

The trans-Pacific market has unleashed potential for new routes. This has so far been prevented by restrictive bilaterals and the absence of ultra long-range aircraft. These factors will change in about three years' time; the number of direct routes could treble in 10 years.

Unleashing the bonanza of the trans-Pacific

The trans-Pacific market has been dominated for many years by the restrictive US-Japan bilateral. This protects incumbent airlines Japan Airlines (JAL), United and Northwest. The majority of traffic is carried on trunk routes from the US to Tokyo, and then on to select points in the Asia-Pacific by the incumbents and a few other airlines with 5th freedom rights.

The market has developed with partial liberalisation of the US-Japanese bilateral. Several new US carriers – American (AA), Continental (CO), Delta (DL) and All Nippon Airways (ANA) – have gained 3rd and 4th freedom rights to Japan. More US gateways now serve Japan. These are hubs that have been developed by incumbents, as well as hubs of non-incumbents that have recently entered the market.

Many other Asia-Pacific countries now have an Open Skies agreement with the US. Despite this, and the fact that the market boasts one of the highest traffic growth rates of 6.3% per year, not many new direct routes have been opened. In fact, the majority of traffic is still routed via Japan. This is because airlines are reluctant to open new routes that require technical stops.

Ultra long-range aircraft which make it possible to operate the longest routes non-stop, are only now becoming available. This development may finally make it economic for airlines to bypass Japan and so stimulate the opening of new direct routes between the US and Asia-Pacific cities. Airlines attempting new routes also have to consider traffic potential.

Liberalised markets

The trans-Atlantic market has changed in 15 years following the relaxation of US-European bilaterals. Most European countries have an Open Skies agreement with the US.

The consequence has been fast growth in the opening of many new city-pairs. This has seen more airlines enter the market and the most common aircraft type change from the 350–400 seat 747 to the smaller 180–220 seat 767 family.

Prior to 1985, Pan Am and TWA were the only US carriers to operate trans-Atlantic networks. These were joined and then replaced by AA, United, DL, CO, US Airways and Northwest.

The nature of evolution has also seen many US gateways open up to the Atlantic market. This includes Denver, Atlanta, Cincinnati, Charlotte, Philadelphia, Detroit, Minneapolis, Dallas and Houston.

Further traffic growth will now see more European gateways being served. For example, DL, which code-shares with Air France, has started serving Lyons.

The 767 became popular on account of its 180–220 seat size and range, combining to make it an ideal aircraft for serving many of the new routes opened across the Atlantic.

A faster increase in the number of routes than total traffic volume has prompted a reduction in average aircraft size in many liberalised markets.

Trans-Pacific history

Historically the trans-Pacific has

always been one of the most restricted markets. This is due to the bilateral between the US and Japan originally agreed in the late 1940s.

This bilateral for many years gave rights to three passenger carriers, Pan Am, Northwest and JAL to operate between the US and Japan, plus 5th freedom rights into Asia from Japan.

Although the US had bilaterals with other Asia-Pacific countries that allowed it to operate direct routes between them, two factors largely prevented these route rights being exploited. First, the strength of the Japanese economy meant that for many years Japan provided a higher volume of traffic to the US than any other Asia-Pacific country.

Also, aircraft that can operate direct between the US and countries such as China, Hong Kong and Taiwan have only become available in the past five to eight years. Ultra long-range aircraft that can operate between Singapore, Malaysia and Thailand and north America, will not be in operation for at least another three years.

Fuelling and technical stops were a necessity for many routes across the Pacific until about the mid-1990s. These stops were often made in Japan, since it is conveniently placed in terms of distance from the US and routing. This is illustrated by JAL's recent order for the 777-300X, which has a range of 7,230nm and 359 seats. Unlike many other carriers, JAL does not require ultra long-range, but does need high capacity.

It has been convenient for the incumbent carriers in the trans-Pacific market to operate between the US and Japan and to combine 5th freedom routes into the Asia-Pacific region. This allowed

them to dominate and distort the market.

Despite route rights being held by incumbent and non-incumbent airlines to other Asia-Pacific countries, non-incumbent airlines have found it uneconomic to open new routes. "All airlines have to make technical stops, but the non-incumbents do not have the O&D traffic between the US and Japan and between Japan and other Asian countries. The non-incumbents would only be carrying O&D traffic between the US and the Asia-Pacific country they are flying to," explains David Boggess, manager, Pacific network analysis, at DL. "A non-incumbent would therefore be in a weak position with respect to revenue generation".

Yields to and from Tokyo are also high. Incumbents have therefore continued to operate the majority of capacity via Japan, diverting a lot of traffic onto their networks. Technical stops also increase total flying time and costs.

The incumbents admit it has been convenient to route via Tokyo. "Tokyo is perfectly positioned and has a lot of O&D traffic," says Greg Kaldahl, vice president route planning at United. "There are lots of lucrative positions to serve in the Asia-Pacific, but these cannot be served non-stop from the US west coast".

Continues Boggess, "Ironically, the Asia-Pacific countries that have Open Skies agreements with the US are beyond the non-stop range capability of current long-range aircraft from the US, and so there has not been a proliferation of new routes. Ultra long-range aircraft will create a level playing field, since it will be cheaper to operate direct routes. If we started direct services to further points in Asia, Northwest and United might then have to compete with us by offering direct services themselves.

"Although we have a small fleet of 777-200ERs they are required elsewhere. The biggest opportunities in the trans-Pacific depend on the range capability of the 777-200X and A340-500, and we are analysing lots of different routes based on financial criteria and traffic restrictions," says Boggess.

Kaldahl concedes the A340-500 and 777-200X will change things for United. "The arrival of these aircraft will make more non-stop routes possible. We will see the effect of traffic diversion on our routes to Tokyo when we open routes to Shanghai and Beijing. We suspect we will face the A340-500 and 777-200X in competition, and so will have to examine them. Some routes will still have to be routed via Tokyo until markets develop".

Northwest does not see the small number of new routes as purely related to the unavailability of ultra long-range aircraft. "New routes are only opened when it is economic to start them," says

YEAR 2000 DIRECT TRANS-PACIFIC ROUTE NETWORK CAPACITY

Route	Operators	Aircraft types	Return flights	ASMs (millions)	Gt circle (nm)	Aircraft size
LAS-NRT	NW	747	156	596	4,778	400
LAX-CAN	CZ	777-200	192	803	6,280	333
LAX-PEK	CA, MU	747, MD-11	372	1,276	5,417	317
LAX-SHA	MU	MD-11	144	547	5,623	338
LAX-HKG	CX, UA	747	864	4,341	6,283	400
LAX-TPE	BR, CI, SQ, MH	747	1,507	8,872	5,885	378
LAX-NGO	JL, RG	747, MD-11	372	1,134	4,880	312
LAX-KIX	JL, NW, TG	747/Combi	876	3,814	4,976	437
LAX-NRT	DL, JL, KE, MH, NH NW, RG, SQ, TG, UA	747, MD-11	3,348	12,374	4,727	391
LAX-SEL	KE, OZ	747	1,944	7,135	5,175	355
LAX-AKL	NZ, QF, UA	747	1,236	5,593	5,654	400
LAX-SYD	NZ, QF, UA	747	1,644	8,534	6,508	399
LAX-MEL	QF, UA	747	612	3,438	6,883	408
PDX-NGO	DL	MD-11	360	772	4,323	248
PDX-NRT	DL	MD-11	360	746	4,180	248
SEA-TPE	BR	747	360	1,253	5,258	331
SEA-KIX	NW	DC-10	216	562	4,366	298
SEA-NRT	AA, NW, UA	747, 777	1,080	2,765	4,134	310
SEA-SEL	OZ	747	156	404	4,502	288
SFO-PEK	CA, MU	747, MD-11, A340	312	956	5,124	299
SFO-SHA	CA, UA	747	312	1,379	5,330	415
SFO-HKG	CX, SQ, UA	747, A340	1,068	4,538	5,993	355
SFO-TPE	BR, CI, UA	747	1,248	5,289	5,597	379
SFO-KIX	UA	747	360	1,411	4,690	418
SFO-NRT	JL, NH, NW, UA	747	1,812	6,852	4,442	426
SFO-SEL	KE, OZ, SQ, UA	747, 777, A340	1,176	3,647	4,883	318
SFO-MNL	PR	747	360	1,915	6,058	439
SFO-SYD	UA	747	360	1,940	6,447	418
YVR-SHA	CA	747	48	187	4,866	400
YVR-PEK	CP, CA	747, 767	408	869	4,584	232
YVR-TPE	AE, BR, CI, CP	747	888	3,681	5,169	401
YVR-HKG	AC, CP, CX	747, A340	1,284	5,355	5,531	377
YVR-NGO	CP	767	204	359	4,189	210
YVR-KIX	AC	A340	708	388	4,281	274
YVR-NRT	CP, JL	747, 767	924	2,996	4,051	400
YVR-SEL	AC, KE, SQ	747, A340	408	1,032	4,408	287
DFW-SEL	KE	747-400	156	710	5,926	384
DFW-KIX	AA	777	360	992	5,816	237
DFW-NRT	AA, JL	747, 777, MD-11	1,080	4,127	5,586	342
DTW-SHA	NW	747	96	496	6,185	418
DTW-PEK	NW	747	216	1,038	5,746	418
DTW-KIX	NW	747	360	1,726	1,736	418
DTW-NGO	NW	747	204	964	5,653	418
DTW-NRT	NW	747	552	2,559	5,544	418
IAH-NRT	CO	777	360	1,182	5,760	285
MSP-NRT	NW	747	468	1,941	5,156	402
ORD-HKG	UA	747	360	2,032	6,751	418
ORD-KIX	JL	747	264	1,456	5,638	489
ORD-NRT	AA, JL, NH, UA	747	1,800	7,634	5,437	390
ORD-SEL	KE	747	360	1,566	5,663	384
ATL-NRT	DL	MD-11	360	1,060	5,938	248
EWR-NRT	CO	777	360	1,197	5,835	285
JFK-NRT	JL, NH, NW, UA	747	1,644	8,375	5,845	436
JFK-SEL	KE	747	360	1,652	5,975	384
IAD-NRT	NH	747	360	1,635	5,853	388
IAD-SEL	KE	747	156	721	6,019	384
YYZ-NRT	AC	A340	264	775	5,558	264

Source: OAG/Back Information Services

YEAR 2000 TRANS-PACIFIC 5TH FREEDOM ROUTES NETWORK CAPACITY

Route	Operators	Aircraft types	Return flights	ASMs (millions)	Gt circle (nm)	Aircraft size
Routes continuing from Hong Kong						
HKG-SIN	SQ, UA	747-400	720	817	1,399	406
Routes continuing from Taipei						
TPE-KUL	MH	747-400	204	286	1,743	402
TPE-SIN	SQ	747-400	360	496	1,754	393
Routes continuing from Tokyo						
NRT-BKK	TG, NW, UA	747-400, 777	912	1,676	2,513	366
NRT-HKG	NW, UA	747-400	720	935	1,582	410
NRT-KUL	MH	747-400	156	364	2,900	402
NRT-MNL	NW	747-400	360	495	1,643	418
NRT-PEK	NW, UA	747-400	516	489	1,149	413
NRT-SEL	KE, NW, UA	747-400	1,080	565	653	400
NRT-SIN	SQ, NW, UA	747-400	1,080	2,525	2,896	404
NRT-TPE	NW	747	360	335	1,164	400
NRT-PVG	NW, UA	747-400	564	449	966	412
Routes continuing from Osaka						
KIX-BKK	TG	747-400	156	285	2,253	405
KIX-KHH	NW	DC-10	204	128	1,054	298
KIX-KUL	NW	DC-10	144	227	2,651	298
KIX-MNL	NW	747-400	360	428	1,422	418
Routes continuing from Seoul						
SEL-SIN	SQ	A340-300	516	650	650	250

Source: OAG/Back Information Services

Loren Aandahl, managing director, international planning and scheduling, Northwest. "Although lack of the right aircraft is an issue, the bigger problem is that there is not enough traffic between two cities which do not yet have direct flights. The trans-Pacific market is different to the trans-Atlantic. The trans-Atlantic can sustain many routes because of all the cities. Most Asia-Pacific countries only have one major city and expatriate Asian communities are concentrated on a few west and east coast US cities. This limits the number of new routes with traffic potential".

The US-Japan bilateral has been liberalised in the past two years. ANA became an incumbent. Incumbent US carriers can use more US gateways to serve Japan, and Japanese carriers can serve more US gateways.

United (which replaced Pan Am) and Northwest, can serve unrestricted from Japan on 5th freedom routes to any cities in the Asia-Pacific area.

Also, extensive code-sharing was permitted from 1998 between US airlines and Japanese and Asia-Pacific carriers. United, for example, code-shares with

ANA and with Thai to Bangkok.

These developments only apply to the incumbents. They do not apply to US non-incumbents; DL, CO and American. DL, for example, which now operates to Japan, has to bargain to operate from a new US gateway. This is a leftover of the original bilateral. Non-incumbents also do not have 5th freedom rights.

New negotiations between the US and Japan will start at the end of 2000. The US will attempt to get an Open Skies agreement with Japan. This would eliminate distinction between US incumbents and non-incumbents, and so provide non-incumbents with 5th freedom rights. This development would provide a more level playing field for the non-incumbents.

Not all believe getting an Open Skies agreement between the US and Japan is a foregone conclusion. "We do not expect the current agreement to change much," says Aandahl. "JAL and ANA may not agree to Open Skies. This might only occur if they want to have anti-trust immunity with us and United. In this case JAL and ANA may have to concede to Open Skies, but they may not be prepared to do this".

Trans-Pacific market

The trans-Pacific market can broadly be divided into two groups.

The first is the network of non-stop routes (*see table, page 21*) and consists of two sub-groups: the first consists of routes operated by airlines with 3rd and 4th freedom rights; the second, non-stop trans-Pacific routes operated by airlines that have 5th freedom rights via Asia-Pacific gateways. For example, Malaysian Airlines operates between Los Angeles and Taipei and has 5th freedom rights from Taipei.

Airlines operating across the Pacific with 5th freedom rights are Singapore Airlines, Cathay Pacific, Varig, Thai, Korean, Northwest and United, JAL and ANA. They have 5th freedom rights from Tokyo, Osaka, Seoul, Taipei and Hong Kong.

The Asia-Pacific portion of these 5th freedom routes is the second group of trans-Pacific routes (*see table, this page*).

The trans-Pacific market is characterised by the long distances of the routes operated. The table of non-stop routes (*see page 20*), shows the majority to be in excess of 4,900nm, but few exceed 6,000nm. This group totals 57 non-stop routes from north America to the Asia-Pacific. These provide bi-directional capacity of 153 billion available seat-miles (ASMs) and 27 million seats.

Because of the US-Japanese bilateral and range capability of the aircraft available to date, the west coast gateways dominate the market. Of the 57 routes, 36 are from the west coast, eight routes originate from Vancouver and 21 from Los Angeles and San Francisco.

Even routes that originate from the west coast can be at least 6,000nm: for example, San Francisco-Hong Kong and San Francisco-Manila.

Longer routes from central US gateways, such as Chicago, Minneapolis, Dallas and Houston, to points in China, Hong Kong, Japan and Korea, total 14 and are all close to 6,000nm.

Only seven routes originate from the US east coast. These are only to Korea and Japan and are also close to 6,000nm.

Routes operated in a westerly direction will face a headwind and so the equivalent still air distance will be longer than the distance shown in the table. The length of these routes therefore suits the range capability of the 747-400, 777-300X, 777-200ER, A340-300 and MD-11.

There are 26 direct routes that serve Japan and another eight to Korea. China has another nine of the routes, while Taipei and Hong Kong account for another eight (*see table, page 21*). The remainder of the routes are to Australia and New Zealand and one to Manila. All other cities in the Asia-Pacific and north

The incumbents across the Pacific enjoy their status and route their networks via US and Japanese hubs. The arrival of ultra long-range aircraft may stimulate the opening of new direct routes, bypassing Japanese hubs. This will not adversely affect United and Northwest, but will divert traffic away from JAL and ANA.

America are served by 5th freedom and connecting routes.

The dominant carriers in the market are JAL, Korean Air, United and Northwest. These three airlines provide 82 billion ASMs for the 57 direct routes across the Pacific. There are another 20 airlines providing the other 71 billion ASMs.

The 152 billion ASM and 27 million seat capacity for the 56 direct routes is provided by large aircraft types. The 747 is used on 47 routes. The 777, A340 or MD-11 are the only other types used, with the exception of three sectors that use either the DC-10 or 767. Average aircraft size across the network is 354 seats.

Evidence of traffic restriction is seen on many routes where equal or exact fractions of traffic are provided by the carriers on the route. For example, Los Angeles-Auckland is served by Air New Zealand, Qantas and United. All three airlines use the 747-400 configured with a similar number of seats. Qantas and United each fly about a quarter of the frequencies, while Air New Zealand flies about half.

Busier routes on the network have higher frequencies of three or more flights per day. Lighter sectors have frequencies of one or two flights per day, or just five or six per week. There are 38,000 annual return flights for these 57 routes and the average frequency across the network is about two return flights per day. These two frequencies are usually shared by two carriers.

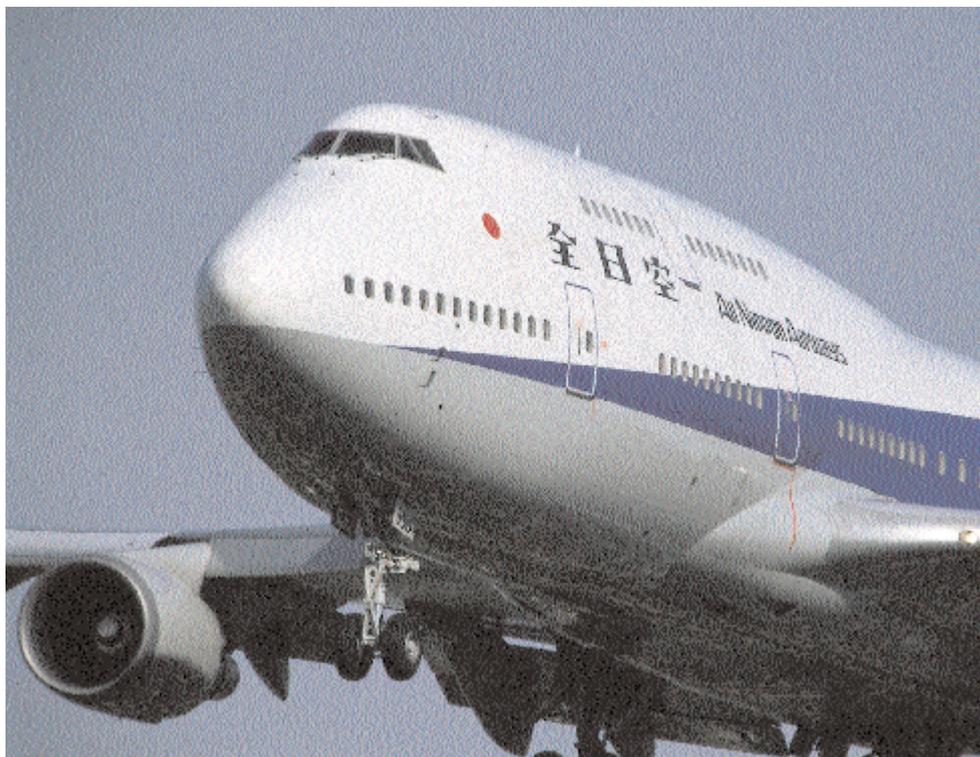
This dominance of gateways and by airlines is further illustrated by the 5th freedom networks originating from Hong Kong, Taipei, Tokyo, Osaka and Seoul.

Potential routes

There are 11 major US, two Canadian and 13 major Asia-Pacific gateways that have trans-Pacific routes operating from them. Although 169 city-pairs could theoretically be operated, there are only 57 direct routes between these cities.

No direct routes are operated from Miami, Cincinnati, Denver, Macau, Jakarta, Bangkok, Singapore and Kuala Lumpur. This adds five north American and five Asia-Pacific cities with potential for trans-Pacific routes. This provides potential for more than 300 city-pairs.

Many factors determine what routes will be opened, such as airline strategies and political and economic developments.



Passenger growth is handled by increased frequency, larger aircraft size, high load factors and new routes.

Since the Asia-Pacific market has the lowest level of market liberalisation, there could be a significant reorganisation of the trans-Pacific network. The actual number of new routes that will open is hard to predict. Passengers will ultimately dictate travel patterns.

If an Open Skies policy between the US and Japan is agreed, it would allow non-incumbent airlines to operate 5th freedom routes from Japan, and routes from an unlimited number of US gateways. This would stimulate the opening of more direct routes, and will also coincide with the arrival of the first 777-200Xs and A340-500s.

The first stage of route development will probably come from abandoning 5th freedom routes for direct services. The airlines that will feel the effect more than any other will be JAL and ANA.

This will be followed by US majors using more of their hubs as gateways to serve direct and 5th freedom routes. The US gateways will be those currently serving few or no Asia-Pacific cities: Denver, Dallas, Houston, Chicago, Minneapolis, Atlanta, New York, Washington and possibly Miami.

“Despite the arrival of ultra long-range aircraft, we do not expect to see non-incumbents opening new routes at the same pace as has occurred in other liberalised markets,” says Aandahl.

“Northwest and United have developed their US and Japanese hubs so that each route has two daily frequencies. One transits via the Japanese hub and the other via a US hub. In this way we develop our market presence. It will be

much harder for a non-incumbent to start from nothing”.

The first stage of airline reaction to a liberalised US-Japan bilateral will last several years and will occur as the first A340-500s and 777-200Xs come into operation, and also possibly the first A3XXs and 747-Xs. These aircraft will make the operation of almost any direct route possible.

The A340-500, 777-200X, A3XX-50LR/-100LR and 747-X will be the four ultra long-range aircraft available to best serve the trans-Pacific.

The A340-500 has a still air range of 8,500nm with 313 passengers. The 777-200X, which has not yet received launch orders, has a 8,865nm capability with 301 passengers.

The A3XX-50 and -100LR are also planned with a range of 8,750nm. Development studies of the 747 are for two models. The first, the -400X, will have the same seat capacity as the -400 model and stretch would seat 500. Both would have MTOWs of 910,000lbs. The -400X will have a range of 8,900-9,000nm and the stretch a 7,800nm capability. The -400X would therefore be able to fly most trans-Pacific city-pairs non-stop.

The longest potential routes are from Atlanta to Singapore (8,670nm great circle distance) and Kuala Lumpur (8,583nm great circle).

Traffic growth

Besides new routes, airlines can handle traffic growth with higher load factors, increased flight frequency and larger aircraft. Passenger load factors are unlikely to increase much, because



airlines will want to avoid passenger spill.

"It is difficult to have high frequency in the trans-Pacific market," says Kaldahl at United. "This is because of flight times, airport curfews, slot restrictions and time differences. We have two flights a day to Tokyo each from Chicago and San Francisco, but they are only 15 and 75 minutes apart. This means larger aircraft are not so unlikely".

Not all airlines are restricted in their ability to increase frequencies to accommodate extra traffic. "In many cases we only operate a route with a single daily frequency and could easily increase frequencies rather than aircraft size. More frequency is preferable to larger aircraft," explains Aandahl.

It is predicted that liberalisation will see route and traffic fragmentation, as has been witnessed across the Atlantic. This could obviate the need to increase aircraft size on current major routes, while it will be necessary to keep average aircraft size constant. That is, 747-sized aircraft will remain popular. Fragmentation and new routes will spur demand for the smaller, ultra long-range types.

Annual traffic growth in the market is about 6% per year. Ten years growth will then see traffic increasing by 80%. Because more direct and longer distance routes will be opened and the Asia-Pacific portion of 5th freedom routes closed, the 153 billion ASM capacity of direct routes will increase by a factor higher than 80%. Seat capacity would rise by 80% or about 17 million.

The increase in traffic will be absorbed by new and current routes. The proportions will determine aircraft size.

"The new markets we are examining are the usual suspects," says Kaldahl. "These are the Asia-Pacific business

capitals. First, 27 new weekly frequencies have been granted to US carriers to destinations in China. We also have rights to many other places in Asia, but have slot restrictions at Tokyo. A new runway will open at Tokyo Narita in 2002.

"We actually have two choices for route development. We expect to face competition on direct routes from the A340-500 and 777-200X, and our beyond traffic to Singapore and other places from Tokyo will have to go on direct routes. In five or six years, however, we could use the A3XX to consolidate traffic through Tokyo. In 10 years we may need to use both choices anyway, because of high growth".

Unlike the Atlantic, the smallest types to open new routes across the Pacific are the A340 and 777. Since the A340 and 777 are relatively large, the pace at which new routes are opened and frequencies increased on will be low. New routes will probably be operated by single airlines or carriers that code-share.

Current annual seat capacity of the 56 direct routes is about 27 million. If any traffic growth is absorbed by the current network, average aircraft size or flight frequency will have to increase, since frequencies will not. Such an increase on some routes will obviate the need for larger aircraft. The busiest, which already have high frequency, will need aircraft larger than the 747 in as little as three years' time.

Since the A340-500 and 777-200X are both about 300 seats and are the most likely types to open new routes, the number of routes that might be opened in 10 years' time can be assessed.

Seat capacity growth on direct routes in 10 years will be about 80%, or about 17 million. If 75% of the 10-year

New direct routes opened by carriers with minority shares in capacity will start with 300-seat ultra long-range aircraft and single daily frequencies. Incumbents may need aircraft larger than a 747-400 in about five years on some sectors.

capacity growth is accounted for by new routes and these had a frequency of two flights a day, then the number of new routes that could absorb the capacity growth would be about 75.

This shows how easily the trans-Pacific market could fragment into a large number of new sectors supporting the A340-500 or 777-200X. This scope for new direct routes will almost certainly see the end of operation of 5th freedom routes.

Traffic growth after 15 and 20 years is likely to see routes being operated at a frequency of two or three times a day on almost all 300 potential major north American and Asia-Pacific city-pairs, as well as to smaller hubs.

Boeing's prediction is that the A340 and 777-200 variants will serve more than 130 city-pairs by 2018. A340 and 777 operations will account for more than 40% of flights over the trans-Pacific.

Summary

Development in the trans-Pacific has been stifled by the restrictive US-Japan bilateral and the lack of ultra long-range aircraft. Only 57 of a potential 200-300 direct routes are operated.

The market has become liberalised, and more restrictions are expected to be lifted. This will coincide with the arrival of the first ultra long-range aircraft that will make more direct routes economic.

The combination of these events could see a rapid change in the trans-Pacific market in the next five to ten years. The airlines to experience the largest changes will be JAL, ANA and Korean Air, since many 5th freedom routes operating via Japan and Korea into Asia will be abandoned. United and Northwest will also see a change, but these airlines can substitute their networks that route via Japan and Korea for new direct routes into Asia.

Other airlines in the trans-Pacific market will open routes with 300-seat ultra long-range aircraft and thus gain a larger market share.

Traffic growth in the market is high enough for aircraft sizes to be maintained on current routes, while providing scope for a large number of new direct routes. Even if this occurs with the use of A40-500s and 777-200Xs and twice daily frequencies, current routes are still likely to require aircraft larger than the 747 in five to ten years' time. 