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Asia/Pacific Area Traffic Forecasts 2004–2020

**Report of the Twelfth Meeting
of the Asia/Pacific Area Traffic
Forecasting Group (APA TFG)**

Bangkok, 23–30 July 2004

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**REPORT OF THE
ASIA/PACIFIC AREA TRAFFIC FORECASTING GROUP
(APA TFG)
TWELFTH MEETING
BANGKOK, 23 TO 30 JULY 2004**

Includes:

- Forecasts of Transpacific and Intra-Asia/Pacific Traffic to the Year 2020
- Forecasts for Major City-Pairs of Intra-Asia/Pacific and Transpacific to the Year 2007
- Analysis of FIR Data

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SUMMARY

1. The ICAO Pacific Area Traffic Forecasting Group was formed in 1991 with the primary objective of developing forecasts of civil aviation activity in the Transpacific market to support air navigation systems planning activity for ICAO and its Contracting States. The scope of the Group was subsequently broadened to include Intra-Asia/Pacific which is reflected in the current designation as Asia/Pacific Area Traffic Forecasting Group (APA TFG). The Group maintains close relationships with and provides essential data for regional meetings as well as groups charged with air navigation planning and implementation in North America (NA) and Asia/Pacific (AP). This report contains forecasts produced by the Group summarized below.
2. During the period 1980 to 2003, Gross Domestic Product (GDP), measured in real terms, grew at average annual growth rates of 3.5 per cent, 2.7 per cent and 4.4 per cent for the world, the North American and Asia/Pacific regions, respectively. In the aggregate, GDP in the Transpacific area grew at 3.4 per cent (see Table 2).
3. The average revenue yield, measured in real terms, of the world's airlines total scheduled passenger traffic decreased at an average annual rate of 3.2 per cent during the same period. Yield for airlines based in the North America region declined at the average rate of 2.7 per cent per year, while for airlines in the Asia/Pacific region it declined at 3.0 per cent per year. Transpacific yields for the period declined at an average annual rate of 3.1 per cent (Table 2).
4. During the same period, international scheduled passenger traffic in the Transpacific market increased from 6.4 million to almost 22.8 million passengers, at an average annual growth rate of 5.7 per cent (Table 1). The comparable global passenger traffic increased 4.5 per cent per year over the same period. However, the Transpacific traffic experienced a decline of some 10 per cent both in 2001 and 2003 and about 2.5 per cent in 2002.
5. For the period 2002 - 2005, the GDP for the North American and Asia/Pacific regions is expected to increase at average annual rates of 3.7 per cent and 5.8 per cent respectively. For the period 2005 - 2015 the GDP for the North American and Asia/Pacific regions is expected to increase at 3.0 per cent and 3.7 per cent per annum respectively. In the aggregate, the most likely GDP growth rate for the Transpacific area is projected to increase at an average annual rate of 3.6 per cent for the forecast horizon 2002 - 2020 (Table 3).
6. Average Transpacific airline passenger yield is expected to increase in real terms by 0.6 per cent per annum for the period 2002 - 2005 and to decline gradually during the period 2005-2020 (Table 3). Average Intra-Asia/Pacific yield is expected to decline over the period 2002 - 2005 and to continue the declining trend over the 2005-2020 period at a rate similar to that for Transpacific yield.

7. Based on these "most likely" GDP and yield projections, Transpacific traffic is forecast to increase at an average annual rate of 3.5 per cent for the period 2002 - 2005, reaching some 28 million passengers in the year 2005. Growth rates of 6.5 and 5.7 and 5.2 per cent per annum are expected for the periods 2005 - 2010, 2010 - 2015 and 2015 - 2020, respectively, resulting in a forecast of about 65 million passengers by the year 2020 (Table 4). The low growth rate of 3.5 per cent projected for the 2002 - 2005 period is a consequence of the decline of traffic experienced in 2002 and 2003 due mainly to the events of 11 September 2001 and the Severe Acute Respiratory Syndrome (SARS) outbreak.

8. Consistent with the forecasts of passenger traffic growth, future expectations of load factors and average aircraft size (Table 5), total aircraft (including cargo) movements across the Pacific are expected to increase from an estimated 130.9 thousand in 2002 to 147.5 in the year 2005, equivalent to an average annual growth rate of 4.1 per cent. For the period 2002-2020 these aircraft movements are expected to increase at an annual growth rate of 4.6 per cent, to reach almost 294 thousand aircraft movements by the year 2020 (Table 6).

9. Intra-Asia/Pacific passenger traffic is expected to increase at a "most likely" average annual rate of 3.6 per cent during 2002 - 2005, reaching some 92.5 million passengers in the year 2005. An average annual growth rate of 4.9 per cent is forecast for the period 2002 - 2020, resulting in over 196 million passengers by the year 2020 (Table 9).

10. Intra-Asia passenger aircraft movements are forecast to increase from 662 thousand in 2002 to some 766.6 in 2005, equivalent to an average annual growth rate of 5.0 per cent. For the period 2002 to 2020 aircraft movements are forecast to increase at an average annual growth rate of 4.6 per cent.

11. The top 41 city-pairs in terms of numbers of passengers in the Asia/Pacific and Transpacific are expected to show traffic increases in aggregate terms of passenger flow at an average annual growth rate of 4.9 per cent from 2002 to 2007. This growth will result in an increase in passenger traffic on the routes concerned from some 46.6 million passengers in 2002 to 59.2 million passengers in the year 2007 (Table 12).

1. INTRODUCTION

1.1 This report includes medium-term forecasts of air traffic in the Transpacific area, in the Asia/Pacific region, and for selected Transpacific and Asia/Pacific city-pair markets through to 2007. The report also contains a long-term forecast with a horizon to the year 2020, including intermediate forecasts for each of the years 2005 - 2010, 2010 - 2015 and 2015 - 2020. Forecasts are provided for total passenger traffic and aircraft movements, and in the case of the aggregate Transpacific market, also for peak hour movements on selected route groups for the year 2007. The peak hour analysis is based on a detailed review of traffic during a typical July week of 2002 and 2003, summarized in Appendix B. The Intra-Asia/Pacific forecasts include passenger and aircraft movements forecasts to the year 2020.

1.2 These forecasts were produced by the APA TFG at its twelfth meeting, held in Bangkok from 23 to 30 July 2004. Membership in APA TFG consists of representatives from Australia, Canada, Chile, Japan, Singapore and the United States. The twelfth meeting of the Group was attended by representatives of Thailand which offered support to the Group in response to the Council's request to States to provide expertise and data to ICAO regional traffic forecasting groups. In addition, China has been invited to be a member of the TFG, though its participation has not been confirmed. The Group's activities are serviced and co-ordinated by the ICAO Secretariat at Headquarters, in close consultation with the ICAO Asia and Pacific Regional Office. Participants in the twelfth meeting are listed in **Appendix A**.

1.3 The economic downturn experienced in 1997/1998 in the Asia/Pacific region had major impacts on traffic levels, but the region regained economic strength. This was evidenced by a 4.0 per cent growth in total Asia/Pacific region GDP in 2000. The GDP of China grew at 8.0 per cent while Asia's four newly industrialized economies grew by almost 10 per cent. Consequently, traffic in the Transpacific and the Intra-Asia/Pacific regions in 2000 increased by 8.1 and 5.8 per cent respectively. Tourism in the region also benefited from the recovery and experienced high growth rates. It was against this background that the tenth meeting of the APA TFG revised the Transpacific and Intra-Asia/Pacific forecasts in June 2001. In addition, forecasts of aircraft movements, to the year 2015 for the Intra-Asia/Pacific route group, were introduced for the first time. The Group also considered ways and means of addressing the requirements identified by the ICAO Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) and its relevant sub-groups.

1.4 The events of 11 September 2001 in the United States precipitated a sudden drop in traffic and thereby invalidated the forecasts which had been developed by the Group in June 2001, particularly as weaknesses in the global economy began to emerge and as consumer confidence eroded.

1.5 In light of the above developments, the eleventh meeting of APA TFG concentrated primarily on the revision of the Trans-Pacific and Intra-Asia/Pacific forecasts together with forecasts of aircraft movements to the year 2015 for the Intra-Asia/Pacific region.

1.6 The SARS outbreak had devastating effects on air traffic both to, from and within the affected areas in the first half of 2003. Reported monthly figures suggest that the drop in passenger traffic reached its lowest in May after which it started a steady recovery. It is estimated that in 2003 passenger traffic on Transpacific and Intra-Asia/Pacific routes dropped by some 10 and 13 per cent, respectively. It was against this background that the twelfth meeting of the APA TFG focussed on the revision of the medium-and long-term forecasts for Transpacific and Intra-Asia/Pacific; the horizon of the long-term forecasts being extended to the year 2020.

1.7 Apart from ICAO member States, the primary users of these area forecasts are expected to be air navigation service providers in the regions concerned and planning groups, especially APANPIRG. This information is also likely to be of interest to airlines and airports of the region to assist in their planning processes. The format and content of these reports and the forecasts of the APA TFG will be modified progressively to respond to the requirements of primary users such as APANPIRG and assist with progressive implementation of CNS/ATM systems in the region.

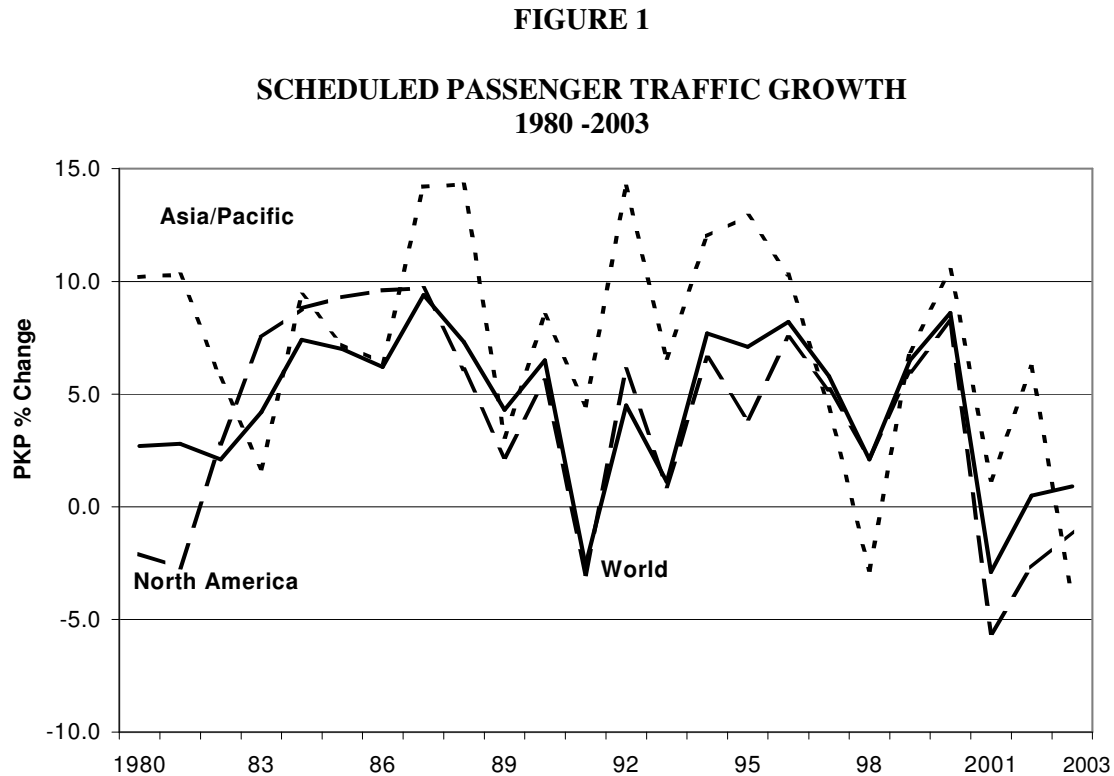
2. TRANSPACIFIC TRAFFIC TRENDS AND FORECASTS

2.1 Geographical Scope

2.1.1 For the purpose of these forecasts, the Transpacific is defined as traffic between the ICAO statistical regions of North America (Canada and United States) and of Asia/Pacific (see Appendix E).

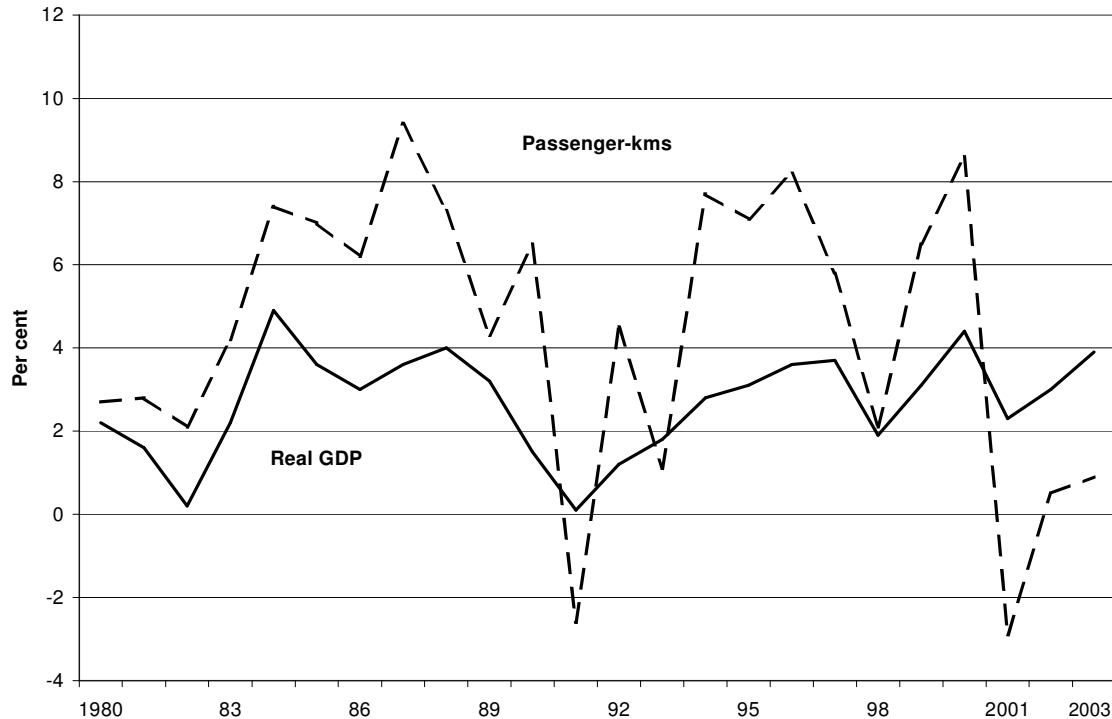
2.2 Historical Traffic by Region of Airline Registration

2.2.1 During the period 1980-2003, the volume of world scheduled international and domestic passenger traffic in terms of passenger-kilometres performed (PKPs) increased from 1 089 billion to some 2 992 billion, at an average annual growth rate of 4.5 per cent. During the same period, airlines in the Asia/Pacific region increased their traffic from some 160 billion to 759 billion PKPs, at an average annual growth rate of 7.0 per cent, the highest growth rate achieved by any region. Traffic of airlines registered in the North America region increased over the 1980 - 2003 period from 446 billion PKPs to almost 1 087 billion PKPs, or at an average annual growth rate of 3.9 per cent. However, since 1998, Intra-Asia/Pacific traffic, in terms of passengers carried, suffered some declines, namely in 1998, 2001 and 2003, the latter estimated at some 13 per cent and resulting from the SARS outbreak which had a significant adverse impact on the passenger traffic to, from and within the affected areas. Due to the events of 11 September 2001 and the SARS outbreak, traffic declined sharply on all Transpacific corridors in 2001 and 2003 and as a result, a total decline of some 10 per cent was registered in both years. The year-to-year growth rates for the world airlines' scheduled passenger traffic and those of the Asia/Pacific and North American regions are depicted in **Figure 1**.



2.2.2 In broad terms, the pattern of traffic growth over the years 1980-2003 was a reflection of economic conditions experienced during this period. As a result of this relationship, economic downturns experienced during this period have affected the world traffic growth significantly. World recession in 1981, a sharp increase in oil prices in 1991, the financial crisis in Asia/Pacific in 1997 and the events of 11 September 2001 created a difficult environment for the global economic growth and consequently for the growth of world airline traffic. Even though the world economy has shown signs of improvement since 2002, the world airline traffic remains depressed due mainly to a slow recovery after the events of 11 September 2001 and also the SARS outbreak in the eastern part of Asia/Pacific. The general relationship between world economic activity and world scheduled passenger traffic is shown in **Figure 2**.

FIGURE 2
GDP AND SCHEDULED PASSENGER TRAFFIC
WORLD GROWTH, 1980-2003



2.3 Historical Transpacific Traffic

2.3.1 For the purposes of this analysis, the most useful source of traffic data are the U.S. Immigration and Naturalization Service and the Canadian government statistics for Canadian gateway traffic. The data used for the basic time series of passenger traffic is shown in **Table 1**. Over the period 1980-2003, the number of Transpacific passengers carried on scheduled air services increased from about 6.4 million to some 22.8 million at an average annual growth rate of 5.7 per cent. This compares with an average annual growth rate of 3.5 per cent for the world. Traffic declined in 1998 by about 6 per cent due to the financial downturn that spread throughout the Asia/Pacific region towards the latter half of the year 1997. It rebounded in 1999 reaching almost the same level as that of 1997. In 2000, traffic grew by some 8.1 per cent, about the average growth rates experienced in the decade prior to the financial downturn. In 2001, traffic declined by 10 per cent, due primarily to the ramifications of the events of 11 September. It further declined by some 2.4 per cent in 2002 and by 10 per cent in 2003 due to the effects of the SARS outbreak.

TABLE 1
TRANSPACIFIC PASSENGERS CARRIED
(Thousands)

Year	U.S.- Asia	Canada-Asia	Total	U.S.-Oceania	Total Transpacific
1980	4,925	258	5,183	1,220	6,403
1981	5,286	287	5,573	1,272	6,845
1982	5,450	284	5,734	1,302	7,036
1983	5,525	303	5,828	1,230	7,058
1984	6,535	352	6,887	1,409	8,296
1985	7,002	370	7,372	1,517	8,889
1986	7,725	455	8,180	1,864	10,044
1987	8,863	577	9,440	2,077	11,517
1988	10,283	720	11,003	2,360	13,363
1989	11,481	810	12,291	2,438	14,729
1990	12,990	895	13,885	2,148	16,033
1991	13,228	974	14,202	2,161	16,363
1992	14,754	1,150	15,904	2,217	18,121
1993	15,390	1,356	16,746	2,221	18,967
1994	16,635	1,511	18,146	2,120	20,266
1995	18,548	1,776	20,324	2,243	22,567
1996	20,365	1,958	22,323	2,493	24,816
1997	21,845	2,306	24,151	2,628	26,779
1998	20,392	2,265	22,657	2,527	25,184
1999	21,450	2,425	23,875	2,806	26,681
2000	22,859	2,880	25,739	3,103	28,842
2001	20,142	2,956	23,098	2,848	25,946
2002	19,404	3,066	22,470	2,848	25,318
2003	17,336	2,579	19,915	2,876	22,791

Average Annual Percentage Growth Rates

1980-2003	5.6	10.5	6.0	3.8	5.7
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Source: ICAO, Transport Canada, United States (Federal Aviation Administration (FAA), DOT).

2.3.2 Traffic flow patterns for several major U.S. gateways are shown in **Figures 3 a), 3 b)** and **3 c)**. It is interesting to note that the gateways through which traffic has flown, have changed considerably in recent years, particularly in the case of U.S. gateways with the advent of the nonstop evolution of traffic.

FIGURE 3 a)
US TRAFFIC TO/FROM ASIA

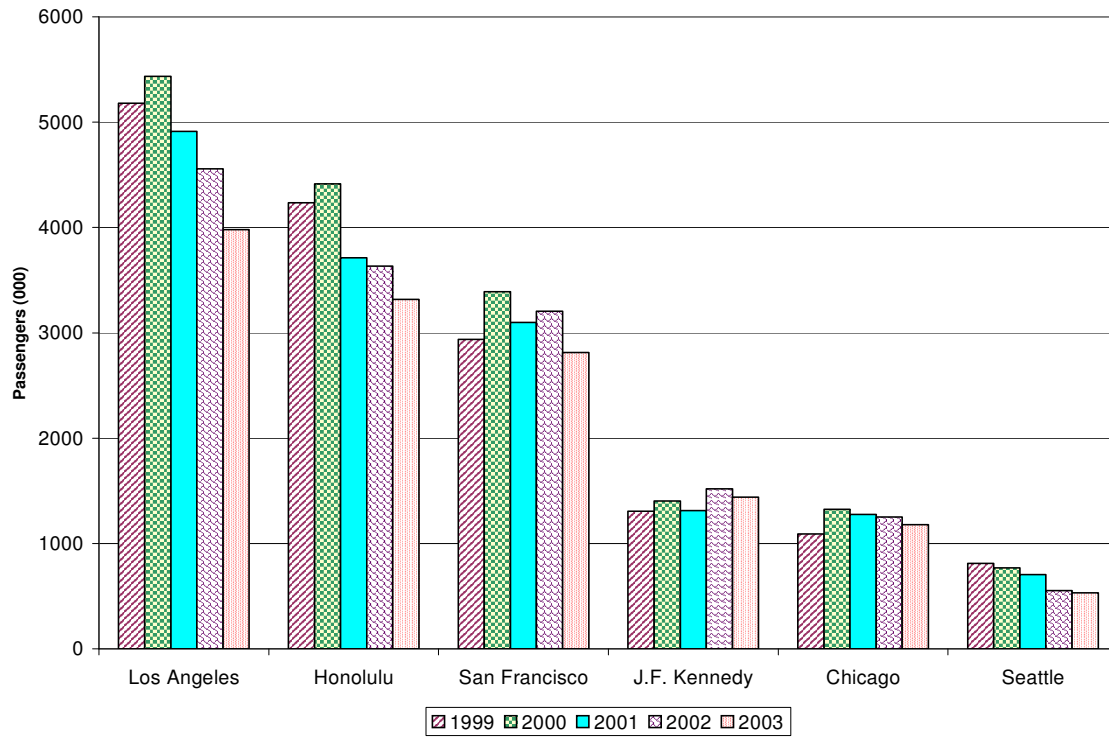


FIGURE 3 b)
US TRAFFIC TO/FROM ASIA

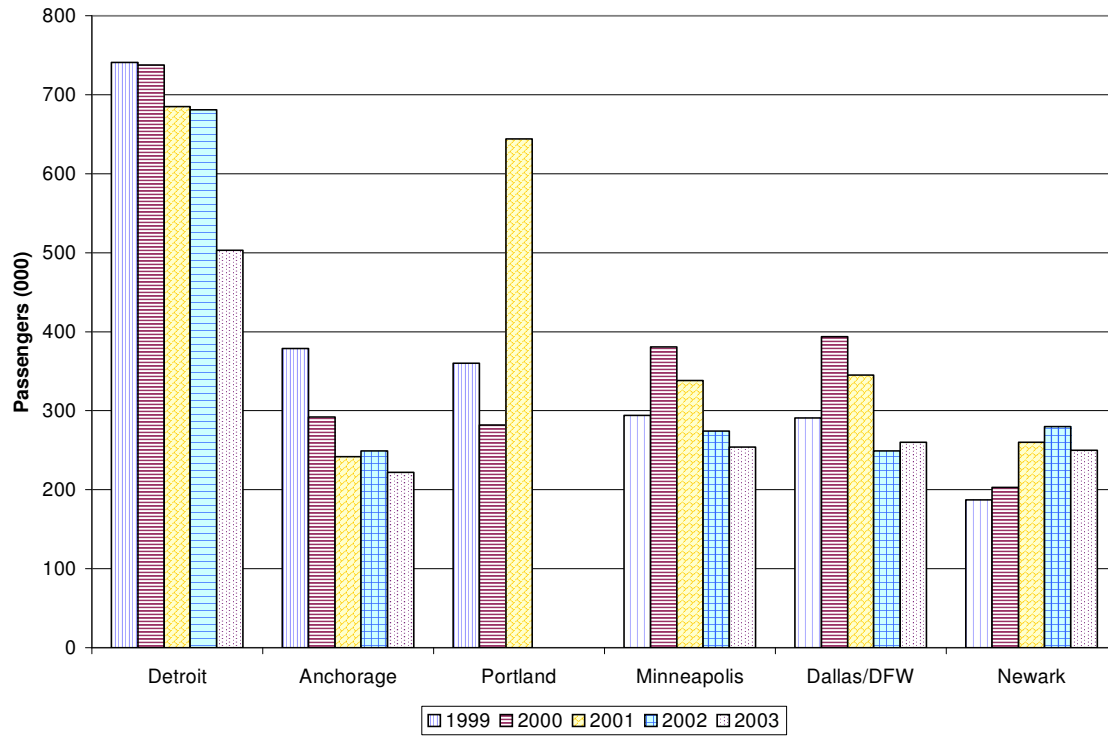
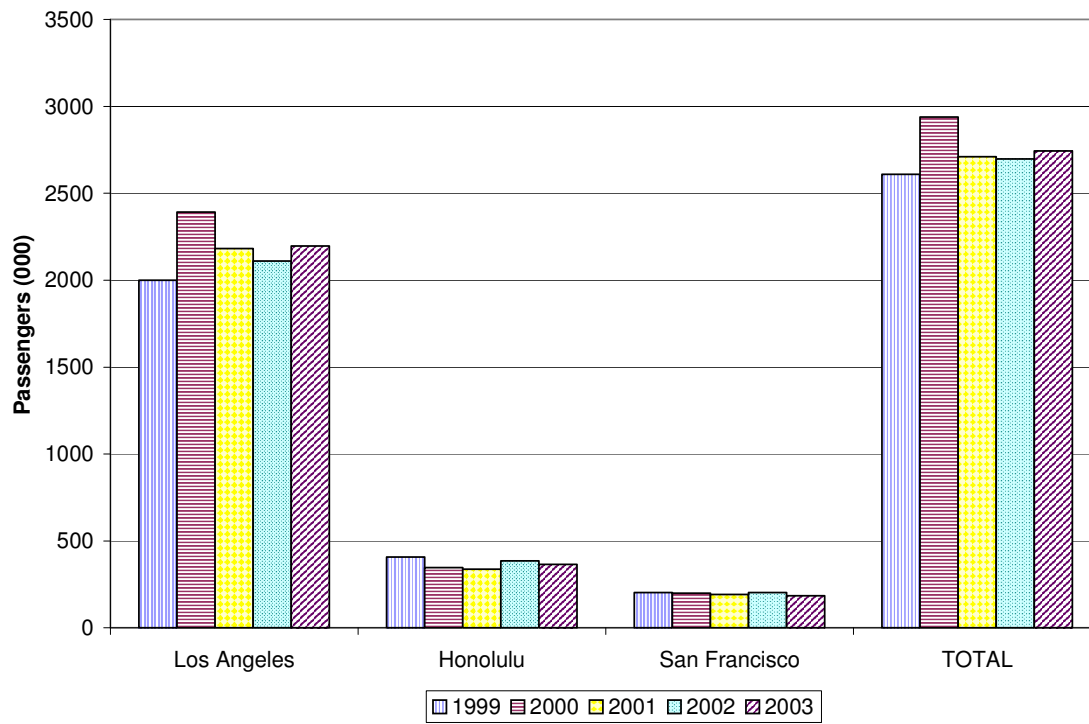


FIGURE 3 c)
US TRAFFIC TO/FROM AUSTRALIA AND OCEANIA



2.4 Factors Affecting Demand for Air Travel

2.4.1 Air travel demand is related to several complex variables and, in the Transpacific and Intra-Asia/Pacific markets, the factors which influence total demand may at times be more complex than in many comparable markets. Factors such as regulatory/liberalization policies including rights for foreign carriers in each country and designation of multiple international gateways, policies toward travel including restrictions or promotion, can be complex, and affect traffic in the area. Overall economic factors, including the prospects for trading blocs, the pace of economic growth, especially for developing economies, the overall movement of business capital within the region, and the pace and cost of travel infrastructure development, may be volatile, especially in the long run horizon used in this forecast.

2.4.2 In order to study the relationship between traffic and socio-economic trends in the Transpacific area, data from several sources were collected on the economies of the countries in the area. GDP data originate from the WEFA Group, the International Monetary Fund (IMF), and the World Bank. These forecasts were adjusted by the APA TFG based on the most recent information available from other sources.

2.4.3 Between 1980 and 2003, the world economy measured in terms of GDP grew at an average annual rate of 3.5 per cent in real terms. Following the recession of 1980-1982, the world economy experienced its longest period of sustained progress since World War II. During the 1983-1989 period, average annual growth was 3.6 per cent. In 1990-1992, a slowdown in the world economy occurred. After a 3.5 per cent increase in GDP in 1989, world GDP grew only 2.6 per cent in 1990. A recession or economic slow-down hit several major nations, and was made worse by the war in the Gulf. As a result of the economic weakness, world GDP increased only 1.8 per cent in 1991. During the period 1992 to 1997 the world economy continued to improve. However, a slowdown was experienced in 1998 with growth estimated at 1.8 per cent compared with 3.7 per cent in 1997. In line with the global average, the economies of industrial countries grew at an annual rate of 2.3 per cent during 1998. North American and European GDPs grew at 3.5 per cent and 2.8 per cent respectively during 1998. In contrast, the economic growth of the Asia/Pacific region experienced a decline of 1 per cent. In 1999 the world economy experienced a rebound and reported a 3.1 per cent growth and continued to grow in 2000 by 4.7 per cent. Another slowdown was experienced in 2001 accompanied by a marked decline in trade growth, significantly lower commodity prices and deteriorating financing conditions in emerging markets. The events of 11 September 2001 amplified the impact on consumer and business confidence, demand and activity, particularly in the United States. Consequently, the world economy grew by 2.3 per cent in 2001. The North American GDP increased by only 0.5 per cent and the Asia/Pacific economy slowed down and grew by about 3.9 per cent. In 2002, with trade and industrial production improving across all regions, the world economy recovered and grew by 3 per cent. The North American GDP grew below the world average while the Asia/Pacific region's economy experienced a 4.6 per cent growth. Supported by increasing consumer confidence and demand, the world GDP registered a growth of 3.9 per cent in 2003, the highest growth since 2000. The North American and Asia/Pacific economies grew by some 3 per cent and 6 per cent, respectively.

2.4.4 The economies in the Asia/Pacific region experienced strong growth during the 1980-1997 period. The region's economies grew in real terms at an average of 4.6 per cent per year, compared to an average annual growth of the North American region of 2.7 per cent. As a result of a financial crisis in the region, several States in the Asia/Pacific region experienced an economic downturn of an unprecedented nature after almost three decades of uninterrupted high growth. The worst affected States were Indonesia, the Republic of Korea and Thailand, followed to a lesser extent by Malaysia and the Philippines. In the three former States, real growth in GDP turned abruptly from a trend of over 7 per cent per annum to almost no

growth in 1997 and a decline of 2 per cent in 1998. The Japanese economy, which represents almost half of the region's economic activity and which experienced slow growth in recent years, went into recession in 1998, declining by 2.9 per cent. In 1999 the region's economy rebounded and as a result experienced growth rates of 3.5 and 5.7 per cent respectively during 1999 and 2000 but registered a 3.9 per cent growth in 2001 as a result of a downturn in the world economy. In 2002, the region's economy grew by about 4.6 per cent. Despite the adverse effects of the SARS outbreak in the first part of 2003, the economy bounced back in the second half of the year with a surge in domestic demand coupled with export growth boosted by increased global activity, the upturn in demand for high technology products, favourable exchange rates, higher consumer confidence and a boost in tourism. As a consequence, the region's economy grew by 6 per cent in 2003. The economic balance within the region has shifted during recent years due to the growing significance of the Chinese and other high growth economies of developing Asian States. The historical trends of real GDP growth and airline yield for the regions are shown in **Table 2**.

TABLE 2

AGGREGATED GROSS DOMESTIC PRODUCT AND AIRLINE YIELD INDEX
(Billions of US \$ in 1990 prices)

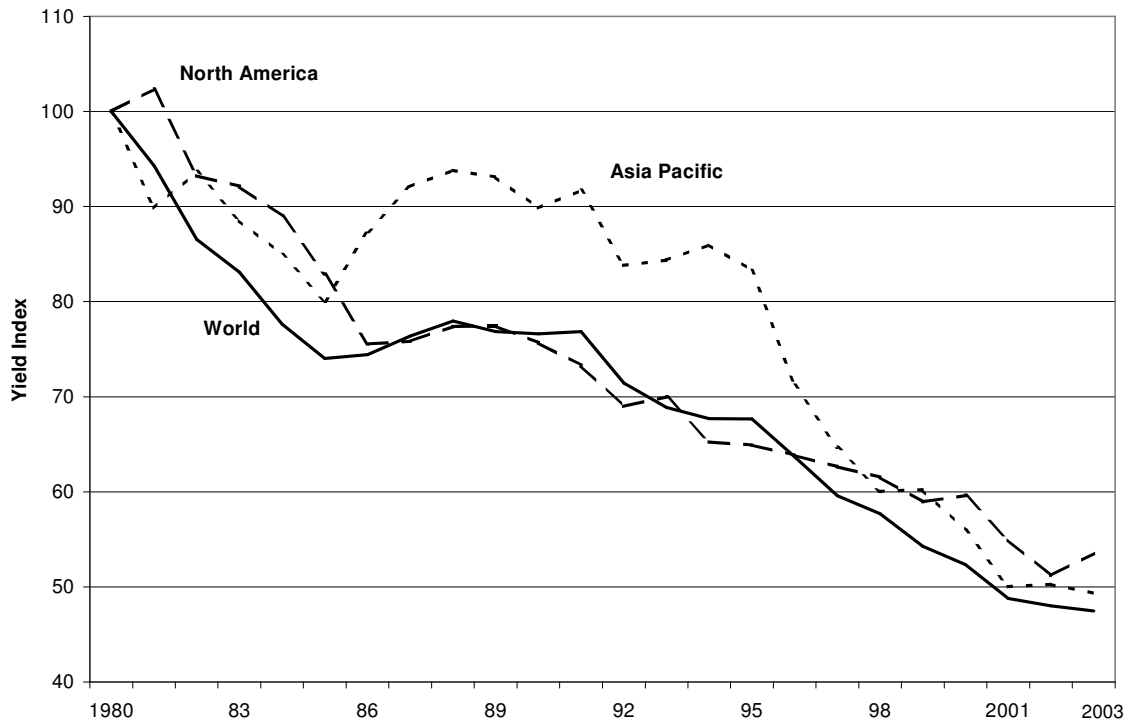
Year	North America	Intra- Asia/Pacific	Transpacific Total	Trans-Pacific YLD Index
1980	4,708	2,980	7,688	139.5
1981	4,799	3,108	7,907	145.7
1982	4,692	3,216	7,908	134.5
1983	4,870	3,347	8,217	132.1
1984	5,172	3,532	8,704	127.4
1985	5,344	3,713	9,057	119.3
1986	5,501	3,862	9,363	126.1
1987	5,677	4,073	9,750	115.6
1988	5,905	4,364	10,269	108.4
1989	6,054	4,588	10,642	103.2
1990	6,120	4,817	10,937	100.0
1991	6,077	5,032	11,109	100.8
1992	6,207	5,287	11,494	93.6
1993	6,396	5,331	11,727	94.0
1994	6,659	5,526	12,185	93.7
1995	6,873	5,859	12,732	88.0
1996	7,084	6,157	13,241	83.9
1997	7,360	6,379	13,739	80.4
1998	7,626	6,315	13,941	80.4
1999	7,946	6,536	14,482	78.8
2000	8280	6,909	15,189	84.8
2001	8321	7,178	15,499	77.2
2002	8504	7,508	16,012	70.2
2003	8768	7,959	16,727	67.5
Average Annual Percentage Growth Rates				
1980 - 2003	2.7	4.4	3.4	-3.1

2.4.5 Traffic growth was also robust during the historical period concerned. However, 1991 was the first year since 1945 when the world scheduled traffic showed a decrease, of approximately 2.6 per cent in terms of passenger-kilometres performed. In 1992 traffic rebounded by about 4.5 per cent and continued to grow at high rates until 1998 when it moderated, as a consequence of the Asian economic downturn, to 2.1 per cent. Traffic growth recovered in 1999 and its growth continued in 2000. The economic downturn and the related decline in business confidence had a negative impact on traffic in late 2000 and 2001 when the events of 11 September exacerbated an already difficult situation. As a result, traffic declined in 2001 by an estimated 2.9 per cent, the first decline since 1991. In 2002, demand for air travel remained depressed and traffic grew barely at a rate of 0.5 per cent. Following declines in the first part of the year resulting from the SARS outbreak and the war in Iraq, traffic rebounded in the second part of 2003 and increased by an estimated 0.9 per cent for the whole year.

2.4.6 The revenue yield index is a weighted index based on information provided by airlines of the States of the North America and Intra-Asia/Pacific regions operating in the Transpacific market. In real terms, airline yields have declined nearly every year since the advent of jet aircraft. This is a consequence of airlines passing on to the consumer most of the cost savings that have resulted from technological advances, greater competition, longer average trip length, and other economies of scale. Consequently, the marketing of air transportation has been aided by the fact that air fares represent a steadily increasing bargain in comparison with most other goods and services.

2.4.7 During the period 1980-2003, the average world passenger yield, measured in U.S. dollars, is estimated to have decreased in real terms at an annual rate of 3.2 per cent. During the same period, the average yield for airlines in the North American region declined by 2.7 per cent per year, while those in the Asia/Pacific region declined 3.0 per cent per year as shown in **Figure 4**. The Transpacific yields for the period also declined at an estimated rate of 3.1 per cent per year. Real yield for 1991 was up slightly, as airlines raised prices to respond to large fuel price increases. Yields remained fairly stable for the period 1992 to 1994, and then declined by approximately 4.4 per cent per annum during the period 1995 to 1997. In 1998, yield remained constant in real terms. During the period 1999-2003 it declined at an average annual rate of about 3.8 per cent.

FIGURE 4
TRENDS IN AIRLINE PASSENGER YIELDS
(Real Terms)
1980 - 2003



2.5 Forecast Methodology

2.5.1 For the present forecast, the long-term demand for air travel is assumed to be primarily determined by economic developments, notably the growth of global and regional income levels as measured by variations in GDP, demographic trends, and the cost of air travel as measured by yields (gross passenger revenue divided by passenger-kilometres performed). It is also assumed that the political and general economic climate are generally conducive to growth, and no specific assumptions are made about various possible political and economic scenarios (beyond basic GDP growth assumptions). World energy demand, supply and prices are important both to economic progress and to the cost of air travel. It is assumed that during the forecast period, there will not be any major disruptions in the availability of oil.

2.5.2 As discussed previously, there are complex causal relationships and factors which have and will affect traffic volumes. However, the demand for air travel is primarily determined by economic activity and the demographics of the travelling population, as well as by the cost, and hence the price of air travel.

2.5.3 The first step in forecasting is to develop a model which can be used to explain the causes of historical traffic changes, and to forecast future traffic. At its earlier meetings, the APA TFG considered several types of models. The statistical model providing the best fit to traffic data was one which used GDP growth rates and an index of real yield in a multiplicative form (all terms transformed into logarithms). The logarithmic transformation causes the statistical model to be based on rates of change, rather than absolute changes in the values of the variables.

2.5.4 Following testing and evaluation of various functional forms and explanatory variables the Group decided that a log-log model of the general form given below provides the most satisfactory explanation of likely future trends. Two "dummy variables" were introduced to the model; first to capture the impact of the traffic downturn that occurred in 2001 and 2003 and the second to account for the fluctuation of the yield index for the years 2002 and 2003. The introduction of these variables provided a more accurate simulation of the traffic forecast and improved the predicting capability of the model.

$$\text{Log (Passengers)} = \text{Constant} + A \text{ Log(GDP)} + B \text{ Log(Yield)} + C \text{ Dummy}_1 + D \text{ Dummy}_2$$

In this functional form, A, B, C and D are constant coefficients which represent elasticities.

2.5.5 The analysis resulted in the following formula:

$$\text{Log (Passengers)} = -0.88 + 1.57 \log(\text{GDP}) - 0.89 \log(\text{Yield}) - 0.24(\text{Dummy}_1) - 0.40(\text{Dummy}_2)$$
$$(R^2 = 0.99, \text{S.E.} = 0.05, t_{\text{GDP}} = 5.4, t_{\text{Yield}} = -2.9)$$

2.5.6 In recognition of the level of uncertainty necessarily associated with forecasts - particularly long-range horizons such as those to the year 2020 - the Group adopted the approach of formulating and using a three-tiered range of input assumptions or scenarios on future values of GDP and yield. For descriptive purposes, these were categorized into the generic categories of:

- most likely (baseline);
- high (high GDP and low yield growth); and
- low (low GDP and high yield growth).

These categories of assumptions provided the basis for upper and lower bounds for resultant forecasts of both passenger traffic and aircraft movements.

2.6 Forecasts of GDP and Yield Scenarios

2.6.1 The forecasts of traffic were developed based on different assumptions of GDP and yield. The most recent studies from the World Bank, the International Monetary Fund (IMF), WEFA Group and other economic consulting services forecast an increase in world trade and continued improvements of most major economies. The forecast for the most likely economic scenario was developed using the economic forecasting services discussed above. High and low ranges for GDP were developed taking into account pertinent data and prevailing conditions that are likely to produce more optimistic or pessimistic conditions.

2.6.2 Airline yields are dependent on a number of factors such as efficiency gains, operating expenses and the level of competition. Major developments related to these factors include changes in fuel and labour costs, the continuing introduction of new, more efficient aircraft types and continuing strong competition. The APA TFG developed a new methodology to estimate future airline yields. This methodology takes into account the major airline cost components and other efficiency parameters that would have an impact on the make-up of airline yields. Among those factors considered were the following primary factors:

- Labour, fuel and capital costs;
- Labour productivity; and
- Aircraft fuel efficiency (based on anticipated mix of the aircraft fleet).

It should be noted that recently the crude oil prices have reached record breaking high levels. Subsequently, escalation in jet fuel prices is expected to affect the prices of air travel, which is partly reflected in an anticipated 7 per cent increase in the airline yields for 2004 (**Table 3**).

2.7 Passenger Forecast

2.7.1 Applying the above scenarios of economic and yield trends to the econometric model resulted in alternative predictions of passenger traffic ("most likely", "low" and "high") for the forecast horizon. The different GDP and yield values which were used for the forecasts are included in Table 3. The forecasts of passenger traffic are given in **Table 4**, and illustrated in **Figure 5**.

2.7.2 Transpacific passenger traffic is expected to increase at a "most likely" average annual rate of 3.5 per cent for the period 2002-2005, reaching some 28 million one-way passengers in the year 2005, which is almost the same level achieved in the year 2000. A higher "most likely" average annual growth rates of 6.5, 5.7 and 5.2 per cent are forecast for the periods 2005 - 2010, 2010-2015 and 2015 - 2020, respectively, resulting in slightly over 65 million one-way passengers by the year 2020.

2.7.3 Traffic growth varied among the different Transpacific markets during the recent years. The differences in activity are the result of economies recovering at different rates. As each economy tries to regain a stable long-term growth rate, the combined effect is difficult to assess. The most likely average annual growth rate for the period 2002-2020 is forecast to be 5.4 per cent. The low and the high growth rates for the period concerned are projected at 4.1 per cent and 6.7 per cent, respectively. Table 4 and Figure 5 depict the forecasts.