**

Through 2022 the world's major airlines will need more than 12,400 single-aisle passenger aircraft to accommodate traffic growth and renew their fleets. Of these, some 2,400 will be provided by aircraft recycled back into the fleet after being replaced by their initial operator.

The advanced and efficient A320 family, ranging from the A318 to the A321, is well placed to secure a large share of the remaining demand for 10,100 new aircraft in this category.

By 2022 the active fleet of 13,830 mainline single-aisles will be operating at 1,506 airports, linking 8,216 airport-pairs with some 63,000 daily one-way flights. Operations will be largely focused on domestic US routes; all the Top Ten airports served by these aircraft (measured in terms of aircraft utilisation) will be in the US. Indeed, the most highly-ranked non-US airport, Frankfurt, is in only 11th place.

### 10,075 new mainline single-aisles will be needed

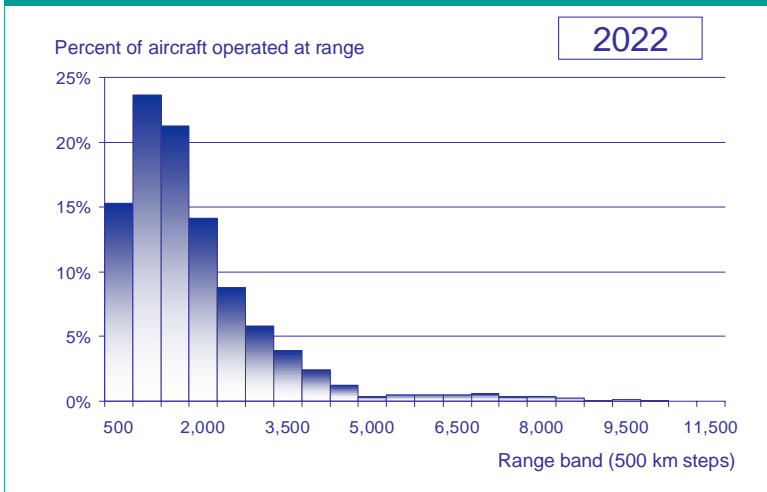


### Mainline single-aisle operations will be concentrated on US domestic routes





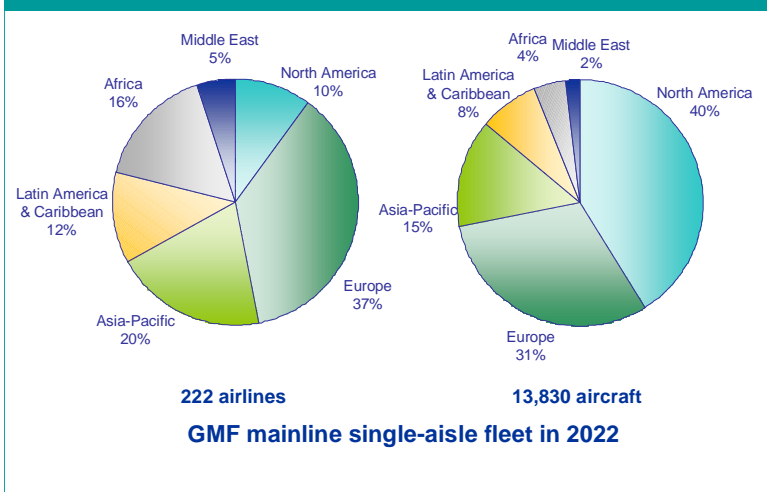
## Mainline single-aisles will be largely flown on short routes ...



Similarly, the Top Ten routes will all be within the US. In this case, the first non-US route (Bangkok- Koh Samui) is ranked just 33rd.

Compared with the world fleet as a whole, the use of single-aisles will be relatively dispersed. Flights from the Top 25 airports, led by Chicago O'Hare and Dallas/Fort Worth, will absorb the productive capacity of just 26% of the aircraft, and 50% of the single-aisle fleet will be used on flights from the Top 87 airports.

## ... with 41% flown by airlines in North America



The single-aisle aircraft will be flown overwhelmingly on short flights; by 2022 39% of the aircraft will be used on flights of no more than 1,000 km equivalent to Paris to Madrid.

By 2022, 22 North American airlines will each be operating an average of 254 mainline single-aisles, compared with 82 European airlines operating an average of 53 aircraft each.

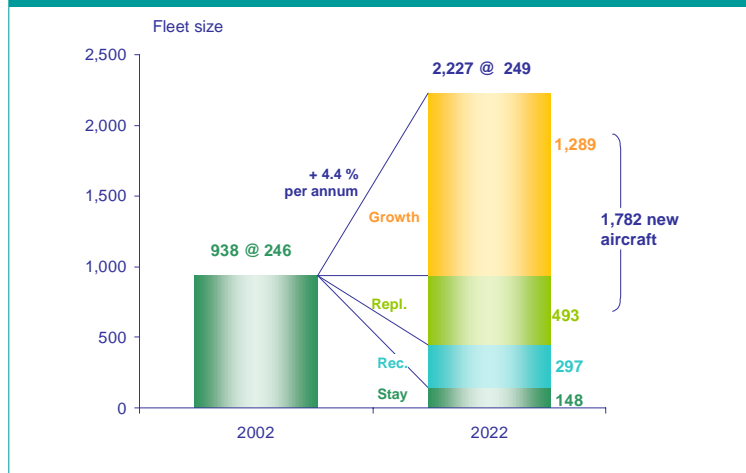
## Demand for passenger aircraft deliveries

### • Small twin-aisles

Demand will develop for a total of 2,100 aircraft in this category. With almost 300 to be replaced by recycled aircraft, this will leave a need for some 1,800 new aircraft to be delivered during 2003-2022.

By 2022 the active fleet of 2,227 small twin-aisle aircraft will be operating at 609 airports, linking a total of 2,623 airport-pairs with some 8,200 daily one-way flights. Operations will be largely focus on intra-European and US domestic flights. The Top Ten airports include six in Europe and three in the US, while the Top Ten routes include three in the US and four in Europe. Amongst Asian airports, only Beijing features among the Top Ten.

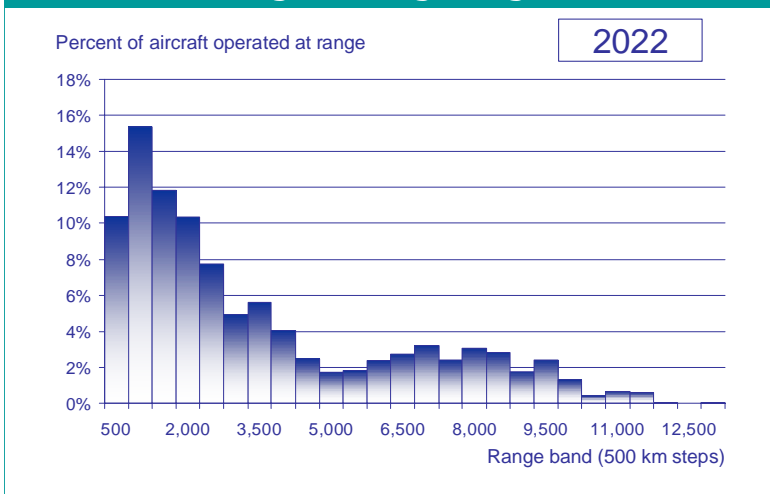
### 1,782 new small twin-aisles aircraft will be needed



### Operations of small twin-aisle aircraft will mainly be in the US & Europe



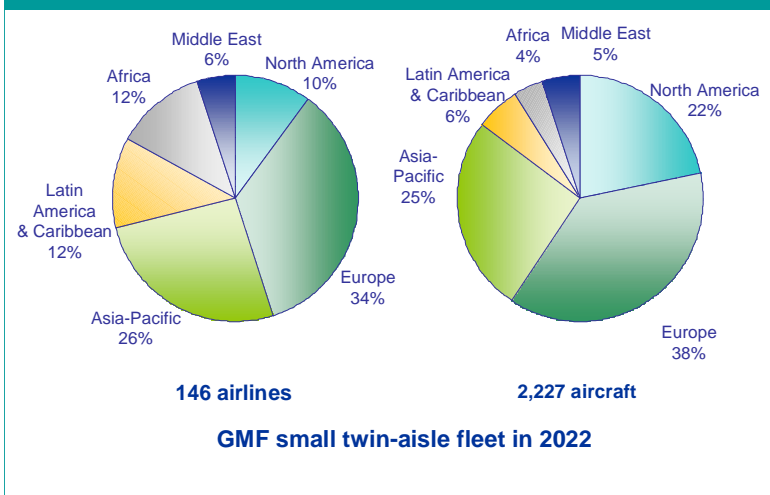
## Small twin-aisle operations will include both short-range & long-range routes ...



As a measure of concentration, flights from the Top 25 airports will use the productive capacity of 32% of the fleet, and 50% of the fleet will be used on flights from the Top 56 airports, led by Paris Charles de Gaulle and London Heathrow.

The world fleet of small twin-aisles will be used on a broad spectrum of routes, but will mainly fly on local and domestic routes largely served today by single-aisles. The higher proportion of these routes will result in a sustained reduction in average flight distance from its current 2,561 km to 1,974 km in 2022. By 2022 70% of the aircraft will be used on flights of no more than 4,000 km; equivalent to Los Angeles to New York.

## ... with European airlines the main users



The airlines of Europe will constitute the largest single regional market for these aircraft, with 50 airlines operating an average of 17 aircraft each. Fifteen North American operators, however, will have a larger average fleet of 32 aircraft each.

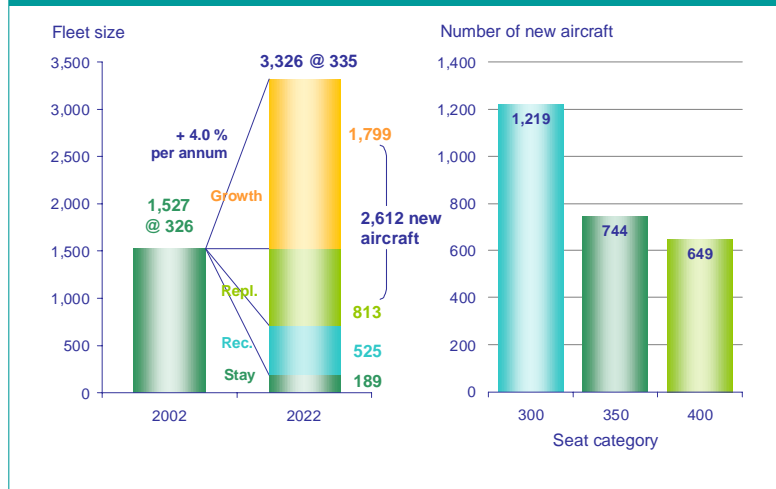
## Demand for passenger aircraft deliveries

### • Intermediate twin-aisles

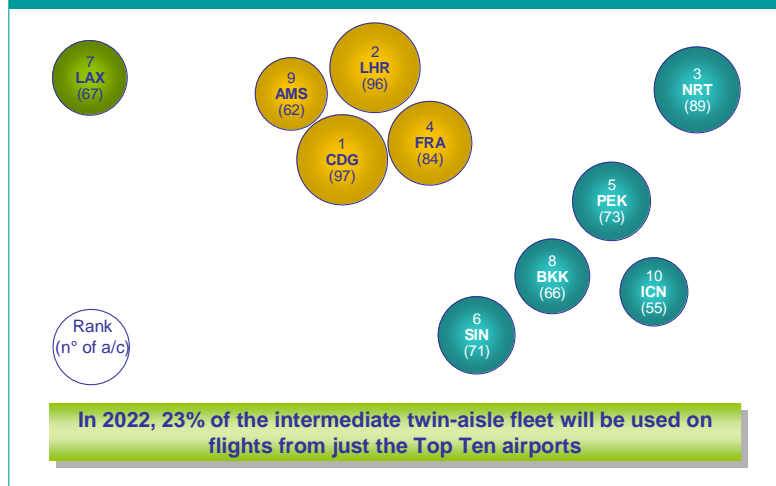
The world's major airlines will need a total of more than 3,100 aircraft in this category; a market segment covered by the A330-300 and the A340 family. 2,600 of these aircraft will be new, leaving 500 to be satisfied by recycled aircraft. Almost half of the new aircraft will be 300-seaters, with the remainder split equally between 350-seaters (28%) and 400-seaters (25%).

By 2022 the active fleet of 3,326 twin-aisles will be operating at 506 airports, linking a total of 2,059 airport-pairs with some 9,400 daily one-way flights. Operations will be spread globally, with only a small proportion of flights on US domestic routes. Of the Top Ten airports served, five will be in the Asia-Pacific region and four in Europe, leaving just Los Angeles in the US. The Top Ten routes also show a global spread.

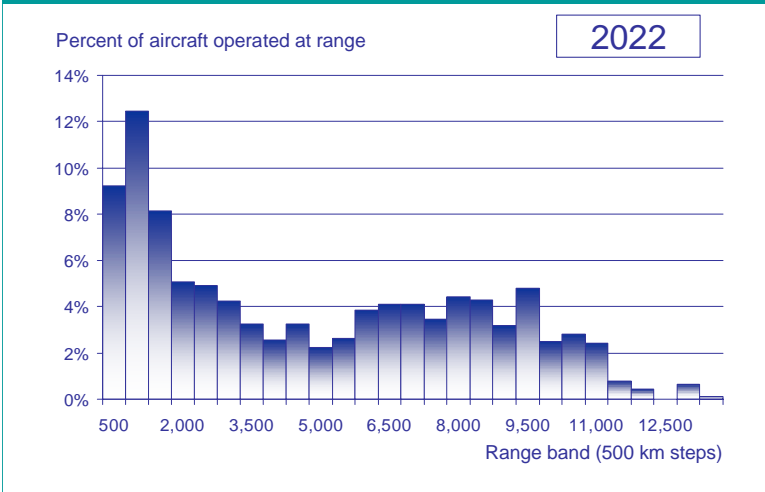
### 2,612 new intermediate twin-aisles will be needed



### Intermediate twin-aisle operations will be concentrated largely on Asia-Pacific & Europe



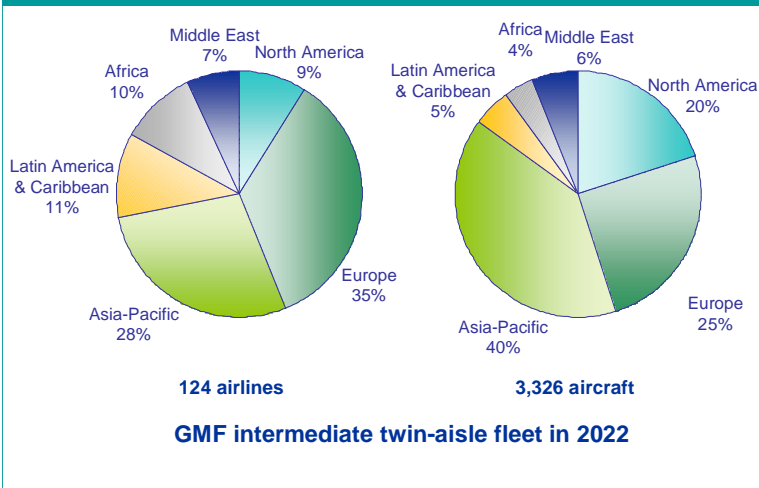
## A significant proportion of intermediate twin-aisle flights will demand 4-engine autonomy



Compared with the world fleet as a whole, operation of intermediate twin-aisles will be relatively concentrated, with flights from the Top 25 airports – led by Paris Charles de Gaulle and London Heathrow – absorbing the productive capacity of 44% of the aircraft. Half the aircraft will be used on flights from the Top 32 airports.

The deployment of the intermediate twin-aisle fleet shows a similar pattern to that of the smaller twin-aisle aircraft, but with a substantially greater use on long-range routes. Half the fleet will be used on flights of no more than 4,000 km (roughly equivalent to San Francisco to Montreal), but one-third will be used on flights longer than 7,500 km (roughly equivalent to New York to Moscow).

## Asia-Pacific will be the largest market



The 35 Asia-Pacific operators will constitute the largest single regional market, with an average of 38 aircraft each.

# Demand for passenger aircraft deliveries

## • Large aircraft

By 2022, in order to sustain profitable operations in the face of maturing markets, continuing severe price competition, and increasingly stringent infrastructure and environmental constraints, major airlines will need a total of almost 1,200 very large and economical aircraft like the A380. Just 18 will be recycled back into the fleet after being replaced by their initial operators (ten of these being aircraft delivered during the 20-year forecast period).

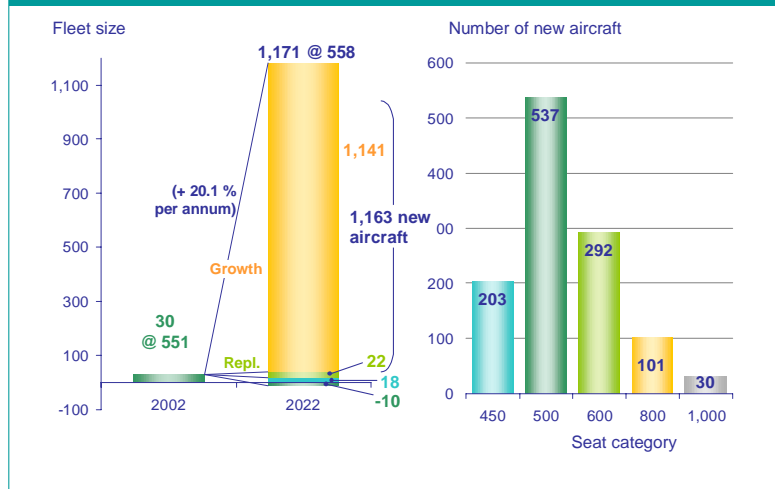
Over 70% of the new large aircraft delivered will be in the 500- and 600-seater categories. The remaining 30% of demand will be satisfied by some 200 450-seaters leaving only 130 aircraft in the 800- and 1000-seater categories. The average capacity of all deliveries will be 559 seats, very close to the 555 3-class seating configuration of the A380.

By 2022, these large aircraft will be serving 209 airports, linking 489 airport-pairs with some 3,400 daily departures.

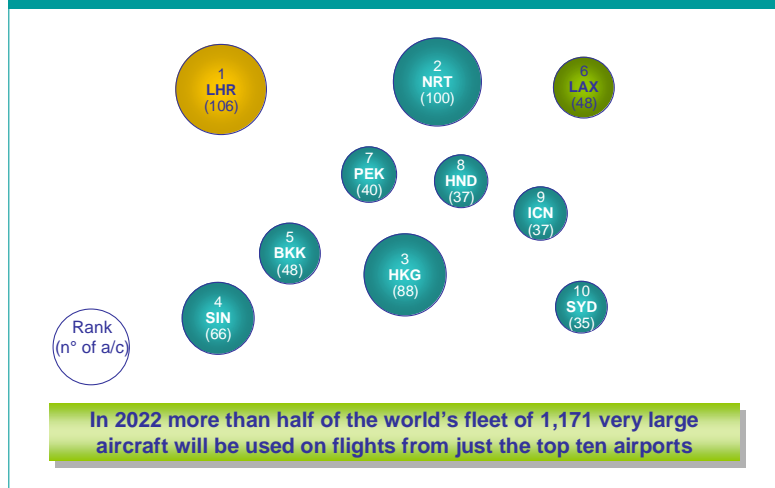
Unsurprisingly, operation of very large aircraft will be highly concentrated, with flights from just the Top 25 airports using the capacity of 70% of the fleet.

Flights from London Heathrow will use the productive capacity of more of these aircraft than flights from any other airport, but – apart from Los Angeles in 6th place – all the other Top Ten airports are in Asia-Pacific. And of the Top Ten routes, only London Heathrow-New York JFK does not serve this dynamic region.

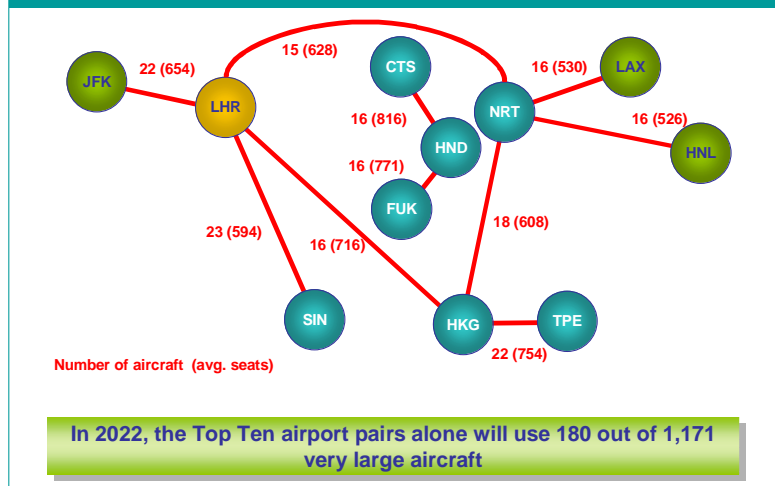
## 1,163 very large passenger aircraft will be needed



## Eight of the Top Ten large aircraft airports will be in Asia-Pacific

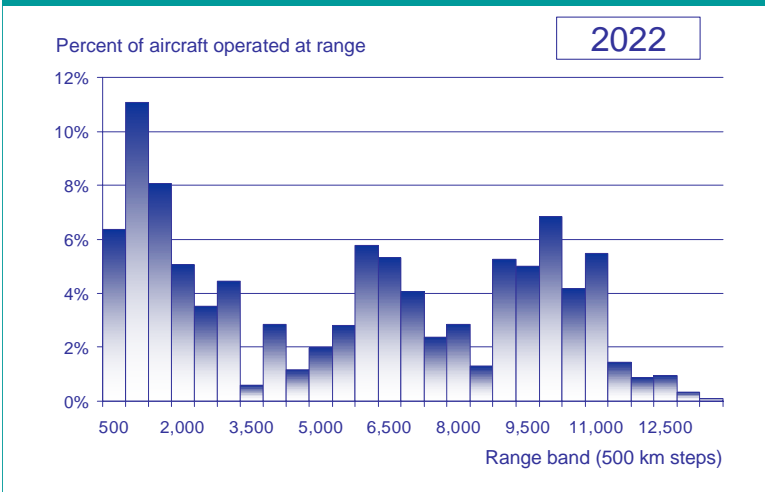


## Nine of the Top Ten large aircraft routes will serve Asia





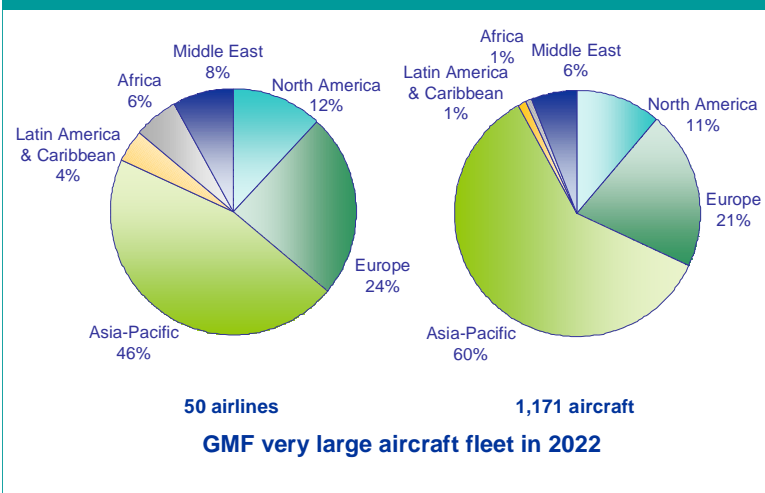
## Large aircraft will fly on domestic as well as international routes



The very large aircraft will be used on the complete range of domestic, local, regional and intercontinental routes. Nearly one-third of the fleet will be used on routes no longer than 2,000 km; equivalent to Hong-Kong to Beijing. At the top end one-third of the fleet will be used on flights longer than 9,000 km (roughly equivalent to Paris to Los Angeles).

By far the greatest number of very large passenger aircraft will be delivered to airlines in the dynamic Asia-Pacific region, with 23 airlines operating an average of 30 aircraft each. In contrast, airlines in North America will account for a total of little more than 120 aircraft.

## Asia-Pacific will dominate demand

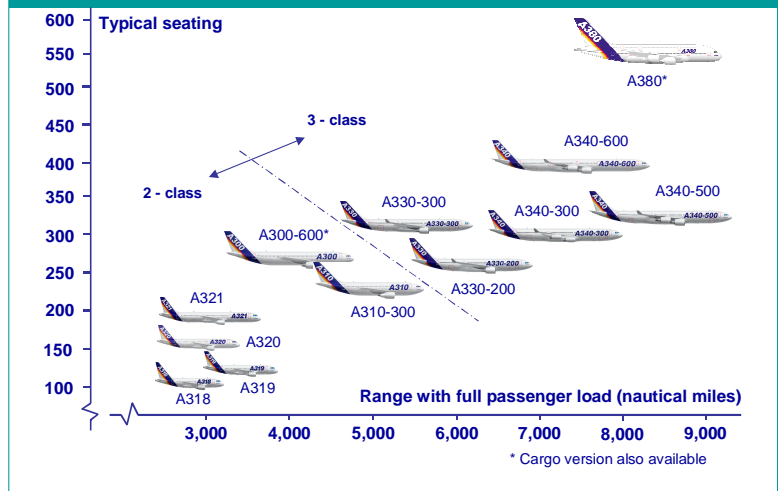


## Demand for passenger aircraft deliveries

### The Airbus product line covers the demand spectrum

Airbus now offers the world's most comprehensive line of safe, comfortable and technically advanced commercial jetliners which cover the full spectrum of airline needs from 100 seats and up, all sharing a high degree of technical and operational commonality. With this product line, Airbus looks forward to helping the airlines bring safe, swift, convenient and sustainable air travel within reach of more and more of the world's peoples, expanding personal horizons and building understanding between nations.

### The advanced Airbus product line



# 9. Air cargo forecast

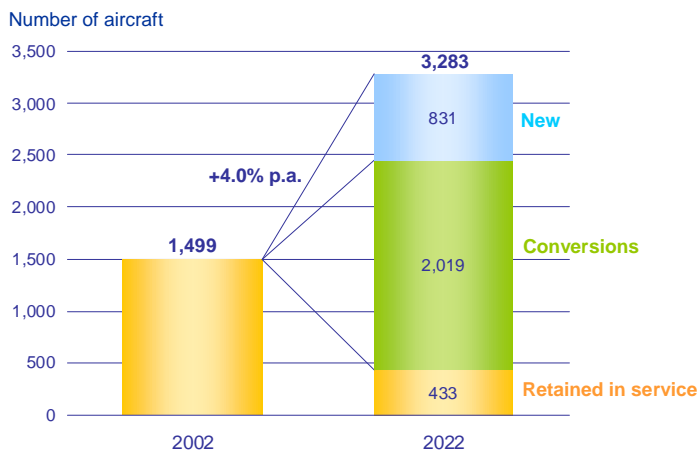
## Global summary

Air cargo has been less affected by the current crisis than passenger traffic. However, reductions of passenger schedules have led to significant changes in the composition of the active freighter fleet and in the utilisation of aircraft, with an increased usage of larger aircraft, higher load factors and intensive utilisation of the feeder fleet.

Airbus forecasters believe that the increased efficiency achieved by operators of dedicated freighters will be maintained in the future, leading to an ever higher contribution by dedicated freighters to air cargo transport.

Recovery of airfreight traffic is well underway and its long-term prospects are strong, with an average yearly growth of 5.75% leading to a tripling of freight tonnes-kilometres (FTKs) by 2022.

### The world freighter fleet will more than double



This traffic will be carried by a fleet of 3,283 dedicated freighters, from a base of 1,499 active units in 2002. Over the forecast period, the GMF anticipates the retirement of 1,066 freighters, accompanied by the introduction of 2,019 converted passenger aircraft and the delivery of 831 new factory-built aircraft valued at \$123 billion (2003 \$) .

## Sustained growth in airfreight demand

The ongoing recovery from the recent crisis demonstrates that the underlying factors for strong growth are still at work, among them the development of trade between Asia and Europe or North America and the need to carry quickly and safely more and more high-value goods.

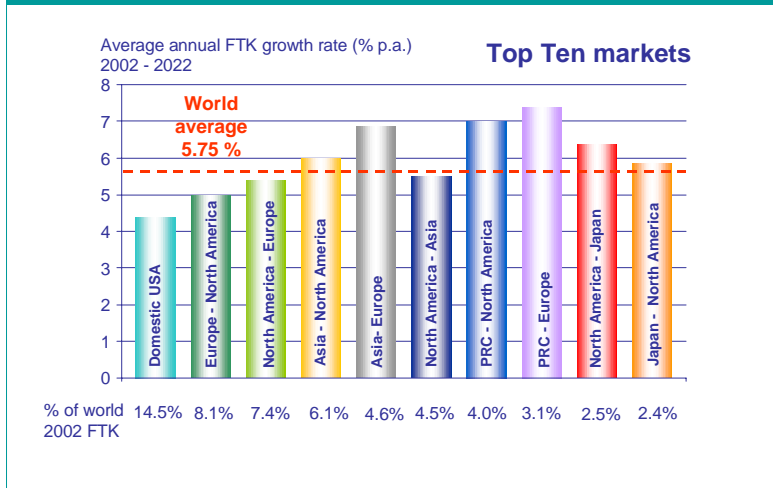
The fastest growing airfreight markets are those linking the Asia-Pacific region to Europe and North America. Seven of the Top Ten flows serve this region, six of which will enjoy traffic growth higher than the world average. These Asia-Pacific markets are expected to represent nearly 31% of global airfreight in twenty years' time, compared with less than 27% in 2002.

Reflecting Global Insight's more optimistic long-term forecasts for imports and exports, Airbus' 20-year prediction of average annual FTK growth has increased from 5.5% p.a. in the previous GMF to 5.75% p.a.

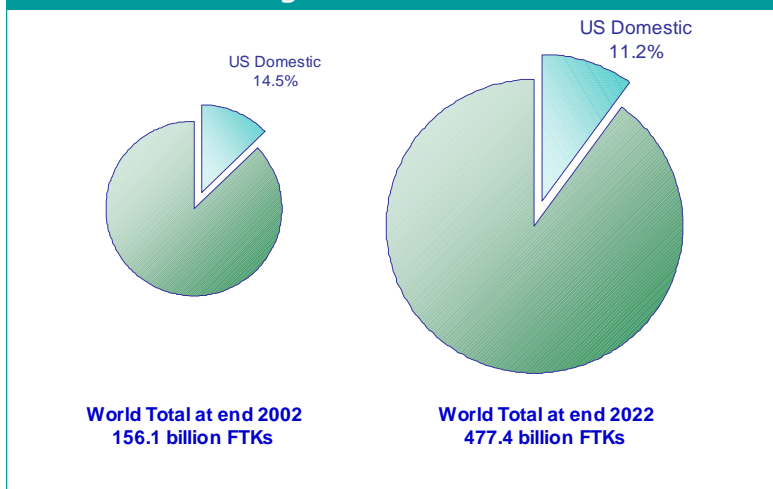
As a consequence the US domestic market, which has been the leader both in traffic and tonnage transported, will see its share eroding to the benefit of markets linking Asia-Pacific countries to the other regions. However, this decline will be less steep than in the passenger market.

Respective contributions and growth projections for each of the 145 directional airfreight submarkets studied in the GMF are listed in Appendix D.

### Asia-Pacific countries will lead the growth in airfreight demand



### US domestic share of world airfreight traffic is eroding



## Belly traffic will not keep pace with overall demand

Transport of goods in the remaining volume of passenger aircraft is attractive in terms of costs, but is dependent on the availability of passenger flights and on passenger load factors.

The recent crisis, where passenger carriers reduced frequencies but quickly recovered passenger load factors, led to a significantly reduced availability of belly capacity. Cargo traffic also suffered, albeit to a lesser extent. Cargo carriers reacted by minimally reducing their active fleet, but more importantly by utilising better the resources available, in particular by flying more large freighters.

Airbus forecasters believe that this will persist in the future, with the advantages of dedicated flights (time-definite supply, safety and security of cargo, controlled flight conditions), continuing to offset the lower marginal cost of belly transport.

Thus, in 2002, the forecasters estimate that the 64 billion FTKs carried as passenger aircraft belly freight represented only 41% of the total FTKs generated. As passenger traffic, and thus available belly volume, are expected to grow more slowly than freight traffic, the share of belly traffic will reduce further, decreasing to a third of total FTKs by 2022.

In contrast, airfreight carried on dedicated freighters is expected to grow at an average annual rate of 6.3% per year.

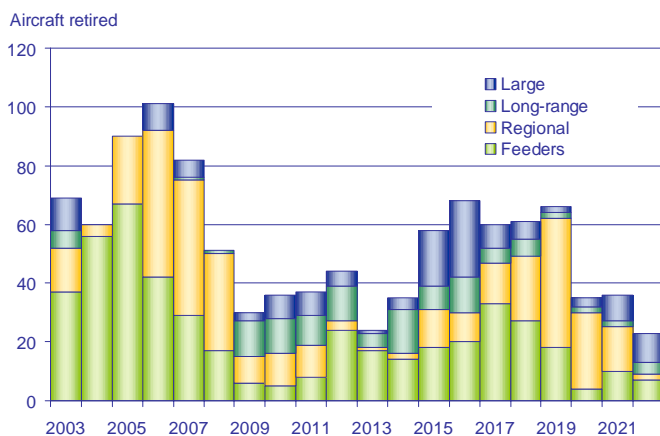
## Freighter retirements are accelerating

The 2001-2002 crisis has hastened the retirement of older freighters. A number of passenger-to-freighter conversions have also been put on hold.

In the medium term cargo airlines, especially in Europe, will have to respond to the new Chapter 4 noise regulations by diverting operations to dedicated cargo airports, modifying and re-certificating types which can be made compliant and/or replacing non-compliant types (e.g. 747-200s or DC-10s) earlier than planned.

In the absence of announced retirement plans for a specific airline the GMF assumes that freighters are kept in service until they reach the ultimate limit of their economic life, taken as 37 years for single-aisles and 35 for widebodies. Since this takes no account of possible more stringent noise regulations, it leads to a conservative estimate of future retirements and associated capacity needs.

### The retirement of ageing feeders and regional freighters is underway



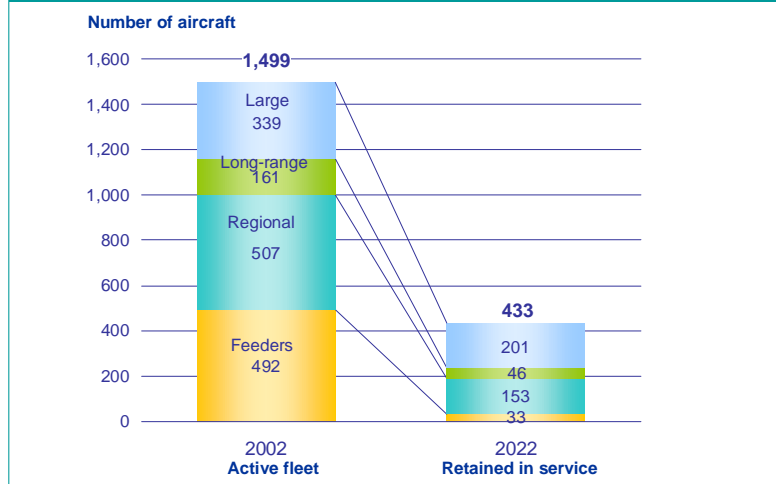
### Retirement of older aircraft shapes demand for new freighters

Airbus' projection of freighter retirements through 2022 takes account of the wave of retirements resulting from the current crisis or anticipating more severe noise regulations. 70% of these early retirements are 727Fs, DC-8Fs and 747-100Fs, which would have been retired between 2003 and 2008, had the GMF age criterion been applied. The ongoing retirement wave affects mainly feeders and regional freighters, as most of them are converted older passenger aircraft to be retired during the period.

The fleets of long-range and large freighters in service at end 2002 were considerably younger, averaging just 14 years compared with 28 and 21 years respectively for feeder and regional freighter fleet. Consequently the majority will remain in service well into the second decade of the forecast period.

Overall, during the next twenty years, a total of 1,066 freighters (70% of the 2002 active fleet) will be retired and replaced.

#### 70% of the current fleet will be retired by end 2022

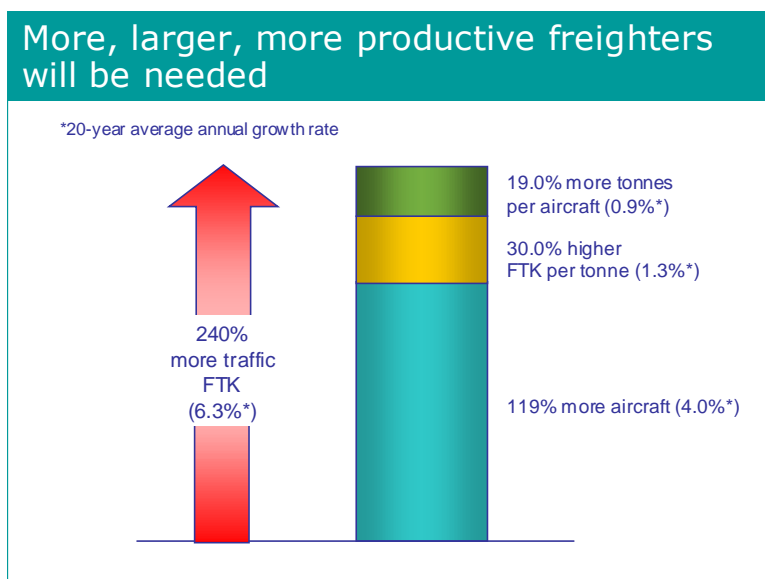




## Freighter productivity will improve ...

To accommodate a 20-year traffic increase of 240%, future freighters will need to work harder to assure profitable operations in the face of pricing and competitive pressures. By 2022, each tonne of freighter capacity in service will generate 1.58 million FTKs annually, compared with an already respectable 1.21 million in 2002.

Most of this improvement in productivity will be achieved through an increase in annual aircraft utilisation, from 1,707 flight hours in 2002 to 2,254 in 2022. This will largely result from the retirement of less-efficient first-generation jets, many of which are still being used for marginal low-utilisation operations, as well as the higher growth rates projected on higher utilisation, longer-range services.



## ... and average capacity per aircraft will increase

Unlike passenger airlines under pressure to improve service levels by increasing frequencies, freight operators generally have little incentive to increase frequencies beyond once-daily service and are more likely to respond to growing traffic by increasing aircraft size and thereby achieving lower unit operating costs.

Overall, the capacity of the average freighter will increase from 50.4 tonnes in 2002 to 60.0 tonnes in 2022.

### Results by freighter category:

#### • Feeders

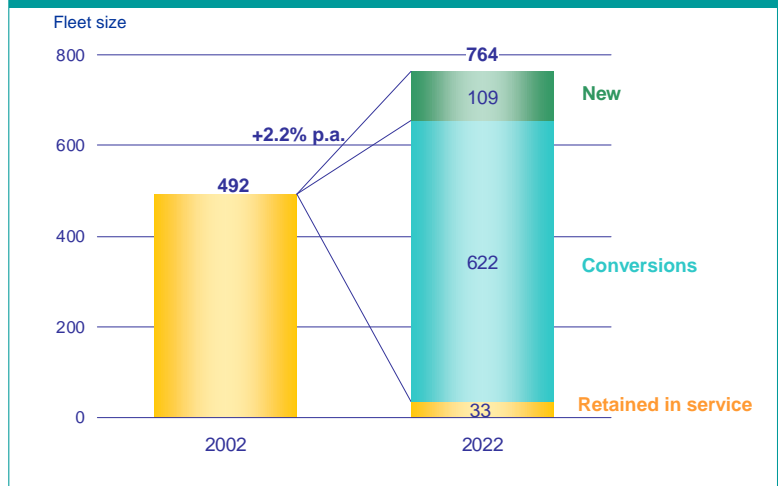
Airbus estimates that the active feeder fleet operated during 2002 amounted to 492 aircraft. This excludes an additional 221 aircraft stored or virtually non-utilised, which did not contribute any significant traffic. Very few of these older, noisy aircraft are likely to return to active service.

From 2002 to 2022, the feeder fleet will increase by 272 aircraft. This represents more modest growth than in the other freighter categories, but coupled with the need to replace 93% of the current fleet (459 aircraft) as they reach the end of their economic lives, it creates a need for delivery of a total of 731 freighters in the feeder category.

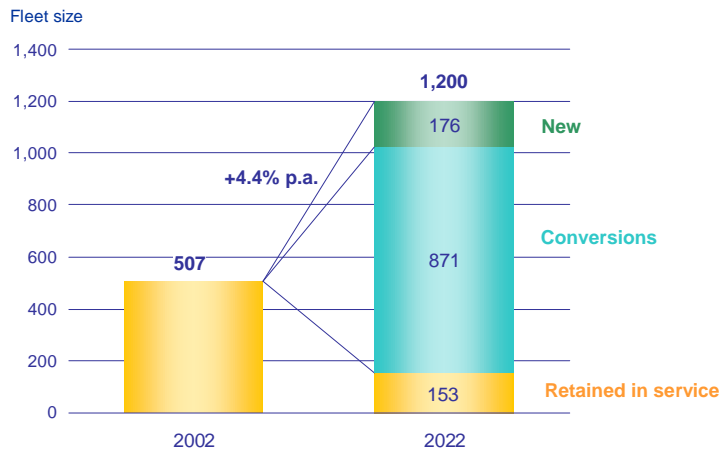
As many as 622 of these will be passenger-to-freighter conversions. Small freighters are usually operated on short-range routes where amortisation of newly-built aircraft is more difficult to attain, and the passenger system will provide an abundance of cheap capacity to replace retired 727Fs and DC-9Fs. In the longer term, when enough suitable airframes become available, the A320 family will be an extremely attractive candidate to fill this need.

This leaves a need for 109 factory-built freighters during the twenty-year period. Demand will be concentrated, with 70% of deliveries going to just seven airlines in the US and Latin America.

#### The current feeder fleet will grow by 55% by end 2022



More than 1,000 regional freighters will be needed



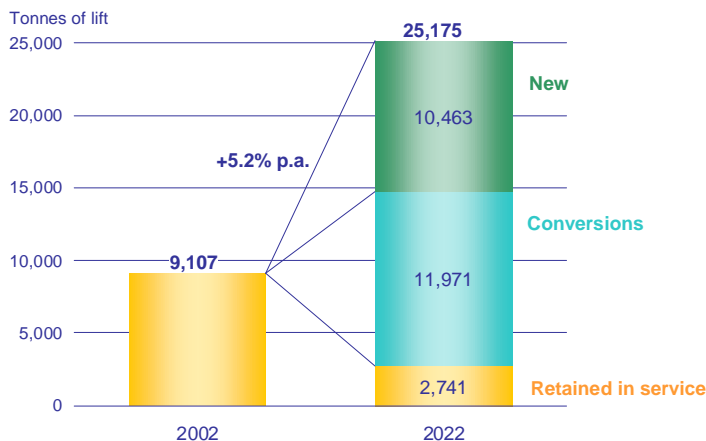
• Regional

In 2002 the regional freighter fleet included 507 aircraft in active operation, together with 167 aging aircraft - mostly DC-8Fs and 707Fs - which were parked or hardly utilised.

By 2022, the active fleet will have grown by 693 aircraft, and 354 (70% of the 2002 active fleet) will have been retired.

This will create demand for a total of 1,047 deliveries, of which 176 will be new-build aircraft and 871 passenger-to-freighter conversions.

The capacity of the long-range freighter fleet will increase almost 3 times by 2022

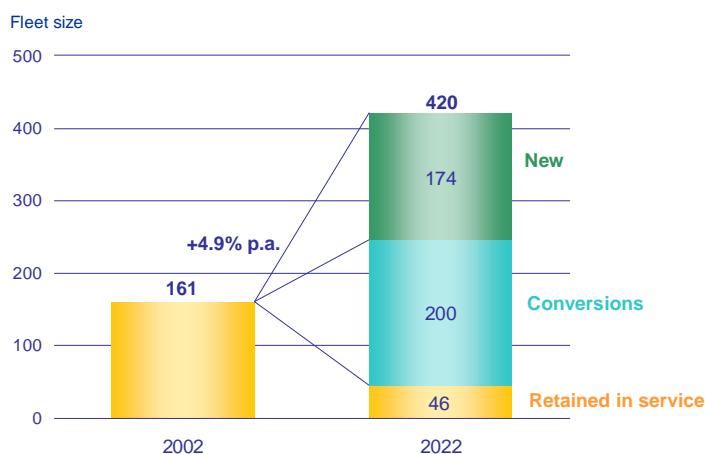


• Long-range

The long-range freighter segment will see capacity growing at an average annual rate of 5.2%. The increase in capacity is more meaningful than that of fleet size because this segment currently includes a number of combis, so that its capacity is more dispersed than in other segments. Based on the GMF's assumption that combis will be converted to full freighters when they are replaced as passenger aircraft, and in view of the age of the DC10-30/40 fleet, 71% of current capacity in this segment will have to be replaced by end-2022.

The increase in fleet size of 259 aircraft, together with the need to replace the 115 aircraft in the current fleet which will reach the end of their economic lives before end 2022, will call for delivery of 374 freighters during the forecast period. Long-range freighters are deployed predominantly on high-or-intermediate utilisation operations. Consequently the GMF predicts that as many as 174 deliveries will be new-build freighters, leaving room for 200 conversions.

Almost half of long-range freighters deliveries will be factory-built



## • Large

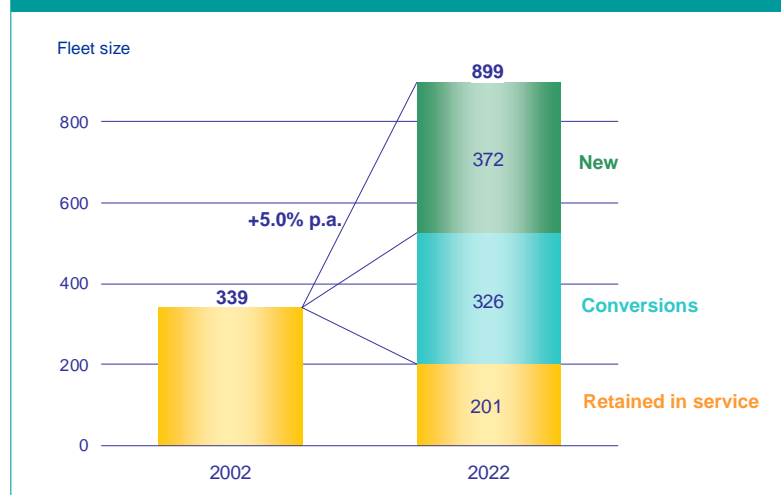
Recent years have seen a significant increase in the number of large freighters used, from 286 in 2000 to 339 in 2002. Airbus forecasters believe that this trend will continue and that the number of large freighters in service will increase at an average 5% per year.

Indeed, the bulk of new airfreight capacity will come from the large freighter segment, where 372 newly-built aircraft as well as 326 conversions will be needed by 2022. This demand will be driven mostly by growth in long-range services, but also by the need to replace a number of early 747Fs due to be retired during the second half of the forecast period.

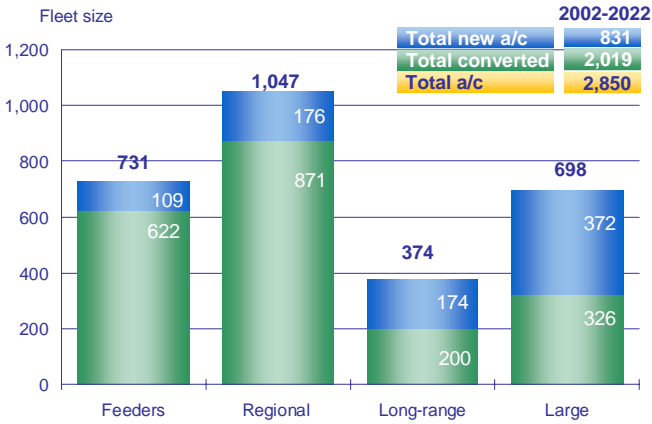
The base fleet in operation during 2002 excluded some 51 large freighters which were parked or almost not utilised; most of them were 747-100s, -200s or 747 combis which are not expected to rejoin the active fleet.

This segment is expected to see the highest capacity growth, with a yearly average increase of 5.4% over the forecast period.

### Reliance on large freighters will grow



2,850 freighters will be delivered



831 factory-built freighters will be needed

Overall, to accommodate growth and renew their fleets, cargo operators will require a total of 2,850 freighter deliveries during the next twenty years, of which 831 will be new factory-built freighters, and 2,019 will be passenger-to-freighter conversions.





## Appendices

A. Airlines & cargo carriers studied	46
B. Detailed passenger traffic forecast	50
C. Detailed passenger fleet forecast	53
D. Detailed cargo traffic forecast	55
E. Freighter fleet forecast	58

# A. Airlines & cargo carriers analysed

The GMF is the product of a “bottom-up” micro analysis that covers 278 individual airlines in six geographical regions, including 63 subsidiaries or associates (airlines for which either operations and/or fleets cannot be separated from their

associate companies; these are marked in italics in the list below) and 129 smaller airlines grouped in 13 sub-regional “remainder” fleet-plans.

In addition the GMF covers a total of 150 freighter operators.

## 278 individual airlines & subsidiaries and 129 others grouped

### Africa (57)

AFI	Africa One	NGA	Nigeria Airways			<b>Remainder</b>	
DAH	Air Algeria	LBT	Nouvelair Tunisie			QSC	African Safari Airways
REU	Air Austral	RAM	Royal Air Maroc			AAW	Afriqyah Airways
AGN	Air Gabon	SHK	Shorouk Air			BOT	Air Botswana
MDG	Air Madagascar	<i>LNK</i>	<i>South African Airlin</i>	<i>SAA</i>		VBW	Air Burkina
MLI	Air Mali	SAA	South African Airways			CCE	Air Cairo
MRT	Air Mauritanie	SUD	Sudan Airways			AML	Air Malawi
MAU	Air Mauritius	DTA	TAAG Angola Airlines			MHS	Air Memphis
NMB	Air Namibia	TCV	TACV Cabo Verde			ASD	Air Sinai
DSB	Air Senegal	TAR	Tunis Air			ATC	Air Tanzania
SEY	Air Seychelles					NBK	Albarka Air
TGA	Air Togo (Eagle Aviation)					AMV	AMC Aviation
AZW	Air Zimbabwe					DJA	Antinea Airlines
UYC	Cameroon Airlines					BLV	Bellview Airlines
NCH	Chanchangi Airlines					ILN	Inter Air
CAW	Comair					KAJ	Karthago Airlines
DAO	Daallo Airlines						Kulula
MSR	Egyptair						Million Air Charter
ETH	Ethiopian Airlines						Nas Air
GHA	Ghana Airways					NTW	Nationwide Airlines
KQA	Kenya Airways					SFR	Safair
LAM	LAM Mocambique					SLA	Sierra National Airlines
LAA	Libyan Arab Airlines					TSG	Trans Air Congo
TAS	Lotus Air					TUI	Tuninter

### North America (43)

ACA	Air Canada	FFT	Frontier			<b>Remainder</b>	
JZA	Air Canada Jazz	HAL	Hawaiian Air			ANT	Air North
	<i>Air Canada Tango</i>	<i>QXE</i>	<i>Horizon Air</i>	<i>ASA</i>		AAY	Allegiant Air
TSC	Air Transat	JBU	JetBlue			AAH	Aloha Airlines
MTE	AirTran Airways	NWA	Northwest Airlines			EGF	American Eagle
ASA	Alaska Airlines	SSV	Skyservice			AMT	American Trans Air
AWE	America West Airlines	SWA	Southwest Airlines			ANX	Canadian North
AAL	American Airlines	NKS	Spirit Airlines				Canjet Airlines
<i>ASE</i>	<i>Atlantic Southeast</i>	UAL	United Airlines			C3M	Champion Air
COA	Continental Airlines	USA	US Airways			COM	Comair Inc
<i>CMI</i>	<i>Continental Micronesia</i>	<i>USS</i>	<i>US Airways Shuttle</i>	<i>USA</i>		FAB	First Air
DAL	Delta Air Lines	WJA	Westjet Airlines				Jetsgo
						MEP	Midwest Express
						NAO	North American Airlines
						PAA	Pan American Airways
						RYN	Ryan Intl Airlines
						SCX	Sun Country Airlines
						TRZ	TransMeridian
						GWY	USA 3000
						WOA	World Airways

## Europe (156)

ADR	Adria Airways		IBE	Iberia		<b>Remainder</b>	
AEE	Aegean Aviation		IWD	Iberworld		AIS	Aeris
EIN	Aer Lingus		ICE	Icelandair		ABD	Air Atlanta Icelandic
AEF	Aero Lloyd		JAT	JAT		KFB	Air Botnia
AMM	Air 2000		JMC	JMC Air	TCW	GRL	Air Greenland
BIA	Air Baltic		KYV	Kibris Turkish Airlines		AIJ	Air Jet
BER	Air Berlin		KLC	KLM Cityhopper	KLM	LIB	Air Lib
BON	Air Bosna		AXL	KLM exel	KLM	LIT	Air Littoral
AEA	Air Europa		KLM	KLM Royal Dutch Airlines		BIE	Air Mediterranee
AEL	Air Europe	VLE	UKA	KLM UK	KLM	SVK	Air Slovakia
AFR	Air France		LDA	Lauda Air			Airlinair
LXR	Air Luxor		LDI	Lauda Air Italy	LDA	ELG	ALPI Eagles
AMC	Air Malta		LIL	Lithuanian Airlines		AIZ	Arkia Israeli Airlines
ADH	Air One		LOT	LOT - Polish Airlines			Astraeus
MPD	Air Plus Comet		LTE	LTE International Airways		FLI	Atlantic Airways
LBC	Albanian Airlines		LTU	LTU		OGE	Atlas Jet
AZA	Alitalia		DLH	Lufthansa		AUB	Augsburg Airways
NOV	Alitalia Team	AZA	CLH	Lufthansa Cityline	DLH	AXX	Avioimpex
AUA	Austrian Airlines		LGL	Luxair		AZZ	Azzurra Air
BDY	Birdy Airlines	DAT	MAK	Macedonian Airlines		LAZ	Balkan Air Tour
BMA	bmi		DAN	Maersk Air			Belair Airlines
BMI	bmibaby	BMA	MSK	Maersk Air Ltd	DAN	BPA	Blue Panorama Airlines
BRA	Braathens		MAH	MALEV		BHY	Bosphorus European
SCW	Braathens Malmo Aviation	BRA	MPH	Martinair		BUC	Bulgarian Air Charter
BZH	Brit Air		ISS	Meridiana Spa		CIM	Cimber Air
BAL	Britannia Airways		MON	Monarch Airlines		BCY	Cityjet
BLX	Britannia Airways AB		MGX	Montenegro Airlines		EDW	Edelweiss Air
BAW	British Airways		MYT	MyTravel Airways		EUH	Euralair Horizons
	British Airways CitiExpress	BAW	VKG	MyTravel Airways A/S		EAF	European Air Charter
LAJ	British Mediterranean	BAW	OAL	Olympic Airways		SBE	Excel Airways
90Z	buzz	RYR	OLY	Olympic Aviation	OAL	FCN	Falcon Air
CFG	Condor Flugdienst	TCW	OHY	Onur Air		FFR	Futura International
CRL	Corsair		PGA	Portugalia		FUA	Futura International
CCM	Corse Mediterranée		RYR	Ryanair		GMI	Germania
CTN	Croatia Airlines		SAS	SAS		HHI	Hamburg Intl
CYP	Cyprus Airways		DAT	SN Brussels Airlines		ISR	Israil
CSA	Czech Airlines		SLR	Sobelair		LTC	LatCharter Airlines
BAG	Deutsche BA		JKK	Spanair		LTP	Latpass Airlines
EZY	easyJet		SEU	Star Airlines		MCS	Macedonian Airlines
EZS	easyJet Switzerland	EZY	SAW	Sterling			MyTravelLite
ELY	El Al Israel Airlines		SWR	Swiss		NDC	Nordic Airlink
ELL	Estonian Air		TAP	TAP Air Portugal		NAX	Norwegian
ECA	Eurocypria	CYP	ROT	TAROM		NVR	Novair
EEZ	Eurofly		TCW	Thomas Cook Airlines		PGT	Pegasus Airlines
ELO	EuroLOT	LOT	THY	THY - Turkish Airlines		RMV	Romavia
ARP	Europe Airpost	AFR	TRA	Transavia Airlines		RZO	SATA International
EWG	Eurowings		TVS	Travel Servis		SHY	Sky Airlines
FIN	Finnair		TYR	Tyrolean Airways		SIE	Skynet Airlines
BEE	flybe.		VIR	Virgin Atlantic		SLL	Slovak Airlines
GBL	GB Airways		VEX	Virgin Express		SXS	Sun Express
	Germanwings	EWG	VLE	Volare Airlines		AWC	Titan Airways
HLF	Hapag Lloyd					WEA	White Eagle Aviation
HLX	Hapag Lloyd Express	HLF				WIF	Wideroe's Flyveselskap

## Airlines analysed

### Latin America & Caribbean (49)

AES	ACES		75Z	Grupo TACA	TAI	<b>Remainder</b>
SER	Aero California		LRC	LACSA	TAI	ASU Aerosur
ACQ	Aero Continente		LPE	LAN Peru	LAN	GRO Allegro Air
CBE	Aerocaribe	MXA	LAN	LanChile		AFB American Falcon
ARG	Aerolineas Argentinas			LanExpress	LAN	VND Aviandina
LNT	Aerolineas Internacionales		LPR	LAPA		BHS Bahamasair
AMX	Aeromexico		LLB	Lloyd Aereo Boliviano		CAY Cayman Airways
ALV	Aeropostal		MXA	Mexicana		RDN Dinar Lineas Aereas
RPB	AeroRepublica		NES	Nordeste LAR	VRG	FLB FLY
AJM	Air Jamaica		PUA	PLUNA		LBH Laker Airways
AUT	Austral	ARG	RSL	Rio Sul	VRG	LASER
AVE	AVENSA		SAM	SAM Colombia	AES	SKU Sky Airline
CHP	AVIACSA		SWD	Southern Winds		SLM Surinam Airways
AVA	Avianca	AES	LAP	TA Mercosur	TAM	
BWA	BWIA West Indies Airways		TAI	TACA Intl Airlines		
CMP	COPA		TAM	TAM Linhas Aereas		
CUB	Cubana		VRG	VARIG		
DCE	Dutch Caribbean Express		VSP	VASP		
GLO	GOL					

### Middle East (13)

UAE	Emirates		OAS	Oman Air	
GFA	Gulf Air		QTR	Qatar Airways	
IRA	Iran Air		RJA	Royal Jordanian	
IRC	Iran Aseman Airlines		SVA	Saudia	
KAC	Kuwait Airways		SYR	Syrian Arab Airlines	
IRM	Mahan Air		IYE	Yemenia	
MEA	Middle East Airlines				

### Asia-Pacific-PRC (89)

CCA	Air China		JAZ	JALways	JAL	<b>Remainder</b>
AIC	Air India		JAS	Japan Air System	JAL	RSO Aero Asia
AMU	Air Macau		JAL	Japan Airlines		S3I Air Asia
ANZ	Air New Zealand		JEX	Japan Airlines Express	JAL	AJX Air Japan
ANK	Air Nippon	ANA	JAA	Japan Asia Airways	JAL	KOR Air Koryo
FJI	Air Pacific		JTA	Japan TransOcean Air		RON Air Nauru
S3N	Air Sahara		JAI	Jet Airways		ANG Air Niugini
THT	Air Tahiti Nui		KAL	Korean Air		GAP Air Philippines
A3J	Airlink	QFA	LNI	Lion Airlines		VTA Air Tahiti
ANA	All Nippon Airways		MAS	Malaysia Airlines		ACI AirCalin
LLR	Alliance Air	IAC	MDL	Mandala Airlines		BKP Bangkok Airways
	ANA Group	ANA	MDA	Mandarin Airlines	CAL	Batavia Air
AAR	Asiana Airlines		MNA	Merpati Nusantara		BOU Bouraq Indonesia
AUZ	Australian Airlines	QFA	NJS	National Jet Systems	QFA	DRK Druk Air
BBC	Biman Bangladesh Airlines		PIA	Pakistan Intl Airlines		FEA Far Eastern Air Transport
CPA	Cathay Pacific		PAL	Philippine Airlines		IAA Indonesian Airlines
CPI	Cebu Pacific Air		QFA	Qantas Airways		Jatayu Air Pk
CGN	Changan Airlines	CHH	RBA	Royal Brunei Airlines		MGL MIAT - Mongolian Airlines
CAL	China Airlines		RNA	Royal Nepal Airlines		PIC Pacific Airlines
CES	China Eastern Airlines		CDG	Shandong Airlines		PAS Pelita Air Services
CBF	China Northern Airlines	CSN	CSH	Shanghai Airlines		VAP Phuket Airlines
CNW	China Northwest Airlines	CES	CSZ	Shenzhen Airlines		PAO Polynesian Airlines
CSN	China Southern Airlines		SLK	Silk Air	SIA	SAI Shaheen Air Intl
CXN	China Southwest	CCA	SIA	Singapore Airlines		SKY Skymark Airlines
CXH	China Xinhua Airlines	CHH	ALK	Srilankan Airlines		
CXJ	China Xinjiang Airlines	CSN	THA	Thai Airways Intl		
CYH	China Yunnan Airlines	CES	TNA	TransAsia Airways		
HDA	Dragonair		UIA	UNI Airways	EVA	
EVA	EVA Air		HVN	Vietnam Airlines		
FOM	Freedom Air International	ANZ	VOZ	Virgin Blue		
GIA	Garuda Indonesia		CWU	Wuhan Airlines	CES	
CHH	Hainan Airlines		CXA	Xiamen Airlines		
IAC	Indian Airlines		CJG	Zhejiang Airlines	CCA	

## 150 freighter operators

## Africa (21)

AIN	African International	DSR	DAS Air	SFR	Safair
CCE	Air Cairo	MSR	Egyptair	XSO1	SonAir
MHS	Air Memphis	ETH	Ethiopian Airlines	SAA	South African Airways
NMB	Air Namibia	FIA	First International Airlines	SUD	Sudan Airways
AWD	AirWorld	HYDR	Hydro Air Cargo	DTA	TAAG - Angola Airlines
UYC	Cameroon Airlines	LAA	Libyan Arab Airlines	STH1	TransAfrik
CGP	Cargo Plus	MKA	MK Airlines	TSY	Tristar Air

## North America (43)

ACA	Air Canada	EIA	Evergreen International	MUA	Murray Aviation
ATN	Air Transport International	LHN	Express One International	NAC	Northern Air Cargo
ABX	Airborne Express	TCN	Express.Net Airlines	NWA	Northwest Airlines
AJT	Amerijet International	FAO	Falcon Air Express	OAE	Omni Air International
AJIA	Ameristar Air Cargo	FBRI	Falconbridge Ltd	PAC	Polar Air Cargo
APW	Arrow Air	FDX	FedEx	QCIA	Quest Cargo International
GTI	Atlas Air	FBF	Fine Air	RLT	Reliant Airlines
9CG	Capital Cargo International	FAB	First Air	NRG1	Ross Aviation
ROY3	Cargojet Canada	FWL	Florida West International	TDX	TradeWinds Airlines
CWC	Centurion Air Cargo	GCO	Gemini Air Cargo	UPS	United Parcel Service
TSU	Contract Air Cargo	CIC	ICC Air Cargo Canada	JUS	USA Jet Airlines
CQ9	Corp Air	CKSA	Kalitta Air	WINP	Winnport Air Cargo
CUS1	Custom Air Transport	KFA	Kelowna Flightcraft	WOA	World Airways
DHL	DHL Airways	KHC	Kitty Hawk Air Cargo		
EWV	Emery Worldwide Airlines	MALX	Morningstar Air Express		

## Europe (29)

ATT	Aer Turas	EXS	Channel Express	DLH	Lufthansa Cargo Airlines
ABD	Air Atlanta Icelandic	CYGA	Cygnus Air	MPH	Martinair Holland
ABR	Air Contractors	DHK	DHL Air	MSA	Mistral Air
AFR	Air France	ELY	El Al	MNB	MNG Airlines
AFX	Airfreight Express	ELD	Electra Airlines	PNR	Pan Air
AZA	Alitalia	ARP	Europe Airpost	SRR	Star Air
AXIS	Axis Airways	BCS	European Air Transport	SNB	Sterling European Airlines
BBD	Bluebird Cargo	EAF	European Aircharter	SWT	Swiftair
BAW	British Airways	ICE	Icelandair	TNT	TNT Airways
CLX	Cargolux	KLM	KLM Royal Dutch Airlines		

## Latin America &amp; Caribbean (21)

TUS	ABSA Cargo	DHL	DHL Expresso Aereo	TPA	TAMPA Colombia
MPX	Aeromexpress	EFTA	Estafeta Carga Aerea	TCJ	TCB
KRE	Aerosucre Colombia	LAN	LanChile Cargo	TTL	Total Linhas Aereas
TNO	AeroUnion	LAU	Lineas Aereas Suramericanas	VRG	VARIG
BT7	Beta Cargo	MAS	Mas Air Cargo	VRGC	Varig Log
CIU	Cielos Del Peru	SKYM	Skymaster Air Lines	VSP	VASP
CMP	COPA Airlines	TSD	TAF Linhas Aereas	VEC	Vensecar Internacional

## Middle East (7)

DHL	DHL International EC	FDN	Flying Dolphin Airlines	TMA	TMA
DUB	Dubai Air Wing	RJA	Royal Jordanian		
UAE	Emirates Airlines	SVA	Saudi Arabian Airlines		

## Asia-Pacific-PRC (29)

CCA	Air China	QFA	Australian Air Express	MAS	Malaysia Airlines
AHK	Air Hong Kong	DXP1	Blue Dart Express	ANA	Nippon Cargo Airlines
AIC	Air India	CPA	Cathay Pacific	PIA	Pakistan International
AMU	Air Macau	CAL	China Airlines	PAL	Philippine Airlines
ANA	ANA	CKK	China Cargo Airlines	RPH	Republic Express
NGE	Angel Air	CSN	China Southern Airlines	SIA	Singapore Airlines Cargo
AAA	Ansett Australia Cargo	HDA	Dragonair	TRAZ	TransAustralair Air Express
MGE	Asia Pacific Airlines	EVA	EVA Air	TSE	Transmile Air
PA3	Asian Express Airlines	JAL	Japan Airlines	IDTR	Tri - M G
AAR	Asiana Airlines	KAL	Korean Air		

# B. Detailed passenger traffic forecast

RPK & average annual growth rates for 140 submarkets

Sub market	2002 RPK (million)	AAGR 2002-2022
Africa Sub-Sahara - Asia	255	4.3%
Africa Sub-Sahara - Australia/New Zealand	180	3.3%
Africa Sub-Sahara - CIS	33	5.3%
Africa Sub-Sahara - Western Europe	42,605	4.5%
Africa Sub-Sahara - Indian Sub-continent	1,042	3.7%
Africa Sub-Sahara - Middle East	4,539	5.2%
Africa Sub-Sahara - North Africa Sub-Sahara	1,213	3.7%
Africa Sub-Sahara - P.R. China	825	3.8%
Africa Sub-Sahara - South Africa Sub-Sahara	3,287	4.2%
Africa Sub-Sahara - South America	107	4.8%
Africa Sub-Sahara - USA	1,524	4.7%
Asia - Australia/New Zealand	37,795	5.7%
Asia - Canada	7,570	5.3%
Asia - CIS	544	6.3%
Asia - Western Europe	93,613	6.0%
Asia - Indian Sub-continent	10,322	3.5%
Asia - Japan	40,886	5.7%
Asia - Middle East	19,959	4.3%
Asia - North Africa	932	3.3%
Asia - P.R. China	42,212	7.1%
Asia - Pacific	244	4.3%
Asia - South Africa	1,875	4.1%
Asia - South America	1,042	4.7%
Asia - USA	104,815	5.7%
Australia/New Zealand - Canada	1,391	6.3%
Australia/New Zealand - Western Europe	36,416	5.7%
Australia/New Zealand - Japan	14,153	6.1%
Australia/New Zealand - Middle East	4,026	4.1%
Australia/New Zealand - P.R. China	12,326	7.0%
Australia/New Zealand - Pacific	2,635	3.4%
Australia/New Zealand - South Africa	1,851	4.9%
Australia/New Zealand - South America	1,033	5.3%
Australia/New Zealand - USA	22,491	6.0%
Canada - Caribbean	1,672	5.3%
Canada - Central America	702	4.0%
Canada - CIS	485	4.8%
Canada - Central Europe	1,149	4.8%
Canada - Western Europe	44,821	5.5%
Canada - Indian Sub-continent	348	5.0%
Canada - Japan	6,821	4.6%
Canada - Middle East	646	4.3%
Canada - North Africa	701	5.2%
Canada - P.R. China	9,400	5.0%
Canada - Pacific	230	3.9%
Canada - South America	657	3.8%
Canada - USA	25,914	6.3%

continued ...

## Detailed passenger traffic forecast

Sub market	2002 RPK (million)	AAGR 2002-2022
Caribbean - Central America	1,436	4.9%
Caribbean - CIS	181	5.7%
Caribbean - Western Europe	34,993	5.9%
Caribbean - South America	1,224	3.7%
Caribbean - USA	40,377	4.5%
Central America - Western Europe	13,084	6.4%
Central America - Japan	583	4.7%
Central America - South America	4,325	5.3%
Central America - USA	41,199	4.5%
CIS - Central Europe	699	4.0%
CIS - Western Europe	7,429	5.8%
CIS - Indian Sub-continent	835	4.3%
CIS - Japan	467	5.0%
CIS - Middle East	680	5.0%
CIS - North Africa	58	4.3%
CIS - P.R. China	540	8.0%
CIS - USA	767	5.2%
Domestic Africa Sub-Sahara	4,704	3.4%
Domestic Asia	29,309	5.7%
Domestic Australia/New Zealand	29,272	4.0%
Domestic Brazil	31,835	6.5%
Domestic Canada	31,518	3.6%
Domestic Caribbean	264	2.9%
Domestic Central America	14,965	3.4%
Domestic CIS	29,762	4.6%
Domestic Central Europe	320	4.1%
Domestic Western Europe	71,076	4.8%
Domestic Indian Sub-continent	14,026	4.2%
Domestic Japan	64,490	3.5%
Domestic Middle East	11,115	3.8%
Domestic North Africa	2,723	6.3%
Domestic P.R. China	67,956	8.5%
Domestic Pacific	786	3.6%
Domestic South Africa	4,820	3.5%
Domestic South America	10,787	3.6%
Domestic USA	644,572	2.7%
Central Europe - Western Europe	16,795	6.5%
Central Europe - Middle East	2,110	5.0%
Central Europe - North Africa	1,505	4.3%
Central Europe - P.R. China	97	5.1%
Central Europe - USA	2,758	4.5%
Western Europe - Indian Sub-continent	23,629	6.9%
Western Europe - Japan	48,065	5.4%
Western Europe - LowCost	50,420	8.7%
Western Europe - Middle East	49,942	5.2%
Western Europe - North Africa	22,508	5.3%
Western Europe - P.R. China	40,235	6.6%
Western Europe - Pacific	4,107	4.4%
Western Europe - South Africa	21,150	5.2%
Western Europe - South America	57,475	6.0%
Western Europe - USA	298,469	4.9%

continued ...



## Detailed passenger traffic forecast

Sub market	2002 RPK (million)	AAGR 2002-2022
Indian Sub-continent - Japan	1,767	4.3%
Indian Sub-continent - Middle East	29,218	5.0%
Indian Sub-continent - North Africa	232	3.1%
Indian Sub-continent - P.R. China	1,900	3.8%
Indian Sub-continent - South Africa	334	4.9%
Indian Sub-continent - USA	11,118	4.0%
Intra Africa Sub-Sahara	3,710	3.5%
Intra Asia	43,760	5.4%
Intra Australia/New Zealand	7,137	5.1%
Intra Canada	15	2.9%
Intra Caribbean	463	5.0%
Intra Central America	660	4.1%
Intra CIS	6,525	6.6%
Intra Central Europe	568	5.5%
Intra Western Europe	151,446	4.8%
Intra Indian Sub-continent	766	3.1%
Intra Middle East	9,294	3.3%
Intra North Africa	1,044	5.8%
Intra P.R. China	9,270	5.7%
Intra Pacific	85	3.8%
Intra South America	9,834	3.6%
Intra USA	2,550	4.9%
Japan - Middle East	338	5.4%
Japan - North Africa	826	4.9%
Japan - P.R. China	19,321	7.2%
Japan - Pacific	1,630	4.3%
Japan - South America	4,979	4.7%
Japan - USA	47,180	5.6%
Middle East - North Africa	7,286	4.8%
Middle East - P.R. China	5,257	3.1%
Middle East - South Africa	1,438	4.5%
Middle East - USA	9,890	4.3%
North Africa - South Africa	175	4.9%
North Africa - South America	46	3.1%
North Africa - USA	1,081	4.5%
P.R. China - South Africa	1,525	5.8%
P.R. China - USA	31,742	8.5%
Pacific - South America	248	3.2%
Pacific - USA	2,284	3.9%
South Africa - South America	771	4.8%
South Africa - USA	3,012	6.0%
South America - USA	41,478	5.8%
Others & Charter	*)	5.0%
World	3,165,700	5.0%

\*) to give a percentage for the charter would be misleading since an increasing amount is treated as quasi-scheduled, and hence included in the OAG

# C. Detailed passenger fleet forecast

## Aircraft 2002 & 2022 (numbers at year end)

Aircraft Type	2002 in service	2022	Replacements	Deliveries	Aircraft Type	2002 in service	2022	Replacements	Deliveries
<b>100</b>	<b>0</b>	<b>831</b>	<b>0</b>	<b>831</b>	767-200	59	0	59	0
717	84	99	23	38	767-200ER	105	10	95	0
737-200	439	0	439	0	A310-200	26	0	26	0
737-500	369	21	348	0	A310-300	98	0	98	0
737-600	44	37	32	25	<b>250</b>	<b>0</b>	<b>1,935</b>	<b>0</b>	<b>1,935</b>
A318-100	0	84	0	84	767-300	105	2	103	0
Avro 100	59	3	56	0	767-300ER	431	97	367	33
BAe 146	94	0	94	0	767-400ER	37	37	0	0
DC-9-30	226	0	226	0	A300	46	0	46	0
DC-9-40	15	0	15	0	A300-600	31	0	31	0
ERJ-195	0	37	0	37	A300-600R	151	0	151	0
F100	204	1	203	0	A330-200	119	152	78	111
MD-80-87	68	0	68	0	A340-200	18	4	14	0
Yak-42	17	0	17	0	<b>300</b>	<b>0</b>	<b>1,291</b>	<b>0</b>	<b>1,291</b>
<b>125</b>	<b>0</b>	<b>1,723</b>	<b>0</b>	<b>1,723</b>	747SP	9	0	9	0
737-300	963	20	943	0	777-200ER	295	211	186	102
737-700	393	618	155	380	777-200LR	0	5	0	5
A319-100	463	566	258	361	A330-300	116	63	105	52
DC-9-50	60	0	60	0	A340-300	182	48	157	23
<b>150</b>	<b>0</b>	<b>2,487</b>	<b>0</b>	<b>2,487</b>	A340-500	0	11	5	16
707	2	0	2	0	DC-10	66	0	66	0
727	164	0	164	0	L1011	21	0	21	0
737-400	429	13	416	0	MD-11	72	3	69	0
737-800	662	660	335	333	MD-11C	8	0	8	0
A320-100	17	0	17	0	MD-11ER	4	3	1	0
A320-200	1,051	714	821	484	<b>350</b>	<b>0</b>	<b>768</b>	<b>0</b>	<b>768</b>
IL-62	6	0	6	0	747-200	84	0	84	0
MD-80	571	0	571	0	747-300	62	0	62	0
MD-80-83	237	22	215	0	777-200	79	11	73	5
MD-80-88	155	0	155	0	777-300ER	0	48	0	48
MD-90	102	25	77	0	<b>400</b>	<b>0</b>	<b>738</b>	<b>0</b>	<b>738</b>
Tu-154	18	2	16	0	747-100	8	0	8	0
<b>175</b>	<b>0</b>	<b>2,875</b>	<b>0</b>	<b>2,875</b>	747-400	466	47	437	18
737-900	29	43	7	21	747-400ER	3	5	3	5
757-200	776	103	677	4	777-300	44	23	42	21
757-300	38	42	19	23	A340-600	8	51	2	45
A321-100	87	8	87	8	<b>450</b>	<b>0</b>	<b>203</b>	<b>0</b>	<b>203</b>
A321-200	161	225	94	158	<b>500</b>	<b>0</b>	<b>477</b>	<b>0</b>	<b>477</b>
Tu-204	3	10	2	9	747HD	27	0	27	0
<b>210</b>	<b>0</b>	<b>2,551</b>	<b>0</b>	<b>2,551</b>	747SR	3	0	3	0
					A380-800	0	68	10	78
					<b>600</b>	<b>0</b>	<b>292</b>	<b>0</b>	<b>292</b>
					<b>800</b>	<b>0</b>	<b>101</b>	<b>0</b>	<b>101</b>
					<b>1000</b>	<b>0</b>	<b>30</b>	<b>0</b>	<b>30</b>

**Key:**

- end 2002 backlog
- a/c out of production or no orders
- open market neutral category

<b>Open Market</b>	<b>16,302</b>
<b>Backlog</b>	<b>2,527</b>
<b>Total</b>	<b>10,789 20,554 9,064 18,829</b>

## Detailed passenger fleet forecast

### Seats 2002 & 2022 (numbers at year end)

Aircraft Type	2002 in service	2022	Replacements	Deliveries
<b>100</b>	<b>0</b>	<b>83,100</b>	<b>0</b>	<b>83,100</b>
717	9,843	10,749	2,628	3,534
737-200	50,109	0	50,109	0
737-500	40,793	2,220	38,573	0
737-600	4,610	4,008	3,198	2,596
A318-100	0	8,875	0	8,875
Avro 100	6,033	330	5,703	0
BAe 146	8,614	0	8,614	0
DC-9-30	22,973	0	22,973	0
DC-9-40	1,697	0	1,697	0
ERJ-195	0	3,940	0	3,940
F100	20,025	108	19,917	0
MD-80-87	7,861	0	7,861	0
Yak-42	1,986	0	1,986	0
<b>125</b>	<b>0</b>	<b>215,375</b>	<b>0</b>	<b>215,375</b>
737-300	127,229	2,509	124,720	0
737-700	52,985	82,444	21,076	50,535
A319-100	57,146	73,683	31,894	48,431
DC-9-50	7,456	0	7,456	0
<b>150</b>	<b>0</b>	<b>373,050</b>	<b>0</b>	<b>373,050</b>
707	373	0	373	0
727	25,068	0	25,068	0
737-400	62,824	1,872	60,952	0
737-800	108,315	107,082	56,675	55,442
A320-100	2,731	0	2,731	0
A320-200	161,815	108,757	126,617	73,559
IL-62	986	0	986	0
MD-80	79,345	0	79,345	0
MD-80-83	33,840	2,882	30,958	0
MD-80-88	22,209	0	22,209	0
MD-90	14,897	3,025	11,872	0
Tu-154	2,742	332	2,410	0
<b>175</b>	<b>0</b>	<b>503,125</b>	<b>0</b>	<b>503,125</b>
737-900	5,064	7,487	1,316	3,739
757-200	146,795	18,963	128,764	932
757-300	9,220	9,479	4,789	5,048
A321-100	16,299	1,560	16,299	1,560
A321-200	30,236	40,005	18,250	28,019
Tu-204	624	1,783	416	1,575
<b>210</b>	<b>0</b>	<b>535,710</b>	<b>0</b>	<b>535,710</b>

#### Key:

	end 2002 backlog
	a/c out of production or no orders
	open market neutral category

Aircraft Type	2002 in service	2022	Replacements	Deliveries
767-200	11,788	0	11,788	0
767-200ER	19,464	1,740	17,724	0
A310-200	6,049	0	6,049	0
A310-300	19,726	0	19,726	0
<b>250</b>	<b>0</b>	<b>483,750</b>	<b>0</b>	<b>483,750</b>
767-300	27,795	504	27,291	0
767-300ER	97,267	21,272	83,412	7,417
767-400ER	9,787	9,787	0	0
A300	12,508	0	12,508	0
A300-600	8,170	0	8,170	0
A300-600R	39,506	0	39,506	0
A330-200	31,612	38,962	21,127	28,477
A340-200	4,404	996	3,408	0
<b>300</b>	<b>0</b>	<b>387,300</b>	<b>0</b>	<b>387,300</b>
747SP	2,656	0	2,656	0
777-200ER	80,391	59,177	52,937	31,723
777-200LR	0	1,500	0	1,500
A330-300	34,853	18,431	31,937	15,515
A340-300	48,204	12,266	41,557	5,619
A340-500	0	3,064	1,000	4,064
DC-10	19,050	0	19,050	0
L1011	6,816	0	6,816	0
MD-11	19,881	921	18,960	0
MD-11C	2,594	0	2,594	0
MD-11ER	1,215	855	360	0
<b>350</b>	<b>0</b>	<b>268,800</b>	<b>0</b>	<b>268,800</b>
747-200	31,991	0	31,991	0
747-300	24,463	0	24,463	0
777-200	26,272	3,994	24,184	1,906
777-300ER	0	15,938	0	15,938
<b>400</b>	<b>0</b>	<b>295,200</b>	<b>0</b>	<b>295,200</b>
747-100	3,607	0	3,607	0
747-400	174,569	17,795	164,015	7,241
747-400ER	1,074	1,906	1,074	1,906
777-300	17,425	9,916	16,617	9,108
A340-600	2,580	17,421	576	15,417
<b>450</b>	<b>0</b>	<b>91,350</b>	<b>0</b>	<b>91,350</b>
<b>500</b>	<b>0</b>	<b>238,500</b>	<b>0</b>	<b>238,500</b>
747HD	14,873	0	14,873	0
747SR	1,659	0	1,659	0
A380-800	0	38,093	5,750	43,843
<b>600</b>	<b>0</b>	<b>175,200</b>	<b>0</b>	<b>175,200</b>
<b>800</b>	<b>0</b>	<b>80,800</b>	<b>0</b>	<b>80,800</b>
<b>1000</b>	<b>0</b>	<b>30,000</b>	<b>0</b>	<b>30,000</b>

<b>Open Market</b>	<b>3,761,260</b>
<b>Backlog</b>	<b>477,459</b>
<b>Total</b>	<b>1,944,992 4,527,891 1,655,820 4,238,719</b>

# D. Detailed cargo traffic forecast

FTK & average annual growth rates for 145 directional sub markets

Sub market directional	2002 FTK (million)	AAGR 2002-2022
Africa to Africa	9	4.4%
Africa to Asia	92	4.6%
Africa to Central America	17	8.1%
Africa to CIS	5	4.7%
Africa to Europe	1,137	6.4%
Africa to Indian Subcontinent	32	6.7%
Africa to Japan	47	6.0%
Africa to Middle East	12	6.0%
Africa to North America	426	7.3%
Africa to P.R. China	35	6.9%
Africa to Pacific	10	4.7%
Africa to South America	9	5.2%
Asia to Africa	200	4.5%
Asia to Asia	1,561	6.1%
Asia to Central America	1,171	7.7%
Asia to CIS	24	3.8%
Asia to Europe	7,179	6.8%
Asia to Indian Subcontinent	289	4.9%
Asia to Japan	672	6.6%
Asia to Middle East	346	6.3%
Asia to North America	9,520	6.0%
Asia to P.R. China	1,015	7.1%
Asia to Pacific	383	5.7%
Asia to South America	851	5.5%
Central America to Africa	4	2.6%
Central America to Asia	356	8.9%
Central America to Central America	41	5.6%
Central America to CIS	2	5.2%
Central America to Europe	933	4.0%
Central America to Indian Subcontinent	5	4.1%
Central America to Japan	100	7.2%
Central America to Middle East	7	6.4%
Central America to North America	377	6.0%
Central America to P.R. China	38	9.2%
Central America to Pacific	21	5.8%
Central America to South America	174	4.9%
CIS to Africa	19	3.8%
CIS to Asia	162	5.9%
CIS to Central America	36	5.0%
CIS to CIS	45	7.2%
CIS to Europe	15	4.7%
CIS to Indian Subcontinent	27	4.4%
CIS to Japan	29	5.4%
CIS to Middle East	20	5.4%
CIS to North America	130	6.4%
CIS to P.R. China	120	8.7%

continued ...

## Detailed cargo traffic forecast

Sub market directional	2002 FTK (million)	AAGR 2002-2022
CIS to Pacific	1	4.9%
CIS to South America	22	5.1%
Domestic P.R. China	<1	9.0%
Domestic USA	22,630	4.4%
Europe to Africa	1,284	4.9%
Europe to Asia	3,401	6.5%
Europe to Central America	1,748	5.2%
Europe to CIS	10	8.5%
Europe to Europe	2,654	4.9%
Europe to Indian Subcontinent	435	6.2%
Europe to Japan	2,553	5.2%
Europe to Middle East	961	5.4%
Europe to North America	12,641	5.0%
Europe to P.R. China	3,217	7.8%
Europe to Pacific	1,366	4.7%
Europe to South America	2,497	6.5%
Indian Subcontinent to Africa	37	6.5%
Indian Subcontinent to Asia	146	5.6%
Indian Subcontinent to Central America	80	7.6%
Indian Subcontinent to CIS	5	4.7%
Indian Subcontinent to Europe	1,288	5.4%
Indian Subcontinent to Indian Subcontinent	5	6.7%
Indian Subcontinent to Japan	49	4.9%
Indian Subcontinent to Middle East	43	5.7%
Indian Subcontinent to North America	2,139	4.9%
Indian Subcontinent to P.R. China	40	9.8%
Indian Subcontinent to Pacific	32	5.7%
Indian Subcontinent to South America	62	6.9%
Japan to Africa	84	6.3%
Japan to Asia	1,078	5.1%
Japan to Central America	576	6.3%
Japan to CIS	8	3.7%
Japan to Europe	2,665	6.3%
Japan to Indian Subcontinent	73	5.4%
Japan to Middle East	198	5.3%
Japan to North America	3,685	5.9%
Japan to P.R. China	304	6.1%
Japan to Pacific	182	5.9%
Japan to South America	204	4.3%
Middle East to Africa	7	7.4%
Middle East to Asia	55	5.2%
Middle East to Central America	6	4.7%
Middle East to CIS	2	3.1%
Middle East to Europe	108	4.5%
Middle East to Indian Subcontinent	22	7.2%
Middle East to Japan	13	3.2%
Middle East to Middle East	5	4.8%
Middle East to North America	186	6.2%
Middle East to P.R. China	29	8.3%
Middle East to Pacific	7	5.1%
Middle East to South America	1	6.6%

continued ...

## Detailed cargo traffic forecast

Sub market directional	2002 FTK (million)	AAGR 2002-2022
North America to Africa	586	4.7%
North America to Asia	7,023	5.5%
North America to Central America	437	6.0%
North America to CIS	177	5.5%
North America to Europe	11,549	5.4%
North America to Indian Subcontinent	699	6.3%
North America to Japan	3,957	6.4%
North America to Middle East	701	3.7%
North America to North America	720	5.0%
North America to P.R. China	2,493	7.2%
North America to Pacific	1,157	4.5%
North America to South America	2,120	6.0%
P.R. China to Africa	75	8.4%
P.R. China to Asia	334	8.4%
P.R. China to Central America	377	6.3%
P.R. China to CIS	12	5.3%
P.R. China to Europe	4,807	7.4%
P.R. China to Indian Subcontinent	40	10.5%
P.R. China to Japan	264	6.9%
P.R. China to Middle East	85	6.9%
P.R. China to North America	6,258	7.0%
P.R. China to P.R. China	60	5.4%
P.R. China to Pacific	132	8.5%
P.R. China to South America	465	8.5%
Pacific to Africa	99	5.4%
Pacific to Asia	1,008	5.1%
Pacific to Central America	112	5.7%
Pacific to CIS	3	5.0%
Pacific to Europe	2,919	5.1%
Pacific to Indian Subcontinent	110	6.2%
Pacific to Japan	493	4.2%
Pacific to Middle East	269	4.8%
Pacific to North America	648	4.0%
Pacific to P.R. China	211	6.6%
Pacific to Pacific	346	5.0%
Pacific to South America	34	6.6%
South America to Africa	42	4.3%
South America to Asia	852	5.9%
South America to Central America	227	7.2%
South America to CIS	23	6.2%
South America to Europe	3,342	5.0%
South America to Indian Subcontinent	30	5.7%
South America to Japan	303	4.5%
South America to Middle East	100	5.3%
South America to North America	3,404	4.8%
South America to P.R. China	297	7.3%
South America to Pacific	16	5.9%
South America to South America	109	7.1%
World	156,068	5.7%

## E. Freightler fleet forecast

### Capacity (tonnes)

Aircraft size segment	In service 2002	Deliveries		Retire-ments	In service 2022
		New	converted		
Feeders	8,519	2,399	13,686	8,135	16,469
Regional	22,715	7,932	39,210	15,942	53,916
Long-range	9,107	10,463	11,971	6,366	25,175
Large	35,231	44,669	35,826	14,339	101,387
<b>Total</b>	<b>75,573</b>	<b>65,463</b>	<b>11,694</b>	<b>44,781</b>	<b>196,948</b>

### Numbers of aircraft

Aircraft size segment	In service 2002	Deliveries		Retire-ments	In service 2022
		New	Converted		
Feeders	492	109	622	459	764
Regional	507	176	871	354	1,200
Long-range	161	174	200	115	420
Large	339	372	326	138	899
<b>Total</b>	<b>1,499</b>	<b>831</b>	<b>2,019</b>	<b>1,066</b>	<b>3,283</b>