Asia-Pacific Economic Cooperation

Develop Air Connectivity in the APEC Region

UNITED STATES

Tourism Working Group | October 2016

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Head Office Canada:
800 Place Victoria, PO Box 113
Montreal H4Z 1M1, Quebec,
Canada

www.iata.org/consulting

For
Asia-Pacific Economic Cooperation Secretariat
35 Heng Mui Keng Terrace
Singapore 119616
Tel: (65) 68919 600
Fax: (65) 68919 690
Email: info@apec.org
Website: www.apec.org

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Table of Contents

Glossary

The following section presents a list of commonly used expressions and abbreviations found in the report.

Connecting Potential – Common rates of passengers connecting beyond/behind when travelling through a hub to/from a particular region.

Induction/Stimulation – Initial spike in passenger demand when a new non-stop service is offered due to better accessibility, shorter travel time, lower cost etc.

List of Abbreviations

PDEW – Passenger daily each way (passenger demand in each direction between a select origin and destination)

SDEW – Seats daily each way (number of seats offered in each direction on a non-stop or one-stop flight segment).

OD – Origin and Destination

Airport Codes:

AAQ – Anapa, RUS
ACA – Acapulco, MEX
ADL – Adelaide, AUS
AER – Sochi, RUS
AGU – Aguascalientes, MEX
AKJ – Asahikawa, JPN
AKL – Auckland, NZ
ANF – Antofagasta, CHL
AOR – Alor Setar, MAS
AQP – Arequipa, CHL
ARH – Arkhangelsk, RUS
ASF – Astrakhan, RUS
ATL – Atlanta, US
AUS – Austin, US
AYP – Ayacucho, PE
BCD – Negros Occidental, PH
BDJ – Banjarmasin, INA
BHE – Blenheim, NZ
BJX – Silao, MEX
BKI – Kota Kinabalu, MAS
BKK – Bangkok, THA
BLI – Bellingham, US
BMV – Buon Ma Thuot, VN
BNA – Nashville, US
BNE – Brisbane, AUS
BOS – Boston, US
BPN – Balikpapan, INA
BUR – Burbank, US
BWN – Bandar Seri Begawan, BD
BXU – Butuan, PH
CAN – Guangzhou, PRC
CBO – Cotabato, PH
CCP – Concepción, CHL
CEB – Cebu, PH
CEI – Chiang Rai, THA
CEK – Chelyabinsk, RUS
CEN – Ciudad Obregón, MEX
CGK – Jakarta, INA
CGO – Zhengzhou, PRC
CGQ – Changchun, PRC

CGY – Cagayan de Oro and Iligan, PH
CHC – Christchurch, NZ
CJA – Cajamarca, PE
CJC – Calama, CHL
CJJ – Cheongwon-gu, ROK
CJU – Jeju, ROK
CKG – Chongqing, PRC
CLT – Charlotte, US
CME – Ciudad del Carmen, MEX
CNS – Cairns, AUS
CNX – Chiang Mai, THA
CSX – Changsha, PRC
CTS – Hokkaido, JPN
CTU – Chengdu, PRC
CUN – Cancun, MEX
CUZ – Cusco, PE
CVG – Cincinnati, US
CXR – Nha Trang, VN
DAD – Da Nang, VN
DAL – Dallas, US
DCA – Washington, US
DEN – Denver, US
DFW – Dallas, US
DGO – Durango, MEX
DGT – Dumaguete, PH
DJB – Jambi City, INA
DLC – Dalian, PRC
DLI – Da Lat, VN
DME – Domodedovo, RUS
DMK – Bangkok, THA
DPS – Bali, INA
DRW – Darwin, AUS
DTW – Detroit, US
DUD – Dunedin, NZ
DVO – Davao City, PH
EAT – Douglas County, US
EWR – Newark, US
EZE – Buenos Aires, ARG
FAT – Fresno, US
FLL – Fort Lauderdale, US
FOC – Fuzhou, PRC
FSZ – Shizuoka, JPN
FUK – Fukuoka, JPN
GDL – Guadalajara, MEX
GEG – Spokane, US
GMP – Seoul, ROK
GUM – Tamuning and Barrigada, GUM
GYS – Guangyuan, PRC
HAK – Haikou, PRC
HAN – Ha Noi, VN
HGH – Hangzhou, PRC
HKG – Hong Kong, China, HKC
HKT – Phuket, THA
HND – Tokyo, JPN
HNL – Honolulu, US
HRB – Harbin, PRC
HUI – Hue, VN
HUZ – Huizhou, PRC
IAD – Washington, US
IAH – Houston, US
ICN – Seoul, ROK
ILO – Ilo, PE
IQQ – Iquique, CHL
IQT – Iquitos, PE
ISG – Ishigaki, JPN
ITM – Osaka, JPN
IWK – Iwakuni, JPN
JFK – New York, US
JHB – Johor, MAS
JJN – Quanzhou, PRC
JNZ – Jinzhou, PRC
JOG – Yogyakarta, INA
JUL – Juliaca, PE
KBR – Kota Bharu, MAS
KBV – Krabi, THA
KCH – Kuching, MAS
KGD – Kaliningrad, RUS
KHH – Kaohsiung, CT
KHN – Nanchang, PRC
KIX – Osaka, JPN
KKE – Kerikeri, NZ
KLO – Kalibo, PH
KMG – Kunming, PRC
KNH – Kinmen, PRC
KNO – Kuala Namu, INA
KOJ – Kirishima, JPN

KRR – Krasnodar, RUS
KUF – Samara, RUS
KUL – Kuala Lumpur, MAS
KWL – Guilin, PRC
KZN – Tatarstan, RUS
LAS – Las Vegas, US
LAX – Los Angeles, US
LED – Saint Petersburg, RUS
SVX – Yekaterinburg, RUS
LGA – NY–La Guardia, US
LGK – Padang Matsirat, Langkawi, MAS
LHW – Lanzhou, PRC
LIM – Lima, PE
LOP – Lombok, INA
LPF – Liupanshui, PRC
LPT – Lampang, THA
MBT – Masbate City, PH
MCC – Sacramento, US
MCO – Orlando, US
MDW – Chicago, US
MDZ – Mendoza, ARG
MEL – Melbourne, AUS
MEX – Mexico City, MEX
MFM – Macau, MAC
MIA – Miami, US
MLM – Alvaro Obregon, Michoacan, MEX
MNL – Manilla, PH
MRY – Monterey, US
MSP – Minneapolis–Saint Paul, US
MTT – Cosoleacaque, MEX
MTY – Apodaca, MEX
MZG – Magong City, CT
NBC – Nizhnekamsk, RUS
NGB – Ningbo, PRC
NGO – Nagoya, JPN
NKG – Nanjing, PRC
NKM – Nagoya, JPN
NNG – Nanning, PRC
NPE – Napier, NZ
NPL – New Plymouth, NZ
NRT – Tokyo, JPN
NSN – Nelson, NZ
NTG – Nantong, PRC
OAK – Oakland, US
OAX – Oaxaca, MEX
OKA – Naha, JPN
OOL – Gold Coast, AUS
ORD – Chicago, US
OVB – Novosibirsk, RUS
OZC – Ozamiz, PH
PDG – Sumatra, INA
PEK – Beijing, PRC
PEN – Penang, MAS
PER – Perth, AUS
PHL – Philadelphia, US
PHX – Phoenix, US
PIU – Piura, PE
PLM – Palembang, INA
PLW – Palu, INA
PMC – Puerto Montt, CHL
PMR – Palmerston North City, NZ
PNK – Pontianak, INA
POM – Port Moresby, PNG
PPQ – Paraparaumu, NZ
PQC – Phu Quoc, VN
PSP – Palm Springs, US
PUS – Busan, ROK
PVG – Shanghai, PRC
PVR – Puerto Vallarta, MEX
PXU – Pleiku, VN
PYX – Pattaya, THA
RDU – Raleigh, Durham, US
REP – Siem Reap, KHM
REX – Reynosa, US
RGN – Mingaladon, MMR
RNO – Reno, US
ROC – Rochester, US
ROT – Rotokawa, NZ
ROV – Rostov-on-Don, RUS
RSU – Yeosu, ROK
RTW – Saratov City, RUS

RXS – Roxas City, PH
SAN – San Diego, US
SCL– Santiago, CHL
SEA – Seattle, US
SFO – San Francisco, US
SGN – Ho Chi Minh, VN
SHA – Shanghai, PRC SHE – Shenyang, PRC
SIN – Singapore, SGP
SIP – Simferopol, UKR
SJC – San Jose, US
SJD – San Jose del Cabo, MEX
SLC – Salt Lake City, US
SLP – San Luis Potosi, MEX
SMF – Sacramento, US
SNA – Santa Ana, US
SOC – Solo/Surakarta, INA
SPN – Saipan, US
SRG – Semarang, INA
STL – St. Louis, US
STW – Stavropol Krai, RUS
SUB – Surabaya, INA
SVO – Moscow, RUS
SVX – Koltsovo, RUS
SWA – Jieyang Chaoshan, PRC
SYD – Sydney, AUS
SYO – Sakata, JPN
SYX – Sanya, PRC
SZX – Shenzhen, PRC
TAC – Tacloban, PH
TAM – Tampico, MEX
TAO – Qingdao, PRC
TAV – Tau, ASM
TBP – Tumbes, PE
TDX – Trat, THA
TGG – Kuala Terengganu, MSA
TGZ – Chiapa de Corzo, MEX
TIJ – Tijuana, MEX
TKG – Bandar Lampung, INA
TLC – Toluca, MEX
TNA – Jinan, PRC
TPE – Taipei, CT
TPP – Tarapoto, PE
TRC – Torreon, MEX
TRU – Trujillo, PE
TSA – Songshan, CT
TSN – Tianjin, PRC
TTJ – Tottori, JPN
TXG – Taichung, CT
TYN – Taiyuan, PRC
UFA – Ufa, RUS
UIH – Qui Nhon, VN
UKB – Kobe, JPN
UPG – Makassar, INA
URC – Urumqi, PRC
USM – Koh Samui, THA
VCL – Chu Lai, VN
VDH – Dong Hoi, VN
VER – Veracruz, MEX
VII – Vinh, VN
VKO – Moscow, RUS
VOZ – Voronezh, RUS
VSA – Villahermosa, MEX
VVO – Vladivostok, RUS
WAG – Whanganui, NZ
WEH – Weihai, PRC
WLG – Wellington, NZ
WNZ – Wenzhou, PRC
WRE – Whangarei city, NZ
WUH – Wuhan, PRC
WUX – Wuxi, PRC
XIY – Xi'an, PRC
XMN – Xiamen, PRC
YEG – Edmonton, CDA
YGJ – Yonago, PRC
YHZ – Halifax, CDA
YKA – Kamloops, CDA
YLW – Kelowna, CDA
YNJ – Yanji, PRC
YOW – Ottawa, CDA
YPR – Prince Rupert, CDA
YQM – Moncton, CDA
YQR – Regina, CDA
YSJ – Saint John, CDA

YTS – Timmins, CDA

YUL – Montreal, CDA

YVR – Vancouver, CDA

YWG – Winnipeg, CDA

YXC – Cranbrook, CDA

YXS – Prince George, CDA

YXT – Terrace-Kitimat, CDA

YYB – North Bay, CDA

YYC – Calgary, CDA

YYJ – Victoria, CDA

YYZ – Toronto, CDA

YZP – Sandspit, CDA

YZR – Sarnia, CDA

ZAL – Valdivia, CHL

ZCL – Calera de Victor Rosales, MEX

ZQN – Queenstown, NZ

ZUH – Zhuhai, PRC

1. Introduction to the project

The APEC Secretariat and Economies have observed that the flow of goods, services, capital and people in the APEC Region is constrained by air connectivity limitations and gaps that exist between the APEC economies, particularly between the Americas and Asia Pacific. Improving connectivity is a long-term target of the APEC economies. The APEC Tourism Working Group (TWG) and Transport Working Group (TPTWG) are particularly interested in pursuing this long-term target.

This Project (the "Project") was proposed in 2014 by Thailand and co-sponsored by Australia; Indonesia; Malaysia; Peru; the Philippines; and Chinese Taipei and aims to develop air connectivity in the APEC Region and in turn stimulate a more efficient flow of goods, services, capital and people. The Project has the following objectives:

- To develop market demand-based recommendations for potential new routes, improved flight schedule connection times, and hubs between APEC economies based on analysis of air passenger flow, schedules and new aircraft range capability, including analysis of the number of seats, flights and air traffic.
- To help airlines and regulators develop more accurate demand predictions so they can in turn help APEC economies by providing better air connectivity services, capacity and schedules.

The Project was approved in December 2014, with IATA Consulting selected as the consultant in May 2015. IATA was mandated to complete the following tasks:

1. Develop market demand-based recommendations for potential new routes.
2. Provide recommendations to improve connections between flights at the main hubs linking the APEC economies.
3. Determine which APEC market-pairs could benefit from the introduction of new aircraft with extended range.

The primary concern of this project is to focus on those APEC economies between the Americas and the Asia Pacific Regions. In the course of the work it is possible to identify connection opportunities between the economies of the Americas within APEC: the United States; Canada; Mexico; Peru and Chile (for example the United States-Canada or Mexico-Peru). Clearly whilst there may be some opportunities emerging from these intra-American-APEC economies, they are not the principal focus of this study and have been omitted from this analysis.

2. Approach followed and data used

This section explains the methodology applied by IATA and presents the data used to feed the various underlying analysis. To conduct the analysis, IATA took systematic steps identified in Figure 1.

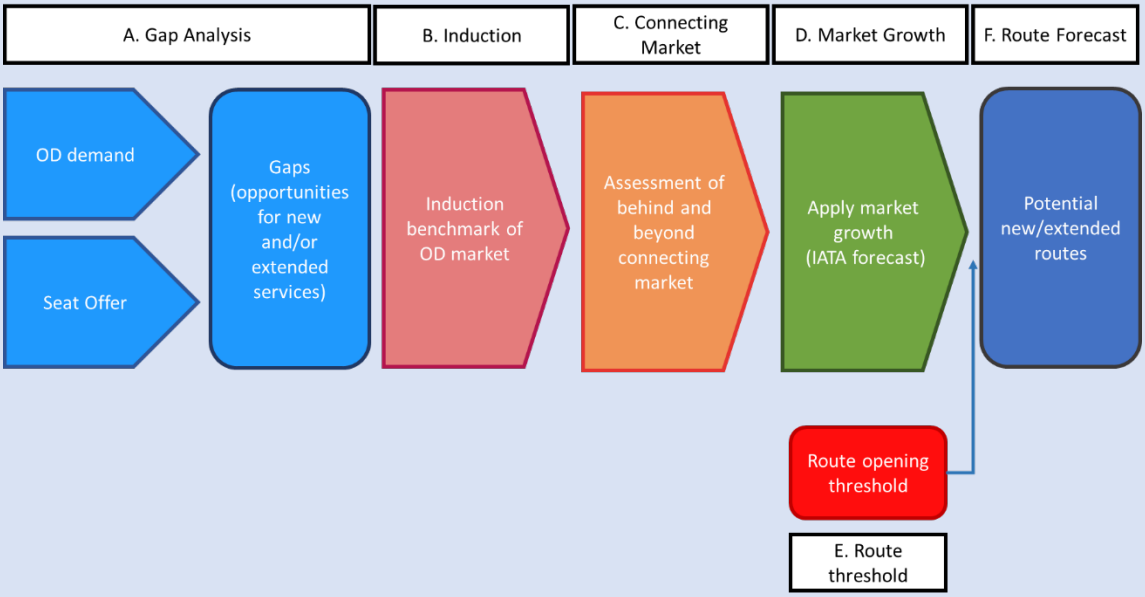

Figure 1: Process used to complete analytical work

The first step involved a demand-supply gap analysis aimed at identifying the unserved routes, presenting potential demand for future development. The size that this potential demand could actually represent if turned into direct service in the future was subsequently forecast, using realistic assumptions related to induction, connecting potential and demand growth.

2.1 Data fueling the model

Principal data for the model originates from Airport IS. IATA's Airport IS system uses IATA billing and settlement plan data to provide detailed demand and supply information on total air traffic. This data has been available for over a 10-year historical period (since 2005).

Approximately 18,500 international APEC routes were analyzed in the execution of this study. Airport IS data was particularly relevant in the gap analysis and assumption development.

Academic articles and published ratios were also used to justify some of the assumptions, including induction and origin destination traffic captured through direct service.

For some of the other variables used in the final traffic determination, economic forecasts were extracted from IHS Global Insight, one of the world's largest commercially available economic databases.

Tourism data was extracted from the World Travel and Tourism Council.

2.2 Gap analysis

IATA applied a funnel approach in conducting the analysis. It first considered the market at the economy pair level, followed by city pairs leading to a market potential assessment (see figure below). Both seat supply and seat demand were considered in the analysis to identify gaps in air service.

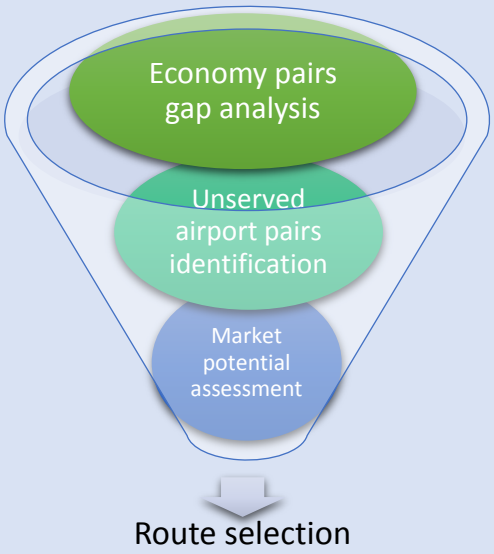

Figure 2: Funnel approach used to conduct analysis

The economy-pair analysis allowed IATA to identify unserved markets.

As an illustration, this analysis showed that there was an average daily demand of 2,426 Passengers Daily Each Way (PDEW) in 2015 that flew via existing connecting routings between the Philippines and the United States, while only an average 1,451 direct (on non-stop service) seats daily each way were offered.

When extending the analysis down to the city pairs, it was possible to identify the largest unserved markets between the two economies: there are 221 PDEW traveling between SGN and LAX

The top 30 unserved routes for the United States are presented in the table below.

Origin Airport	Origin Economy	Destination Airport	Destination Economy	2015 OD Demand (PDEW)	non-stop seats in 2015 (SDEW)	1-stop seats in 2015 (SDEW)
LAX	United States	SGN	Viet Nam	221	0	0
JFK	United States	MNL	The Philippines	202	0	178
JFK	United States	SYD	Australia	191	0	391
JFK	United States	SIN	Singapore	190	0	427
SFO	United States	SIN	Singapore	179	0	591
LAX	United States	BKK	Thailand	165	0	199
SFO	United States	SGN	Viet Nam	162	0	0
JFK	United States	MEL	Australia	133	0	0
LAX	United States	SIN	Singapore	124	0	410
JFK	United States	BKK	Thailand	121	0	0
JFK	United States	ITM	Japan	110	0	0
JFK	United States	MNL	The Philippines	106	0	0
MCO	United States	FOC	China	105	0	246
IAH	United States	CGK	Indonesia	99	0	0
JFK	United States	BKK	Thailand	95	0	90
LAX	United States	CGK	Indonesia	90	0	0
SFO	United States	MEL	Australia	82	0	0
IAD	United States	SGN	Viet Nam	79	0	0
JFK	United States	BNE	Australia	76	0	0
SFO	United States	MEL	Australia	75	0	0
LAX	United States	PER	Australia	74	0	0
IAH	United States	SIN	Singapore	74	0	199
LAX	United States	ITN	Japan	74	0	0
LAS	United States	HND	Japan	72	0	21
LAX	United States	FUK	Japan	70	0	0
IAH	United States	SGN	Viet Nam	69	0	0
HNL	United States	HKG	Hong Kong, China	67	0	0
ORD	United States	SGN	Viet Nam	67	0	0
LAX	United States	CTU	China	66	0	57
LAX	United States	HAN	Viet Nam	66	0	0

Table 1: Top 30 unserved routes from United States, 2015 data

2.3 Induction

To determine realistic estimates of the success of new air service, various assumptions were considered and applied to current passenger demand.

Induction is a well proven concept that explains how new direct air service has a significant impact on increasing the total number of O&D passengers on a city-pair market. This is due to product improvement: shorter travel time, greater convenience and more affordable ticket prices. The extent to which the market will be stimulated varies based on current levels of service (price and flight frequency) offered on a particular route. As stated in the Successful Air Service Development presentation (ICF International, 2014) a market's first non-stop flight can stimulate demand 100% to 300%.

IATA quantified this induction value to show a relationship between two primary factors: region pair and the size of the market before a new route is initiated.

The table below shows the stimulation rates considered for this analysis of the United States. For some instances where inadequate data (less than 4 routes) to conduct a region pair analysis was available, other variables were considered including the average of all routes, the average of long-haul routes or the average of short-haul routes, depending on the specific market.

Market	Base of 10,000 Annual Pax	Base of 25,000 Annual Pax	Base of 50,000 Annual Pax
All APEC Economies	130%	42%	18%
Long Haul	101%	36%	16%
Short Haul	150%	50%	21%
North America-Asia	104%	40%	
North America-China	137%	55%	
North America-North East Asia	70%	26%	
North America-Peru, Chile	90%	28%	

Table 2: Stimulation rates applied to the analysis

2.4 Connecting potential

Increasing the quality of connections through alliance agreements, codeshares, shorter journey times or fewer stops increases overall travel demand in connecting markets. It is a normal phenomenon for new routes to not only increase demand for the city pairs served but also for beyond and behind

destinations that are now more easily accessible (Swan, 2008). On long-haul routes, typically two-thirds of the passengers will make a connection.

IATA's analysis found that connecting markets would stimulate at various rates depending on the region of origin and the hub airport being flown through. These ratios are applied in determining the impact of a new route on connecting flows.

Connecting rates to be applied in this project for flights connecting at the US hubs were estimated based on traffic from various APEC regions flying through SEA, LAX, SFO, DFW, ORD, the two New York airports JFK/EWR and BOS, as well as the foreign hubs being flown to and from the United States.

	SEA	LAX	SFO	DFW	ORD	JFK/EWR	BOS
North America	28.9%	24.8%	21.4%	59.8%	49.3%	26.1%	5.2%
Australia		47.1%	45.3%	82.1%		12.9%	
Asia	34.7%	12.5%	23.5%	74.5%	53.5%	11.0%	4.9%
South East Asia	80.9%	31.3%	19.9%		94.7%	55.4%	
China	41.3%	10.4%	25.7%	75.4%	57.0%	10.0%	1.3%
North Asia	3.2%	14.4%	32.6%	79.3%	60.2%	9.2%	10.6%
Peru-Chile		34.8%		90.7%		27.9%	

Table 3: Connecting potential rates used when flying to/from APEC regions (left) and the listed U.S. hubs (top)

2.5 Demand growth

This refers to the consideration of the natural growth observed on a market segment. IATA Economics publishes a detailed inter- and intra-regional global traffic forecast. These demand growth forecasts were used to provide a regionally specific rate of growth to and from the United States between 2016 and 2018. Growth was typically seen to be approximately 5%. Demand growth also refers to the fact that approximately 80% of a market will choose a non-stop flight option if it is available (Belobaba, 2015).

2.6 Other

Other factors including distance and available traffic rights were used to refine the assessment of potential new services to be opened. Distance considers the possibility of offering a non-stop flight with existing technology, using 15,000km as a maximum distance for a non-stop flight. Available traffic rights consider the bilateral agreements between economies and the current use of those bilateral rights.

2.7 Final route forecast

After conducting the gap analysis and applying the established rates from the various assumptions, the future market potential was estimated, as illustrated in Figure 3 below for the LAX-BKK route.

				1	2	4	
Origin Airport	**Destination Airport**	**Destination Economy**	**2015 OD Non-direct Demand**	**OD Captured Though Deorect Service**	**OD Stimulation**	**Behind/Beyond Connecting Potential**	**Caculations**
LAX	BKK	Thailand	(A) 165	(B) 80%	(C) 16%	(D) 54%	
				(1) 132	21		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	153		(3) = 1+2
		LAX - BKK Total Market Potential (2015 Base)				(4) **333**	(4) = 3/(1-D)

Figure 3: Example of the various assumptions being applied to determine the potential for a new air service.

3. United States

A summary of the United States' economy and demographics, aviation demand, and airport specific information is presented in this section.

3.1 Economy and demographics

The United States is a federal republic composed of 50 states, a federal district of Washington, D.C., five major territories, and various possessions. The 48 contiguous states and Washington, D.C. are in central North America between Canada and Mexico. The state of Alaska is in the north-western part of North America and the state of Hawaii is an archipelago in the mid-Pacific. The territories are scattered about the Pacific Ocean and the Caribbean Sea. It is the fourth largest economy by land area occupying 9.9 million square kilometers.

3.1.1 Demographics

According to the U.S. Census Bureau, the U.S. population is estimated at 323.5 million in 2016, making it the third most populous nation on earth. The population is most concentrated along the eastern seaboard, around the Great Lakes and west to the Mississippi. Across the Great Plains towards the Rockies, populations remain fairly thinly distributed, but there are further heavy concentrations of

population on the western Pacific coast, particularly in California. Overall the US population density is approximately 35 inhabitants per square kilometer.

The population has been growing at around 0.7% per annum over the last five years and is expected to continue growing at historical rates to reach 345m by 2026. (UN, 2015)

Major urban centers and populations include:

City-Region	Population (millions)
New York—Newark	18,351,295
Los Angeles--Long Beach--Anaheim	12,150,996
Chicago	8,608,208
Miami	5,502,379
Philadelphia	5,441,567
Dallas--Fort Worth—Arlington	5,121,892
Houston	4,944,332
Washington	4,586,770
Atlanta	4,515,419
Boston	4,181,019
Detroit	3,734,090
Phoenix—Mesa	3,629,114
San Francisco—Oakland	3,281,212
Seattle	3,059,393
San Diego	2,956,746
Minneapolis--St. Paul	2,650,890
Tampa--St. Petersburg	2,441,770
Denver--Aurora	2,374,203
Baltimore	2,203,663
St. Louis	2,150,706
San Juan	2,148,346

Table 4: Largest United States' cities (United States Census Bureau, 2013)

3.1.2 Economy

The United States is the world's largest national economy whose GDP is estimated to be around USD17.914 trillion or 15.8% of nominal global GDP (IMF, 2016). It has a mixed economy, and overall GDP growth rate in 2015 was 2.4% and is expected to continue growing at between 2.4-2.5% in 2016-2017. Its seven largest trading partners are Canada, China, Mexico, Japan, Germany, Korea, and the United Kingdom.

The economy has abundant natural resources, a well-developed infrastructure, and high productivity. It is the world's largest producer of oil and natural gas, and one of the largest trading nations in the world. It is the world's second largest manufacturer, representing a fifth of the global manufacturing output with the largest internal market for goods and trade in services.

The United States has one of the world's largest and most influential financial markets and, by market capitalization, the New York Stock Exchange is the world's largest stock exchange.

3.1.3 Tourism

International travel to the United States in 2015 reached 75.3 million visitors and this is expected to rise 2.6% in 2016 to reach a new record of 77.3 million visitors. (U.S. Department of Commerce (DOC)). The largest visitor markets include Canada (20.7m), Mexico (18.4m), the United Kingdom (4.9m), Japan (3.8m), China (2.6m), and Germany (2.3m).

According to the current forecast, the United States is likely to see around 90.3 million visitors by 2020. Economies with the largest predicted total growth percentages are China (129%), India (47%), Chinese Taipei (39%), Korea, (36%), and Australia (27%). Venezuela (-25%) and Argentina (-15%) are the only economies expected to have a decline in volume over the forecast period.

The direct contribution of travel and tourism to the US GDP is USD488.0 billion (2.7% of total GDP) in 2015 and is forecast to rise to 2.8% in 2016. This primarily reflects the economic activity generated by industries such as hotels, travel agents, airlines and other passenger transportation services (excluding commuter services). But it also includes, for example, the activities of the restaurant and leisure industries directly supported. The total contribution of travel and tourism to GDP was USD1,469.9 billion (8.2% of GDP) in 2015, and is forecast to rise by 3.0% in 2016, and to rise by 3.4% p.a. to USD2,118.6 billion (9.3% of GDP) in 2026. (World Travel and Tourism Council, 2015).

3.2 Aviation demand

Due to its large geographical size and the population's historically high propensity to fly, air travel has become an important part of the US economy.

3.2.1 Recent demand growth

Passenger air traffic to and from the United States has grown at an average of 3.03% per annum between 2004 and 2014. This growth slowed in 2008/9 following the world recession; however, it has recovered since then with approximately 4.6% p.a. growth in 2014. This demand growth is seen in the table below. In a recent analysis, strong passenger traffic growth of 3.5% is expected to continue through to 2025. (US Federal Aviation Administration (FAA), 2015)).

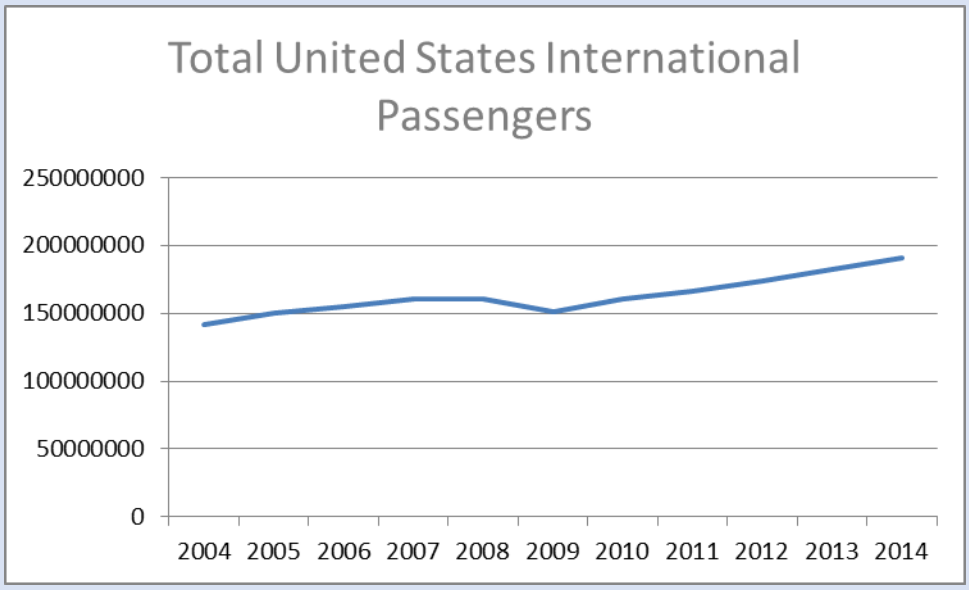

Table 5: Total air traffic United States 2004-2014 (Source: Albatross Airport, 2016).

Air freight, by contrast, has only shown 0.4% growth between 2004 and 2014 (US Department of Transportation, 2015). In 2014, 9.9 million tonnes of air cargo were recorded and despite recent slower growth, the FAA forecasts an average rate of 4.7% growth in the US air cargo sector, with the Pacific region showing the fastest growth.

3.2.2 Current air services to the United States

In 2016, there were 113 routes connecting the United States to various APEC destinations, as shown in the figure below:

Figure 4: Non-stop service to and from the United States and top APEC destinations March 2016 (Source: Airport IS)

International capacity to the United States has grown from 1.58 million inbound seats per month in 1993 to 2.56 million per month in 2016. Growth over this time period has been mainly driven by growth from Europe (+ 39%), other parts of North America (+ 32%), Australasia (+ 39%) and Asia (+ 43%). The fastest growing region has been the Middle East, which has seen a rise of 91% over the period.

In 2015, the strongest direct aviation capacity growth from the APEC region to the United States was from China (+ 22%); Chinese Taipei (+ 12%); Australia (+ 11%); Hong Kong, China (+ 10%); New Zealand (+ 8%) and Korea (+ 8%). However, capacity from Japan declined 3.4% in the same year.

3.2.3 Aviation and the economy

Economic Footprint

In 2009, the aviation sector contributed USD669.5 billion in Gross Value Added (GVA) to the United States, equivalent to 4.9% of the US economy (Oxford Economics, 2011). This total comprises:

- USD206.4 billion directly contributed through the output of the aviation sector (airlines, airports and ground services);
- USD169.4 billion indirectly contributed through the aviation sector's supply chain;
- USD127.4 billion contributed through the spending by the employees of the aviation sector and its supply chain.

Catalytic benefits through aviation-related international tourism of USD104.5 billion bring the overall aviation sector contribution to 4.5% of GDP.

Domestic tourism-related catalytic benefits of USD61.8 billion further raise the overall aviation sector contribution to 4.9% of GDP.
From an employment perspective, the sector supports more than 6.5 million jobs directly and indirectly, and a further 1.3 million jobs through the catalytic effects.

Long-term impact

Economically, aviation has a long-term impact in the United States. According to Oxford Economics (2011), air travel enables long-term economic growth by:

- Opening up foreign markets to US exports;
- Lowering transport costs;
- Increasing the flexibility of labor supply;
- Speeding the adoption of business practices such as just-in-time-inventory management;
- Raising productivity and hence the economy's long-run supply capacity. It is estimated that a 10% improvement in connectivity relative to GDP would see an USD797 million per annum increase in long-run GDP for the US economy.

3.2.4 Government position on aviation

The US Department of Transportation is responsible for promoting the US airline access to foreign markets and competition in international markets. It is also responsible for reducing trade barriers and facilitating the export of domestic transportation goods and services (US DOT, 2016).

The Office of International Aviation also licenses both the US and foreign airlines to serve international markets; assesses the public and competitive benefits of the US and foreign airline alliances and code-

share arrangements, and exercises regulatory oversight of international aviation pricing issues, including inter-carrier fare and rate agreements.

The Office of International Aviation and the U.S. Department of State negotiate bilateral and multilateral air service agreements with the United States' foreign aviation partners. Such agreements provide the basis for airlines of the economies involved to provide international air services for passengers, cargo and mail. Through air service agreements, the United States develops a procompetitive operating environment for the US airline services between the United States and foreign economies.

Since 1992, the United States has pursued an "open-skies" policy designed to eliminate government involvement in airline decision-making about routes, capacity, and pricing in international markets. Open-skies agreements also contain provisions governing commercial opportunities, safety, and security. The United States has negotiated open-skies agreements with more than 100 aviation partners.

On May 1, 2001, Brunei Darussalam; Chile; New Zealand; Singapore; and the United States signed a multilateral open-skies agreement, called the Multilateral Agreement on the Liberalization of International Air Transportation (MALIAT). The Department continues to urge aviation partners to accede to the MALIAT as an effective way to reach open skies with multiple partners.

For the most part, air services are excluded from the US trade agreements. When air services are included, the scope of coverage is very limited. In these instances, the Office of International Aviation works with the Office of the United States Trade Representative and the Department of State to ensure that such provisions are consistent with the US aviation policy.

In the General Agreement on Tariffs in Services (GATS), the annex on air transport explicitly limits coverage of air services to only aircraft repair and maintenance, computer reservation systems, and selling and marketing of air transportation. Under bilateral and multilateral Free Trade Agreements, coverage of air services is limited to aircraft repair and maintenance and specialty air services (DOT, US).

3.3 Airport specific information

3.3.1 Busiest airports in the United States

The United States' major airports are highly developed and the necessary operational facilities are generally satisfactory. Nevertheless, airports are continually required to increase capacity in all aspects of their operations, including roadways, car parking, baggage handling and terminal space, to meet changing demand.

Rank	Airport	IATA CODE	Most Recent Annual Statistics (2015)	% of Total United States' Market
1	Atlanta	ATL	101,489,887	6.3%
2	Chicago O'Hare	ORD	76,942,493	4.7%
3	Los Angeles	LAX	74,704,122	4.6%
4	Dallas/Fort Worth	DFW	64,177,618	4.0%
5	New York JFK	JFK	56,845,250	3.5%
6	Denver International	DEN	54,014,903	3.4%
7	San Francisco	SFO	50,057,887	3.1%
8	Las Vegas	LAS	45,389,079	2.8%
9	Charlotte/Douglas	CLT	44,876,627	2.8%
10	Miami International	MIA	44,350,250	2.8%
11	Phoenix Sky Harbor	PHX	44,025,393	2.7%
12	Houston George Bush	IAH	43,023,224	2.7%
13	Seattle	SEA	42,340,461	2.6%
14	Orlando International	MCO	38,809,337	2.4%
15	Newark Liberty International	EWR	37,427,925	2.3%
27	Honolulu	HNL	19,972,910	1.0%

Table 6: Passenger traffic major airports in United States (Source: Albatross Airport, 2016).

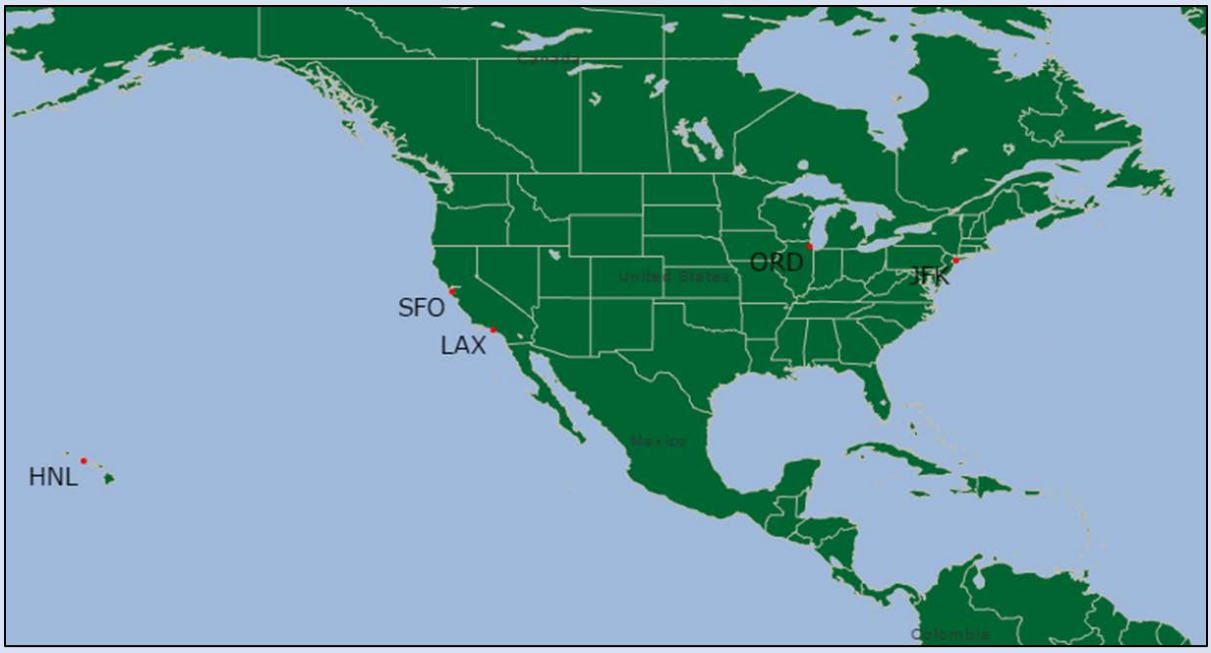

Figure 5: Map of United States' busiest airports (Source: Google maps)

Below is a description of the airports that are included in the new routes studies:

Chicago O'Hare International Airport (ORD)

Chicago O'Hare International Airport is the primary airport serving the Chicago area operated by the City of Chicago Department of Aviation. It is the fourth busiest airport in the world by passenger traffic and also has the most runways (eight) of any major international airport.

ORD is currently a major hub for American Airlines and United Airlines, as well as a hub for regional carrier Air Choice One and a focus city for Frontier Airlines and Spirit Airlines. Trans Pacific carriers include ANA, Japan Airlines, China Eastern and Cathay Pacific.

Los Angeles International Airport (LAX)

Los Angeles International Airport is the largest and busiest airport in the Greater Los Angeles Area and the state of California. It is owned and operated by Los Angeles World Airports, an agency of the Los Angeles city government. It has four parallel runways.

LAX serves as a hub for American Airlines, Delta Air Lines, United Airlines, Alaska Airlines, and Virgin America. It is also a focus city for Allegiant Air, Southwest Airlines and Spirit Airlines and is also important for international carriers Cathay Pacific, Air New Zealand, Qantas and EVA Air. The airport is a major gateway to and from Europe, Latin America, Asia and Oceania.

New York John F Kennedy International Airport (JFK)

John F. Kennedy International Airport is the largest airport serving New York City. It is the busiest international air passenger gateway into the United States and is operated by The Port of New York Authority. It has six passenger terminals and two sets of twin-parallel runways.

Over seventy airlines operate out of JFK and it functions as a hub for American Airlines, Delta Air Lines and Alaskan. It is the primary operating base for JetBlue Airways. Trans Pacific carriers include Japan Airlines, China Eastern, Air China, Korean Airlines and Cathay Pacific.

San Francisco International Airport (SFO)

San Francisco International Airport is the largest airport in the San Francisco Bay Area, including all of Northern California, and the second busiest in California (after LAX). It is owned and operated by the City and County of San Francisco with two sets of twin-parallel runways and four terminals.

SFO is the fifth largest hub for United Airlines operating as their primary transpacific gateway. It also serves as Virgin America's principal base of operations. Trans Pacific carriers include EVA Air, Singapore Airlines and Cathay Pacific.

Las Vegas McCarran International Airport (LAS)

McCarran International Airport is the main airport serving the city of Las Vegas, Nevada. It is owned and operated by Clark County. It has four runways and three passenger terminals.

LAS is a focus city and the largest operating base for Allegiant Air, Southwest Airlines and Frontier Airlines, while United Airlines, Delta Air Lines, American Airlines and Spirit Airlines all have a significant presence. The only international Trans Pacific carrier is Korean Air.

Orlando International (MCO)

Orlando International Airport is located in Orlando, Florida and is operated by The Greater Orlando Aviation Authority. It has two closely and two widely spaced parallel runways. Principally a leisure airport, it serves as a hub for Silver Airways, as well as a focus city for Frontier Airlines, JetBlue Airways, and Southwest Airlines. Southwest Airlines is the airport's largest carrier by passengers carried. MCO also is a major international gateway for the mid Florida region, with flights by foreign air carriers. However, there are no Trans Pacific operations.

Seattle–Tacoma International Airport (SEA)

Seattle–Tacoma International Airport (SEA) is the largest airport in the Pacific Northwest region of the United States. It is the primary airport for the Seattle metropolitan area. It is operated by the Port of Seattle and has three parallel runways.

SEA has flights to cities throughout North America, Europe, the Middle East and Asia. It is the main hub for Alaska Airlines and its regional subsidiary Horizon Air, whose headquarters are near the airport. It is a hub and international gateway to Asia and Europe for Delta Air Lines. Trans Pacific routes include China ; Hong Kong, China; Japan; Korea; and Chinese Taipei.

Honolulu International Airport (HNL)

Honolulu International Airport is the principal aviation gateway of the City and County of Honolulu and the State of Hawaii operated by the Airport Authority of Hawaii. It is located on the island of Oahu. It has five designated runways including a water runway.

HNL serves as the principal hub of Hawaiian Airlines, the largest Hawaii-based airline with flights between the various airports of the Hawaiian Islands and also serves the continental United States, Australia; China; Japan; Korea; New Zealand; American Samoa; and Tahiti. Trans Pacific carriers include major activity from Japanese Airlines, ANA and Korean.

4. Medium-term new route opportunities

This section of the report is dedicated to explaining the potential future air service developments to and from the United States within the APEC region over the next three years. Service gaps, route traffic forecasts, and high-level feasibility analyses conducted are hereby presented.

4.1 Service gaps

As part of the process, air services to the United States were considered on both an economy-pair and city-pair basis.

4.1.1 Economy pair analysis

The following table outlines the supply and demand for air travel between the United States and other APEC economies. The data essentially shows the economy pairs where:

- non-stop service is sufficiently supplied (in green);
- air service is adequate but may need to be improved in the long term (in yellow); and
- air service is at a shortfall and should be improved in the medium term (in red).

Origin Economy	Demand	Supply		Ratio of demand-to-supply
	(PDEW)	Non-Stop Seat Offer (SDEW)	One-Stop Seat Offer (SDEW)	
Australia (AUS)	4,312	5,184	1,023	69%
Brunei Darussalam (BD)	0	0	0	*
People's Republic of China (PRC)	10,119	10,548	3,506	72%
Hong Kong, China (HKC)	3,178	5,027	626	56%
Indonesia (INA)	393	0	0	**
Japan (JPN)	14,202	19,143	1,496	69%
Republic of Korea (ROK)	5,465	10,246	1,409	47%
Malaysia (MAS)	326	0	0	**
New Zealand (NZ)	899	1,399	159	58%
Papua New Guinea (PNG)	2	0	0	*
The Republic of the Philippines (PH)	2,426	1,451	624	117%
Russia (RUS)	62	0	0	*
Singapore (SGP)	950	0	2,112	45%
Chinese Taipei (CT)	2,792	4,039	528	61%
Thailand (THA)	799	0	222	359%
Viet Nam (VN)	1,838	0	161	1139%

Table 7: Total demand-to-supply ratio PDEW (Source: IATA analysis of Airport IS Data)

*** Delineates an economy pair with no air services which has inadequate demand to consider air services in the long term**

**** Delineates an economy pair with no air services which may have adequate demand for service in the long term (next 10 years)**

Typical ratios found in highly liberalized international markets with adequate capacity for demand ranges from 60% to 80%.

Where demand-to-supply ratios are higher than 80%, seat offer should be increased between economy pairs (e.g. United States to Viet Nam at 1139% where there is no non-stop supply).

4.1.2 Economy pair analysis summary

Based on the above analysis at the economy level, the United States may have an opportunity to improve service to three economies in the medium term (highlighted in red):

- The Philippines
- Thailand
- Viet Nam

In addition, actions may be taken to improve service with four economies in the long-term (highlighted in yellow):

- Australia
- China
- Japan
- Chinese Taipei

The following section will look into greater details at these shortfalls in supply at a city-pair level.

4.1.3 City pair analysis by APEC economy

In order to develop a set of city pairs with potential demand, a threshold equal to 39 PDEW (14,235 annual passengers one-way) was considered as the minimum level for any service. This is equivalent to around 70% load factor for a narrow body aircraft flying a thrice weekly service. There are 65 city pairs to and from the United States and other APEC economies that meet this criterion. These are shown in table 8 below.

Origin City	Origin Economy	Destination City	Destination Economy (A-M)	Demand PDEW
JFK	United States	SYD	Australia	191
JFK	United States	MEL	Australia	133
JFK	United States	BNE	Australia	76
SFO	United States	MEL	Australia	75
LAX	United States	PER	Australia	74
LAX	United States	ADL	Australia	63
LAS	United States	SYD	Australia	60
JFK	United States	PER	Australia	46
JFK	United States	FOC	China	95
LAX	United States	CTU	China	66
LAX	United States	SHE	China	59
LAS	United States	PVG	China	59
LAX	United States	TAO	China	59
ATL	United States	PVG	China	45
LAS	United States	PEK	China	40
BOS	United States	TPE	Chinese Taipei	45
HNL	United States	HKG	Hong Kong, China	67
LAS	United States	HKG	Hong Kong, China	44
LAX	United States	CGK	Indonesia	90
JFK	United States	CGK	Indonesia	63
SFO	United States	CGK	Indonesia	51
JFK	United States	ITM	Japan	110
MCO	United States	NRT	Japan	105
LAX	United States	ITM	Japan	74
LAS	United States	HND	Japan	72
LAX	United States	FUK	Japan	70
KOA	United States	NRT	Japan	53
LAX	United States	NGO	Japan	52
MIA	United States	NRT	Japan	50
CMH	United States	NRT	Japan	41
CMH	United States	NRT	Japan	41
LAX	United States	KUL	Malaysia	50
JFK	United States	KUL	Malaysia	48
JFK	United States	MNL	Philippines	202
IAH	United States	MNL	The Philippines	99
ORD	United States	MNL	The Philippines	58

Origin City	Origin Economy	Destination City	Destination Economy (A-M)	Demand PDEW
MIA	United States	MNL	The Philippines	57
MSY	United States	MNL	The Philippines	47
SEA	United States	MNL	The Philippines	45
IAD	United States	MNL	The Philippines	42
EWR	United States	ICN	Republic of Korea	53
BOS	United States	ICN	Republic of Korea	48
LGA	United States	ICN	Republic of Korea	41
LAX	United States	PUS	Republic of Korea	40
JFK	United States	SGP	Singapore	190
SFO	United States	SGP	Singapore	179
LAX	United States	SGP	Singapore	124
IAH	United States	SGP	Singapore	74
ORD	United States	SGP	Singapore	44
LAX	United States	BKK	Thailand	165
JFK	United States	BKK	Thailand	121
SFO	United States	BKK	Thailand	82
IAD	United States	BKK	Thailand	50
ORD	United States	BKK	Thailand	46
SEA	United States	BKK	Thailand	42
LAX	United States	SGN	Viet Nam	221
SFO	United States	SGN	Viet Nam	162
JFK	United States	SGN	Viet Nam	106
IAD	United States	SGN	Viet Nam	79
IAH	United States	SGN	Viet Nam	69
ORD	United States	SGN	Viet Nam	67
LAX	United States	HAN	Viet Nam	66
BOS	United States	SGN	Viet Nam	51
JFK	United States	HAN	Viet Nam	48
ATL	United States	SGN	Viet Nam	40

Table 8: APEC routes to United States over 39 PDEW with no non-stop service (Source: IATA analysis of Airport IS data).

4.2 Higher-level feasibility considerations

As a way to further define a potentially viable route, IATA used two metrics:

- distance viable for non-stop flight with current technology

- market size

Aircraft range capability has improved considerably over recent years; however, few carriers are keen to operate aircraft to airports over 15,000km apart from one another due to cost reasons. The analysis below eliminates any city pairs separated by more than this distance.

Market size uses the existing OD demand and the application of induction and connection potential rates (unique to each region and route type) to calculate the total 2015 estimated market potential. It then applies the following threshold levels to determine whether a route would be viable:

- For ultra-long-haul routes (over 12,000km), demand in excess of 158 PDEW,
- For long-haul routes (between 4,000km and 12,000km), demand in excess of 130 PDEW, and
- For short-haul routes (under 4,000km) demand in excess of 75 PDEW.

Clearly, it is only when demand is close to the borderline where feasibility judgement really needs to be made. However, for the purpose of this analysis these thresholds have been applied fairly rigorously to establish a clear set of route opportunities.

There are 17 routes that fulfilled the criteria. These are presented in the table below with more details in the next section.

Origin Airport	Origin Economy	Destination Airport	Destination Economy	2015 OD Demand	2015 Estimated Market Potential	Distance viable for non-stop flight with current technology	Market size adequate for non-stop service in the medium term	Potential Route
LAX	United States	BKK	Thailand	165	333	✓	✓	Yes
LAX	United States	SGN	Viet Nam	221	288	✓	✓	Yes
JFK	United States	SIN	Singapore	190	263	×	✓	No
JFK	United States	BKK	Thailand	121	257	✓	✓	Yes
JFK	United States	SYD	Australia	191	256	×	✓	No
SFO	United States	SIN	Singapore	179	250	✓	✓	Yes
JFK	United States	MNL	The Philippines	202	220	✓	✓	Yes
SFO	United States	BKK	Thailand	82	190	✓	✓	Yes
ORD	United States	SGN	Viet Nam	67	189	✓	✓	No
SFO	United States	SGN	Viet Nam	162	188	✓	✓	Yes
LAX	United States	SIN	Singapore	124	184	✓	✓	Yes
ORD	United States	MNL	The Philippines	58	172	✓	✓	No
LAS	United States	NRT	Japan	123	160	✓	✓	Yes
LAX	United States	PER	Australia	74	154	×	✓	No
SFO	United States	MEL	Australia	75	150	✓	✓	Yes
JFK	United States	MEL	Australia	133	149	×	✓	No
JFK	United States	PER	Australia	46	148	✓	×	No
SEA	United States	MNL	The Philippines	45	145	✓	✓	Yes
ORD	United States	SIN	Singapore	44	145	×	✓	No
SEA	United States	BKK	Thailand	42	141	×	✓	No
MCO	United States	NRT	Japan	105	139	✓	✓	Yes
HNL	United States	HKG	Hong Kong, China	67	138	✓	✓	No
LAX	United States	ADL	Australia	63	137	✓	✓	No
LAX	United States	CGK	Indonesia	90	136	✓	×	No
MIA	United States	NRT	Japan	50	135	✓	×	No
JFK	United States	SGN	Viet Nam	106	127	✓	×	No
IAH	United States	SIN	Singapore	74	124	✓	×	No
IAH	United States	MNL	The Philippines	99	121	✓	×	No
LAX	United States	SCL	Chile	77	118	✓	×	No
JFK	United States	BNE	Australia	76	114	×	×	No

Table 9: Summary of high-level route feasibility considerations

4.3 Proposed route analysis

IATA narrowed the above selection to 16 different routes through the US airports of LAX, JFK, SFO, ORD, MCO, SEA and HNL. This section decomposes the route potential and presents a three-year demand forecast for each route.

It also considers route opportunities through three main operational/feasibility criteria:

- air service agreements
- airline network strategies and fleets
- route economics

Additionally, proposed operational aspects of the route are presented, including an indicative start date based on market maturity, a proposed airline to serve the route, type of aircraft to be used, flight frequency, and estimated load factors.

4.3.1 Route #1 LAX-BKK

LAX-BKK 2015 total route potential definition:

				1	2	4	
Origin Airport	**Destination Airport**	**Destination Economy**	**2015 OD Non-direct Demand**	**OD Captured Though Deorect Service**	**OD Stimulation**	**Behind/Beyond Connecting Potential**	**Caculations**
LAX	BKK	Thailand	(A) 165	(B) 80%	(C) 16%	(D) 54%	
				(1) 132	21		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	153		(3) = 1+2
		LAX - BKK Total Market Potential (2015 Base)				(4) **333**	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the LAX-BKK route presents a potential of 333 PDEW for a direct service between the two cities. This potential is forecast to grow to 385 by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
United States - Thailand	LAX-BKK	333	350	367	385

This has been derived by taking the 2015 estimated demand and applying the growth rates from inter- and intra-regional global traffic forecast as published by IATA (IATA).

4.3.2 Route #2 LAX-SGN

LAX-SGN 2015 total route potential definition:

				1	2	4	
Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	OD Captured Though Deorect Service	OD Stimulation	Behind/Beyond Connecting Potential	Caculations
LAX	SGN	Viet Nam	(A) 221	(B) 80%	(C) 12%	(D) 31%	
				(1) 177	21		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	198		(3) = 1+2
		BNE-MNL Total Market Potential (2015 Base)				(4) 288	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the LAX-SGN route presents a potential of 288 PDEW for a direct service between the two cities. This potential is forecast to grow to 333 by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
United States - Viet Nam	LAX-SGN	288	302	317	333

4.3.3 Route #3 JFK-SIN

JFK-SIN 2015 total route potential definition:

				1	2	4	
Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	OD Captured Though Deorect Service	OD Stimulation	Behind/Beyond Connecting Potential	Caculations
JFK	SGP	Singapore	(A) 190	(B) 80%	(C) 14%	(D) 34%	
				(1) 152	21		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	173		(3) = 1+2
		BNE-MNL Total Market Potential (2015 Base)				(4) 263	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the JFK-SIN route presents a market potential of 263 PDEW for a direct service between the two cities. This potential is forecast to grow to 304 by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
United States - Singapore	JFK-SIN	263	276	290	304

4.3.4 Route #4 JFK-BKK

JFK-BKK 2015 total Route potential definition:

				1	2	4	
Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	OD Captured Though Deorect Service	OD Stimulation	Behind/Beyond Connecting Potential	Caculations
JFK	BKK	Thailand	(A) 121	(B) 80%	(C) 22%	(D) 54%	
				(1) 97	21		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	118		(3) = 1+2
		JFK - BKK Total Market Potential (2015 Base)				(4) 257	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the JFK-BKK route presents a market potential of 257 PDEW for a direct service between the two cities. This potential is forecast to grow to 297 PDEW by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
United States - Thailand	JFK-BKK	257	270	284	297

4.3.5 Route #5 SFO-SIN

SFO-SIN 2015 total route potential definition:

				1	2	4	
Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	OD Captured Though Deorect Service	OD Stimulation	Behind/Beyond Connecting Potential	Caculations
SFO	SGP	Singapore	(A) 179	(B) 80%	(C) 14%	(D) 34%	
				(1) 143	20		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	163		(3) = 1+2
		BNE-MNL Total Market Potential (2015 Base)				(4) 248	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the SFO-SIN route presents a market potential of 248 PDEW for a direct service between the two cities. This potential is forecast to grow to 257 PDEW by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
United States - Singapore	SFO-SIN	248	263	276	289

4.3.6 Route #6 JFK-MNL

JFK-MNL 2015 total route potential definition:

				1	2	4	
Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	OD Captured Though Deorect Service	OD Stimulation	Behind/Beyond Connecting Potential	Caculations
JFK	MNL	The Philippines	(A) 202	(B) 80%	(C) 13%	(D) 17%	
				(1) 161	21		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	182		(3) = 1+2
		BNE-MNL Total Market Potential (2015 Base)				(4) 220	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the JFK-MNL route presents a market potential of 220 PDEW for a direct service between the two cities. This potential is forecast grow to 255 PDEW by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
United States – The Philippines	JFK-MNL	220	232	243	255

4.3.7 Route #7 SFO-BKK

SFO-BKK 2015 total route potential definition:

				1	2	4	
Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	OD Captured Though Deorect Service	OD Stimulation	Behind/Beyond Connecting Potential	Caculations
SFO	BKK	Thailand	(A) 82	(B) 80%	(C) 33%	(D) 54%	
				(1) 65	22		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	87		(3) = 1+2
		SFO - BKK Total Market Potential (2015 Base)				(4) 190	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the SFO-BKK route presents a market potential of 190 PDEW for a direct service between the two cities. This potential is forecast to grow to 191 PDEW by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
United States - Thailand	SFO-BKK	190	199	209	219

4.3.8 Route #8 ORD-SGN

ORD-SGN 2015 total route potential definition:

				1	2	4	
Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	OD Captured Though Deorect Service	OD Stimulation	Behind/Beyond Connecting Potential	Caculations
ORD	SGN	Viet Nam	(A) 67	(B) 80%	(C) 41%	(D) 60%	
				(1) 54	22		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	76		(3) = 1+2
		BNE-MNL Total Market Potential (2015 Base)				(4) 189	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the ORD-SGN route presents a market potential of 189 PDEW for a direct service between the two cities. This potential is forecast to grow to 219 PDEW by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
United States - Viet Nam	ORD-SGN	189	199	209	219

4.3.9 Route #9 SFO-SGN

SFO-SGN 2015 total route potential definition:

				1	2	4	
Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	OD Captured Though Deorect Service	OD Stimulation	Behind/Beyond Connecting Potential	Caculations
ORD	SGN	Viet Nam	(A) 67	(B) 80%	(C) 41%	(D) 60%	
				(1) 54	22		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	76		(3) = 1+2
		BNE-MNL Total Market Potential (2015 Base)				(4) 189	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the SFO-SGN route presents a market potential of 188 PDEW for a direct service between the two cities. This potential is forecast to grow to 217 PDEW by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
United States - Viet Nam	SFO-SGN	188	197	207	217

4.3.10 Route #10 LAX-SIN

LAX-SIN 2015 total route potential definition:

				1	2	4	
Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	OD Captured Though Deorect Service	OD Stimulation	Behind/Beyond Connecting Potential	Caculations
LAX	SGP	Singapore	(A) 142	(B) 80%	(C) 21%	(D) 34%	
				(1) 99	21		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	120		(3) = 1+2
		BNE-MNL Total Market Potential (2015 Base)				(4) 184	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the LAX-SIN route presents a market potential of 184 PDEW for a direct service between the two cities. This potential is forecast to grow to 212 PDEW by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
United States - Singapore	LAX-SIN	184	193	203	212

4.3.11 Route #11 ORD-MNL

ORD-MNL 2015 total route potential definition:

				1	2	4	
Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	OD Captured Though Deorect Service	OD Stimulation	Behind/Beyond Connecting Potential	Caculations
ORD	MNL	The Philippines	(A) 58	(B) 80%	(C) 47%	(D) 60%	
				(1) 47	23		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	69		(3) = 1+2
		BNE-MNL Total Market Potential (2015 Base)				(4) 172	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the ORD-MNL route presents a market potential of 172 PDEW for a direct service between the two cities. This potential is forecast to grow to 199 PDEW by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
United States – The Philippines	ORD-MNL	172	181	190	199

4.3.12 Route #12 SFO-MEL

SFO-MEL 2015 total route potential definition:

				1	2	4	
Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	OD Captured Though Deorect Service	OD Stimulation	Behind/Beyond Connecting Potential	Caculations
SFO	MEL	Australia	(A) 78	(B) 80%	(C) 36%	(D) 45%	
				(1) 60	22		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	82		(3) = 1+2
		SFO - MEL Total Market Potential (2015 Base)				(4) **150**	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the SFO-MEL route presents a market potential of 150 PDEW for a direct service between the two cities. This potential is forecast grow to 174 PDEW by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
United States - Australia	SFO-MEL	150	158	166	174

4.3.13 Route #13 SEA-MNL

SEA-MNL 2015 total route potential definition:

				1	2	4	
Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	OD Captured Though Deorect Service	OD Stimulation	Behind/Beyond Connecting Potential	Caculations
SEA	MNL	The Philippines	(A) 45	(B) 80%	(C) 62%	(D) 60%	
				(1) 36	23		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	58		(3) = 1+2
		BNE-MNL Total Market Potential (2015 Base)				(4) **146**	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the SEA-MNL route presents a market potential of 146 PDEW for a direct service between the two cities. This potential is forecast to grow to 174 PDEW by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
United States – The Philippines	SEA-MNL	146	154	161	169

4.3.14 Route #14 MCO-NRT

MCO-NRT 2015 total route potential definition:

				1	2	4	
Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	OD Captured Though Deorect Service	OD Stimulation	Behind/Beyond Connecting Potential	Caculations
MCO	NRT	Japan	(A) 105	(B) 80%	(C) 16%	(D) 30%	
				(1) 84	14		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	97		(3) = 1+2
		MCO - NRT Total Market Potential (2015 Base)				(4) 139	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the MCO-NRT route presents a market potential of 139 PDEW for a direct service between the two cities. This potential is forecast to grow to 161 PDEW by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
United States – Japan	MCO-NRT	139	146	154	161

4.3.15 Route #15 HNL-HKG

HNL-HKG 2015 total route potential definition:

				1	2	4	
Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	OD Captured Though Deorect Service	OD Stimulation	Behind/Beyond Connecting Potential	Caculations
HNL	HKG	Hong Kong, China	(A) 67	(B) 80%	(C) 56%	(D) 39%	
				(1) 54	31		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	84		(3) = 1+2
		BNE-MNL Total Market Potential (2015 Base)				(4) 138	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the HNL-HKG route presents a market potential of 138 PDEW for a direct service between the two cities. This potential is forecast to grow to 160 PDEW by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
United States - Hong Kong, China	HNL-HKG	138	145	152	160

4.3.16 Route #16 LAX-ADL

LAX-ADL 2015 total route potential definition:

				1	2	4	
Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	OD Captured Though Deorect Service	OD Stimulation	Behind/Beyond Connecting Potential	Caculations
LAX	ADL	Australia	(A) 63	(B) 80%	(C) 44%	(D) 47%	
				(1) 51	22		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	73		(3) = 1+2
		LAX - ADL Total Market Potential (2015 Base)				(4) 137	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the LAX-ADL route presents a market potential of 137 PDEW for a direct service between the two cities. This potential is forecast to grow to 159 PDEW by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
United States - Australia	LAX-ADL	137	144	151	159

4.3.17 Route #17 LAS-NRT

LAS-NRT 2015 total route potential definition:

				1	2	4	
Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	OD Captured Though Deorect Service	OD Stimulation	Behind/Beyond Connecting Potential	Caculations
LAS	NRT	Japan	(A) 123	(B) 80%	(C) 14%	(D) 30%	
				(1) 98	14		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	112		(3) = 1+2
		LAS - NRT Total Market Potential (2015 Base)				(4) 160	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the LAS-NRT route presents a market potential of 160 PDEW for a direct service between the two cities. This potential is forecast to grow to 185 PDEW by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
United States - Japan	LAS-NRT	160	168	176	185

4.4 Proposed scheduled operations

4.4.1 Potential airline operators

A number of major airlines are based in the United States, including the three major groupings: American, Delta and United. In addition, Southwest Airlines, JetBlue Airways, Alaska Airlines, Spirit Airlines, Frontier Airlines and Hawaiian Airlines provide major carrier activity, along with a number of regional carriers also based in the United States offering domestic services to smaller locations.

AA: American Airlines

American Airlines, Inc. is the largest airline in the world by fleet size and revenue. It operates its largest hub at DFW, and its other hubs at CLT, ORD, LAX, MIA, JFK, LGA, PHL, PHX, and DCA. It is a founding member of the Oneworld airline alliance. In addition, American has a significant presence in ATL, BOS, LHR, RDU, SAT, and SFO.

International APEC destinations include China; Hong Kong, China; Japan; and Korea.

DL: Delta Air Lines

Delta Air Lines, Inc. has its headquarters and largest hub at ATL in Atlanta, Georgia. The airline, along with its subsidiaries, operates an extensive domestic and international network. It is one of the four founding members of the SkyTeam airline alliance and operates joint ventures with Air France-KLM and Alitalia, Virgin Atlantic, and Virgin Australia. Regional service is operated under the brand name Delta Connection.

Internationally within the APEC region it operates extensively to Japan and to a lesser extent to China; Hong Kong, China; and Korea.

UA: United Airlines

United Airlines, Inc. is headquartered in Chicago. It has a comprehensive domestic and international route network. United is a founding member of Star Alliance, the world's first and largest global airline alliance. It operates out of seven base hubs located in IAH, ORD, EWR, DEN, SFO, IAD and LAX. It also operates bases in GUM and NRT in the Pacific region.

Internationally, within APEC it operates extensively to Australia; China; Hong Kong, China; Japan; Korea; the Philippines; and Chinese Taipei.

HA: Hawaiian Airlines

Hawaiian Airlines is the largest airline in Hawaii and is based in Honolulu. The airline operates its main hub at HNL and a secondary hub out of OGG on the island of Maui. Hawaiian Airlines operates numerous flights to the United States mainland but also a strong network of services in APEC, including several routes to Australia; China; Japan; and Korea.

Other Airlines

There are several other large and significant carriers in the United States, including Southwest Airlines, JetBlue Airways, Alaska Airlines, Spirit Airlines, Frontier Airlines and Allegiant Air, but none operate Trans Pacific services.

There are several international carriers with appropriate fleets and scale of operation that could also operate the identified routes including:

- CX: Cathay Pacific Airways
- JL: Japan Airlines
- NH: All Nippon Airways
- PR: Philippine Airlines
- QF: Qantas Airways
- VA: Virgin Australia
- TG: Thai Airlines
- SQ: Singapore Airlines
- VN: Vietnam Airlines

4.4.2 Route #1 LAX-BKK

LAX-BKK is an ultra-long-haul route (approx. 13,300km) which would need to be served by a wide-body aircraft capable of operating this distance, such as Boeing 787 and Airbus A350.

Thai Airways can be the potential operator for this route due to the fact that connecting rates are higher for passengers travelling to/from North America in BKK than the connecting rates seen in LAX.

Considering the 2017 estimated demand, the route can be operated by Thai Airways utilizing the A350-900 aircraft with 10 flights a week. The load factor is estimated to be around 80%:

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency per week	Number of Pax per Flight	Load Factor
BKK-LAX	2017	Thai Airways	A350-900	321	10	257	80%

Operating conditions such as prevailing wind may affect the aircraft performance, and the aircraft payload on certain direction may need to be restricted.

In terms of air service agreements, IATA does not foresee any road block for this route to be operated based on the current high-level policies in place in Thailand and the United States. This point should

however be further validated based on the official bilateral agreements in place (not available for consultation to IATA).

4.4.3 Route #2 LAX-SGN

SGN is the largest airport in Viet Nam serving Ho Chi Minh City. Along with HAN, SGN is one of the two major operating bases of Viet Nam. The route LAX-SGN has a range of 13,116km and similar to BKK, SGN has an estimated 16 hours' block time which would require B787 or A350. Vietnam Airlines has recently acquired the B787-9 aircraft which would also be capable of operating this route.

The high demand on the LAX-SGN route will allow Vietnam Airlines to operate 11-weekly service with a B787-9 aircraft. The load factor is estimated to be 74%.

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency per week	Number of Pax per Flight	Load Factor
SGN-LAX	2017	Vietnam Airlines	B787-9	274	11	202	74%

Operating conditions such as prevailing wind may affect the performance of the aircraft, and payload may be restricted in certain direction.

4.4.4 Route #3 JFK-SIN

SIN is the major international hub for Singapore. It is the principal hub for both Singapore Airlines and its low-cost subsidiary Scoot. The route JFK-SIN has a range of 15,348km and would become the world's longest route. It would have an estimated 18:40 hours' block time.

In 2004, the route which involved SIN-EWR was operated by Singapore Airlines using an A340-500 aircraft. However, in 2013 it ceased operations. The carrier still operates SIN-JFK but stops via Frankfurt.

Based on projected demand in 2018 of 304 PDEW, the route would suit an A350-900 (305 seats) operated on a daily basis. This would give the high load factors of above 90% for the projected route. The route would not support a double daily frequency for several years.

Most recently, Singapore Airlines announced that the route will be returned in 2018, using a new technology A350-900 Ultra Long Range aircraft (305 seats).

4.4.5 Route #4 JFK-BKK

JFK-BKK is an ultra-long-haul route (about 13,900km) which would need to be served by a specific wide-body aircraft capable of operating this distance.

Delta Air Lines is suggested as the operator for this route due to the fact that connecting rates are higher for passengers travelling to/from Southeast Asia in JFK than the connecting rates seen in BKK.

Delta was also selected due to its use of the 777-200 LR which is one of the few aircrafts operated by a US carrier which could serve this distance.

Considering the 2016 estimated demand, a daily service could be operated as from inception, making the route particularly attractive.

The proposed service would therefore allow for an 85% average load factor, as illustrated below:

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency per week	Number of Pax per Flight	Load Factor
BKK-JFK	Now	Delta Airlines	Boeing 777-200	291	7	248	85%

Operating conditions such as prevailing wind may affect the aircraft performance, and the aircraft payload on certain direction may need to be restricted.

4.4.6 Route #5 SFO-SIN

SFO is the largest airport in the San Francisco Bay Area including all of Northern California, and the second busiest in California, (after LAX). It is owned operated by the City and County of San Francisco with two sets of twin-parallel runways and four terminals.

It is the fifth largest hub for United Airlines operating as their primary transpacific gateway. It also serves as Virgin America's principal base of operations. Trans Pacific carriers include EVA Air and Cathay Pacific.

The route SFO-SIN has a range of 13,593km with an estimated 16:35 hours' block time. SFO is an important hub for United Airlines.

United Airlines had commenced the daily SIN-SFO route in June 2016 using a B787-9 aircraft.

4.4.7 Route #6 JFK-MNL

JFK-MNL is an ultra-long-haul route (approximately 13,700km) which would need to be served by a wide-body aircraft capable of operating this distance such as a Boeing 777, Boeing 787, or Airbus A350.

Delta Air Lines was chosen based on higher rates of connection on routes to/from Southeast Asia through JFK than the connecting rates to North America in MNL. Delta is the only carrier which has a hub in either of the city pairs with an aircraft capable of operating this distance. The 777-200 LR would be needed on a segment of this distance. Currently Delta offers a one-stop service on this route (stopping in NRT).

Considering the 2016 estimated demand, a daily service could be operated as from inception. The proposed service would therefore allow for up to an 86% average load factor, as illustrated below:

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Flight Frequency per week	Number of Pax per Flight	Load Factor
MNL-JFK	Now	Delta Airlines	Boeing 777-200	270	7	232	86%

4.4.8 Route #7 SFO-BKK

BKK-SFO is an ultra-long-haul route (about 12,700km) which would need to be served by a specific wide-body aircraft capable of operating this distance.

Thai Airways is suggested as the operator for this route due to the fact that connecting rates are higher in BKK for passengers travelling to/from North America (54%) than the connecting rates seen for passengers in SFO travelling to/from Southeast Asia (20%).

Considering the 2017 estimated demand, service of 6 times weekly could be operated from inception.

The proposed service would therefore allow for an estimated 76% load factor, as illustrated below:

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency per week	Number of Pax per Flight	Load Factor
BKK-SFO	2017	Thai Airways	A350-900	321	6	244	76%

Similar to the Los Angeles and New York services, the operating conditions such as prevailing wind may affect the aircraft performance, and the aircraft payload on certain direction may need to be restricted.

4.4.9 Route #8 ORD-SGN

The route ORD-SGN has a range of 13,973km with an estimated 17 hours' block time. Very few aircrafts are able to cover this range at present and the best candidate for this route is American Airlines with the B777-300ER aircraft.

Based on projected demand in 2017 of 209 PDEW, the route operated on a daily basis with the B777-300ER (260 seats). This would give the attractive load factors of above 80% for the projected route.

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency per week	Number of Pax per Flight	Load Factor
SGN-ORD	2017	American Airlines	B777-300ER	260	7	209	80%

The operating conditions such as prevailing wind may affect the aircraft performance, and the aircraft payload on certain direction may need to be restricted.

4.4.10 Route #9 SFO-SGN

The route SFO-SGN has a range of 12,614km with an estimated 15 hours 20 minutes' block time. Likely aircraft for this route include B787 or A350 aircraft.

Based on the projected demand in 2017 of 207 PDEW, the route would suit Vietnam Airlines' B787-9 (274 seats) operated on a daily basis. The load factor is estimated to be around 76%.

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency per week	Number of Pax per Flight	Load Factor
SGN-SFO	2017	Vietnam Airlines	B787-9	274	7	207	76%

Operating conditions such as prevailing wind may affect the performance of the aircraft and payload may be restricted in certain direction.

4.4.11 Route #10 LAX-SIN

LAX is the largest and busiest airport in the Greater Los Angeles Area and the state of California. It is owned and operated by Los Angeles World Airports, an agency of the Los Angeles city government. It has four parallel runways.

It serves as a hub for American Airlines, Delta Air Lines, United Airlines, Alaska Airlines, and Virgin America. It is also a focus city for Allegiant Air, Southwest Airlines and Spirit Airlines and is also important for international carriers Cathay Pacific, Air New Zealand, Qantas and EVA Air. The airport is a major gateway to and from Europe, Latin America, Asia and Oceania.

The route SIN-LAX has a range of 14,113km with an estimated 17 hours 10 minutes' block time. Likely aircrafts for this ultra-long route include B787 or A350 aircraft.

Singapore Airlines announced the SIN-LAX route will be resumed once they have taken delivery of the A350-900ULR in 2018.

4.4.12 Route #11 ORD-MNL

MNL-ORD is an ultra-long-haul route (approximately 13,100km) which would need to be served by a particular wide-body aircraft capable of operating this distance.

United Airlines was chosen based on higher rates of connection on routes to/from Southeast Asia through ORD than the connecting rates to North America in MNL. The Boeing 787 would provide the necessary range and an adequate capacity to serve this route.

Considering the 2016 estimated demand, six times per week service could be operated as from inception. The proposed service would therefore allow for up to an 83% average load factor, as illustrated below:

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Flight Frequency per week	Number of Pax per Flight	Load Factor
MNL-ORD	Now	United Airlines	Boeing 787-8	255	6	211	83%

4.4.13 Route #12 SFO-MEL

The SFO-MEL route could be served by United as it has an operational presence in both cities and hub presence in SFO. Current flights to/from Australasia through SFO have high rates of connection at approximately 45%.

In terms of fleet, United has started taken delivery of B787-9. This aircraft would provide the optimal operational capacity for this route taking into consideration the length between the two cities (12,600km).

Considering the estimated market potential of 158 PDEW in 2016, the service could start as five times per week and provide an adequate load factor on the route. The proposed service would operate at an estimated average load factor of 80 % as illustrated below:

Proposed Route	Proposed Minimum Opening Date	Proposed Airline	Proposed Aircraft	# of Seats	Proposed Frequencies per week	Number of Pax per Flight	Load Factor
MEL-SFO	Oct-16	United Airlines	Boeing 787-9	255	5	203	80%

4.4.14 Route #13 SEA-MNL

SEA-MNL is a long-haul route (approximately 10,700km) which would need to be served by a wide-body aircraft.

Delta Air Lines was chosen based on its hub presence in Seattle and higher rates of connection on routes to/from Southeast Asia through SEA than the connecting rates to North America in MNL. SEA is a strategic location for beyond/behind connections on Asian flights to other parts of the USA new international terminal will be built in Seattle in the coming years increasing capacity for additional routes such as MNL-SEA.

Considering the 2016 estimated demand, a four-weekly service could be operated as from inception. The proposed service could therefore allow for up to a 92% average load factor, as illustrated below:

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Flight Frequency per week	Number of Pax per Flight	Load Factor
MNL-SEA	Now	Delta Airlines	Airbus A330-300	293	4	269	92%

4.4.15 Route #14 MCO-NRT

The MCO-NRT route is primarily leisure oriented. It is likely to be opened by airlines in Japan to capture the connections from Asia. A possible candidate is Japan Airlines using its B787-8 aircraft with a seat capacity of 186 seats. Running a daily service, it is estimated the load factor will be a healthy 83%:

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency per week	Number of Pax per Flight	Load Factor
NRT-MCO	2017	Japan Airlines	B787-8	186	7	154	83%

4.4.16 Route #15 HNL-HKG

The route HNL-HKG has a range of 8,669km with an estimated 11 hours' block time. Hawaiian Airlines will take delivery of their newly ordered A330-800neo aircraft by 2018 and the range and capacity of the aircraft is suitable for the HKG-HNL route. By starting off with a 5-weekly service, the load factor is estimated to be a healthy 87%.

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency per week	Number of Pax per Flight	Load Factor
HKG-HNL	2018	Hawaiian Airlines	A330-800neo	257	5	224	87%

Such route can also be considered by other Hong Kong, China based airlines.

4.4.17 Route #16 LAX-ADL

Leveraging on its hub presence in LAX, Delta Air Lines could be a good candidate for operating this route, as it would provide strong beyond and behind connections to the US and Canada. Current average connecting rate for flights to and from Australasia through LAX is approximately 47%.

The 777-200LR, with a maximum range of 17,600km, is the only aircraft operated by Delta which is capable of serving a route of this distance (13,200km).

Considering the estimated demand in 2016 (144 PDEW), four frequencies per week could be operated in the beginning.

The proposed service would operate at a strong estimated average load factor of 87% as illustrated below:

Proposed Route	Proposed Minimum Opening Date	Proposed Airline	Proposed Aircraft	# of Seats	Proposed Frequencies per week	Number of Pax per Flight	Load Factor
ADL-LAX	Oct-16	Delta Airlines	Boeing 777-200	291	4	252	87%

A fifth frequency could be added in the successive year, considering the high load factor and the size of the demand foreseen for 2017 (151 PDEW).

4.4.18 Route #17 LAS-NRT

The LAS-NRT route is likely to be opened by Japanese airlines to capture the connections from Asia. It could be considered by ANA using the 215 seats B787-9 aircraft. Considering the estimated market potential of 176 PDEW in 2017, the new service could start with a daily service and operate at an estimated average load factor of 82% as illustrated below:

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency per week	Number of Pax per Flight	Load Factor
NRT-LAS	2017	ANA	B787-9	215	7	176	82%

5. Conclusions and opportunities

In addition to the development of new air services in the medium term, other opportunities for air service development such as connectivity improvement, route frequency increases, and long-term developments are also presented.

5.1 Connectivity improvement

This section identifies poorly connected markets that could be better served by improved connecting times, hence granting additional access to already existing yet less accessible connecting markets.

IATA examined flights operating to and from three of the main hubs on the US West Coast, namely LAX, SFO and SEA for this analysis. A small selection of improvements can be identified based on optimal connecting time-related considerations. Below is a summary of the potential optimizations:

LAX – Los Angeles

- Air New Zealand flight 1 currently departs LAX for AKL at 21:30: delaying the departure time by 15 minutes to 21:45 would enable more than 15 additional connections from the US domestic destinations like PHL, IAH, BOS, ORD, ATL, LAS, DFW, AUS, as well as from MEX and CUN.
- Virgin Australia flight 2 currently departing LAX for SYD at 22:35: delaying the departure time by 15 minutes would enable more than 10 additional connections of flights arriving from domestic the US airports, including IAH, SJC, JFK, BOS, DAL, ATL, SMF, RNO and SLC.

- All Nippon Airways flight 5 currently leaving LAX for NRT at 12:45: delaying the departure time by 15 minutes would enable 13 more connections from the US domestic airports (PHX, ORD, JFK, CVG, SFO, and IAD) and from Mexico (MEX, GDL, MTY).
- Korean Airlines flight 12 currently departing LAX for ICN at 23:30: Delaying the departure time by 15 minutes to 23:45 would enable seven more connections from the US domestic airports: DTW, EWR, RDU, DTW, OAK and LAS.
- American Airlines flight 183 leaving LAX for PVG at 11:20: delaying the departure time by 15 minutes would enable connections from DEN, DFW, CLT, JFK, MCO, SJC, SAN, DEN, DAL and MLM.

SFO – San Francisco

- All Nippon Airways flight 7 currently leaving SFO for NRT at 12:20: delaying the departure time by 15 minute would enable six more connections from JFK, PHL, ORD, BOS, SAN and YVR.
- Air New Zealand flight 7 currently departs SFO for AKL at 21:45: delaying the departure time by 15 minutes to 22:00 would enable more connections from the US domestic destinations (LAS, IAH, MIA, ATL, DFW, DEN, JFK, BUR) as well as from CUN (Mexico).
- United Airlines flight 35 currently departing SFO for KIX at 11:35: delaying the departure time by 15 minutes would enable more connections of flights arriving from the US domestic airports (IAD, FAT, EWR and PHX).
- Philippine Airlines flight 105 currently departing SFO for MNL at 23:30: delaying the departure time by 15 minutes to 23:45 would enable more connections from the US domestic airports: CLT, BUR, MSP, EWR, IAD, FLL, IAH, JFK and LAS.

SEA – Seattle

- Delta Air Lines flight 167 currently leaving SEA for NRT at 12:53: delaying the departure time by 15 minutes would enable six more connections from SMF, OAK, BLI, DFW, GEG and EAT.
- Delta Airlines flight 199 currently departs SEA for ICN at 12:08: delaying the departure time by 15 minutes to 12:23 would enable more connections from the US domestic destinations (DTW, MSP, MDW, DEN, EWR and SNA).
- Hainan Airlines flight 496 currently departing SEA for PEK at 14:00: delaying the departure time by 15 minutes would enable more connections of flights arriving from PSP, GEG, IAH, BNA, DEN, and YYC.

5.2 Route frequency increase

IATA considered all of the international non-stop routes from the United States to determine whether the current non-stop supply adequately matches the demand. Numerous city pairs from the United States with inadequate non-stop service were identified.

Due to the fact that most aircrafts only fly at an average 80% load factor, the ideal demand-to-supply ratio should be under 85%. All of the identified routes in the table below have demand-to-supply ratios of greater than 85%.

Origin Airport	Origin Economy	Destination Airport	Destination Economy	2015 OD Demand (PDEW)	Non-stop Seats in 2015 (SDEW)	Demand Excess over Supply (PDEW)	Ratio of Demand to non-Stop Supply
BOS	United States	PVG	China	134	49	85	274%
BOS	United States	PEK	China	217	167	51	130%
SPN	United States	PEK	China	174	143	31	122%
HNL	United States	MEL	Australia	149	135	14	110%
SPN	United States	PVG	China	159	153	6	104%
LAX	United States	MNL	The Philippines	493	490	3	101%
BOS	United States	HKG	Hong Kong, China	106	105	0	100%
HNL	United States	TPE	Chinese Taipei	78	86	-8	90%

Table 10: List of selected routes with potential for frequency increase

5.3 Long-term new route opportunities

As economic growth is expected to continue within the United States and other APEC destinations, many routes identified in section 4 are expected to become viable in the longer term:

#	Origin		Destination		2015 Demand		Feasibility		Potential Route in the long term
	Airport	Econ	Airport	Economy	OD	Estimated Market Potential	Distance	Market size in the long term	
1	LAX	US	CGK	Indonesia	90	136	✓	✓	Yes
2	MIA	US	NRT	Japan	50	135	✓	✓	Yes
3	JFK	US	SGN	Viet Nam	106	127	✓	✓	Yes
4	IAH	US	SIN	Singapore	74	124	✓	✓	Yes
5	IAH	US	MNL	The Philippines	99	121	✓	✓	Yes
6	LAX	US	HAN	Viet Nam	66	108	✓	✓	Yes
7	LAS	US	HKG	Hong Kong, China	44	107	✓	✓	Yes
8	JFK	US	FOC	People's Republic of China	95	107	✓	✓	Yes
9	LAS	US	SYD	Australia	60	103	✓	✓	Yes
10	JFK	US	ITM	Japan	110	101	✓	✓	Yes
11	IAD	US	SGN	Viet Nam	79	101	✓	✓	Yes

Table 11: Long-term route opportunities

Other city pairings that currently present a viable market potential while being too distant to be operated, considering the existing technology, could also become operational in the longer term when aircraft will be able to cover longer ranges:

#	Origin		Destination		2015 Demand		Feasibility		Potential Route in the future
	Airport	Economy	Airport	Economy	OD	Estimated Market Potential	Distance with technology evolution	Market size	
1	JFK	US	SYD	Australia	191	256	✓	✓	Yes
2	LAX	US	PER	Australia	74	154	✓	✓	Yes
3	JFK	US	MEL	Australia	133	149	✓	✓	Yes
4	JFK	US	PER	Australia	46	148	✓	✓	Yes
5	ORD	US	SIN	Singapore	44	145	✓	✓	Yes

Table 12: Long term route opportunities

5.4 Development of aircraft technology

The latest aircraft available on the market, Airbus' A350-900 and Boeing B787-9, are capable of flying ultra-long-haul routes. The technical capabilities of these aircrafts will allow new direct routes to be operated between APEC economies across the Pacific. The following maps illustrate the range limit[1] of the A350-900 and B787-9:

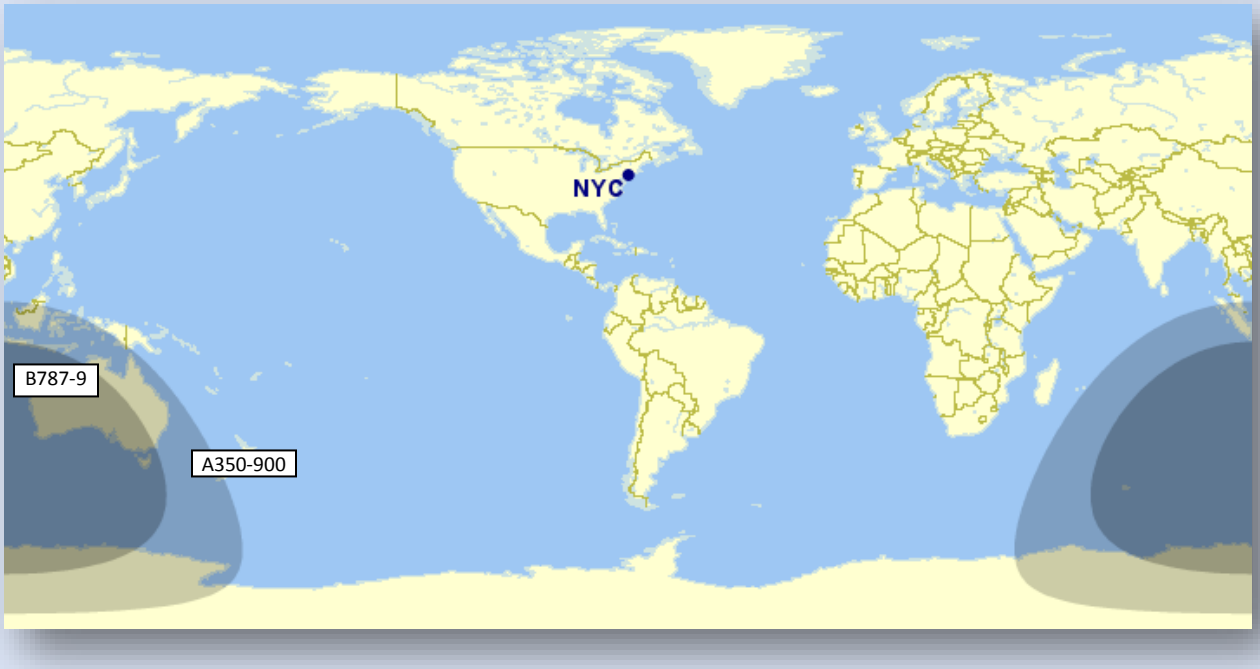

Figure 6: Range limit for the latest generation of aircraft from New York (Source: GCMap)

[1] For illustration only. Based on published range for the base model of each aircraft type. Specific operating conditions may affect the range of the aircraft.

Figure 7: Range limit for the latest generation of aircraft from Los Angeles (Source: GCMap)

6. Recommendations to improve air connectivity

The various recommendations to improve feasibility both generically and specifically for each APEC member economy are presented in this section.

6.1 Generic recommendations

This chapter provides recommendations applicable to all economies, such as greater liberalization of air routes by allowing more access and the elimination of curfews and operational restrictions.

- Continue to liberalize the air services market to other APEC economies, allowing the fullest access to the United States airports while ensuring all the requirements relating to safety, security, and passenger facilitations are met.
- Encourage airlines to explore the opportunities on the ultra-long-haul market when they take delivery of new generation of long-haul aircraft.

6.2 Specific recommendations

- Continue to ensure that sufficient long-term planning is in place for major international airports to cater to long-term traffic growth.

- Closely work with the airline industry to enhance sustainability and profitability of the industry such as providing marketing support and route development incentives.

6.3 How the APEC economy's regulator can help

- Work closely with different stakeholders - for example Tourism agencies, the United States Chamber of Commerce etc. - to gain a deeper understanding of the development of aviation demand.
- Ensure that the major international airports have an adequate investment and improvement program to cater to future traffic demand.
- Explore the possibility of relaxing visa requirements for business and leisure travelers to generate demand.

7. Appendix

7.1 Overview of IATA and IATA Consulting

7.1.1 IATA

IATA – The International Air Transport Association was founded in 1945 as the prime vehicle for inter-airline cooperation in promoting safe, reliable, secure and economical air service for the benefit of the world's consumers. IATA is fully committed to supporting the commercial aviation industry's stakeholders and governments in their efforts to achieve profitability and long-term viability.

IATA's mission:

- To represent, lead and serve the airline industry.

IATA's vision:

- To be the force for value creation and innovation, driving a safe, secure and profitable air transport industry that sustainably connects and enriches our world.

IATA in numbers:

- 250+ member airlines
- 83% of total air traffic
- $387B processed by IATA financial systems
- 1,400+ employees
- 54 offices in 53 countries

7.1.2 IATA Consulting

IATA Consulting overview

IATA Consulting has comprehensive experience in the full array of business challenges facing the aviation sector. Serving the airline industry for 70 years, IATA has developed unrivalled practical experience, which we bring forth to provide the best solutions to our clients.

With our depth and breadth of aviation industry experience, we assist clients to maximize the value of their operating model, realize growth ambitions and gain insights that translate into sustainable competitive advantages.

IATA Consulting has expertise in the following areas:

SAFETY & FLIGHT OPERATIONS

Solutions for aviation organizations and airlines to improve safety, efficiency and air transport management.

ENVIRONMENT & ECONOMICS

Solutions for fulfilling the vision of a safer, more competitive and sustainable aviation industry.

AIRLINES

Solutions to achieve real and lasting results in every aspect of airline commercial and operational management.

AIRPORTS, PASSENGERS & SECURITY

Solutions to plan your airport efficiently to avoid costly mistakes and profit from untapped opportunities.

GROUND HANDLING & CARGO

Solutions to optimize your operations and improve your safety and security while reducing costs.

Our Clients

IATA Consulting has successfully demonstrated its capabilities by providing airlines, airports, tourism offices and other organizations with accurate, unbiased and reliable high quality information and analysis to help them define and understand their markets, while ensuring their long-term facility development and financial success.

IATA is trusted by multiple clients all over the world including airlines, airports, governments and aviation institutions.

Why IATA Consulting was chosen for this project

IATA has, over time, recruited and retained some of the most highly experienced and capable aviation consulting resources within the aviation industry. Due to its position at the heart of the industry, IATA has access to exceptionally skilled and informed subject matter experts and specialists. IATA Consulting's objective is to make a positive difference in its clients' performance, while delivering quality services to all industry stakeholders.

IATA Consulting provides its customers with vast knowledge and expertise in all sectors of the industry worldwide. Our approach has been finely tuned to leverage IATA's global presence and industry thought leadership position in the development of tailored solutions that fit with local cultural considerations and embody international best practices. Our consultants rely on international state-of-the-art standards, unmatched access to data, and products and expert resources to provide cost-efficient and highly informed solutions.

IATA is backed by a robust set of decision support tools, Airport IS and Pax IS have been essential to undertake this study.

Airport IS and **Pax IS** are the most comprehensive aviation databases available in the marketplace, capturing 100% of traffic around the world and bringing together total market supply and demand under a single platform. The data provided is accurate and reliable as it is captured through IATA's Billing and Settlement Plan (BSP).

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Head Office Canada:
800 Place Victoria, PO Box 113
Montreal H4Z 1M1, Quebec,
Canada

www.iata.org/consulting

For
Asia-Pacific Economic Cooperation Secretariat
35 Heng Mui Keng Terrace
Singapore 119616
Tel: (65) 68919 600
Fax: (65) 68919 690
Email: info@apec.org
Website: www.apec.org

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