Asia-Pacific Economic Cooperation

Develop Air Connectivity in the APEC Region

HONG KONG, CHINA

Tourism Working Group | October 2016

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Asia-Pacific Economic Cooperation

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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 traveling through a hub to/from a particular region.

Induction/Stimulation – Initial spike in passenger demand when 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, between Americas and Asia Pacific particularly. 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 connection between flights at the main hubs linking the APEC economies; and,
3. Determine which APEC market-pairs could benefit from the introduction of new aircraft with an extended range.

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.

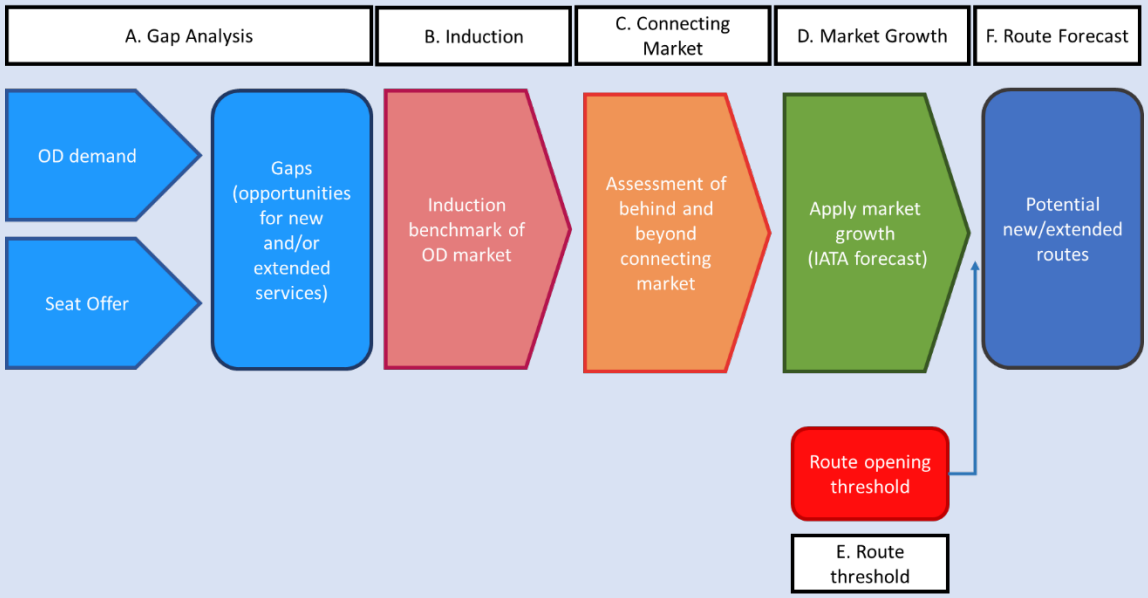

Figure 1: Process used to complete analytical work

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.

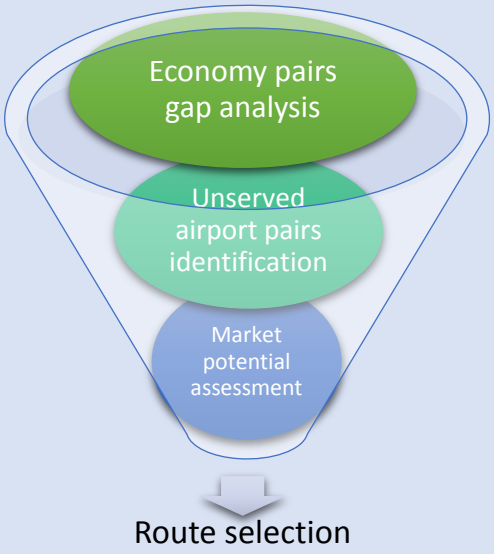

Figure 2: Funnel approach used to conduct analysis

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

As an example, this analysis showed that there was an average daily demand of 1,067 Passengers Daily Each Way (PDEW) in 2015 that fly via existing connecting routings between Hong Kong, China and the United States while an average of 5,027 direct (on non-stop service) seats were offered daily each way.

When extending the analysis down to the city pairs it was possible to identify the largest unserved market between the two economies: 67 Passengers Daily Each Way (PDEW) travelled between HKG and HNL in 2015.

The top 20 unserved routes for Hong Kong, China 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)
HKG	Hong Kong, China	HNL	United States	67	0	0
HKG	Hong Kong, China	YYC	Canada	48	0	0
HKG	Hong Kong, China	YUL	Canada	48	0	0
HKG	Hong Kong, China	LAS	United States	44	0	0
HKG	Hong Kong, China	MIA	United States	37	0	0
HKG	Hong Kong, China	KNO	Indonesia	36	0	0
HKG	Hong Kong, China	DVO	The Philippines	35	0	0
HKG	Hong Kong, China	KCH	Malaysia	34	0	107
HKG	Hong Kong, China	ATL	United States	34	0	11
HKG	Hong Kong, China	BUF	United States	32	0	0
HKG	Hong Kong, China	CHC	New Zealand	31	0	0
HKG	Hong Kong, China	DCA	United States	31	0	154
HKG	Hong Kong, China	SRG	Indonesia	30	0	0
HKG	Hong Kong, China	IAH	United States	29	0	0
HKG	Hong Kong, China	JOG	Indonesia	27	0	0
HKG	Hong Kong, China	IAD	United States	27	0	0
HKG	Hong Kong, China	MEX	Mexico	23	0	0
HKG	Hong Kong, China	YEG	Canada	23	0	0
HKG	Hong Kong, China	LGK	Malaysia	20	0	0
HKG	Hong Kong, China	HRB	China	20	0	35

Table 1: Top 20 unserved routes from Hong Kong, China, 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 by 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 Hong Kong, China. 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%	
Within Asia	157%	63%	32%
Asia - South East Asia	150%	56%	
Asia - North East Asia	135%	55%	28%
Australasia - Asia	117%	48%	24%

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 main hub in Hong Kong, China were estimated based on traffic from various APEC regions flying through HKG.

	HKG
North America	38.90%
Australasia	50.30%
Asia	21.70%
South East Asia	23.70%
China	26.60%
North Asia	17.40%
Russia	20.40%

Table 3: Average rate of connecting passengers at the hub airport in Hong Kong, China

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 Thailand between 2016 and 2018. Growth was typically seen to be around 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 service to be offered. Distance considers the feasibility of offering a non-stop flight with existing technology, using 15,000km as a maximum distance. 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 HKG-HNL 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**
HKG	HNL	The United States	(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)

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

3. Hong Kong, China

A summary of Hong Kong, China and its economy and demographics, aviation demand, and airport specific information is presented in this section.

3.1 Economy and demographics

Previously occupied by the United Kingdom, Hong Kong, China became the Hong Kong Special Administrative Region of the People's Republic of China on 1 July 1997. It lies in Eastern Asia, bordering the South China Sea and China.

3.1.1 Demographics

HKC's population was estimated at 7,324,300 at the end of 2015. It is one of the most densely populated places in the world with a land population density of 6,760 persons per square kilometre as of 2015 (Census and Statistics Department, 2016). According to World Bank (2015), 100% of the population is urbanised.

Approximately 52.2% of the population is distributed in the New Territories area (including marine), 30.3% in the Kowloon area, and 17.5% in the Hong Kong Island area (Census and Statistics Department, 2014). HKC's population is expected to reach the peak of 8.22 million in mid-2043 (at an average annual growth rate of 0.4%), and then gradually decline to 7.81 million in mid-2064 (at an average annual rate of decrease of 0.2%) (Census and Statistics Department, 2015).

3.1.2 Economy

HKC is the most service-oriented economy with the services sector accounting for more than 90% of its Gross Domestic Product. It is an important banking and financial centre within the Asia-Pacific region with 199 authorised institutions and 64 representative offices located in HKC. The economy grew at 2.4% in real terms in 2015 compared to 2.6% in 2014. It is expected to grow between 1-2% in 2016 (HKTDC, 2016).

The spill over effect of China's economic slowdown is sizeable. According to World Bank (2015), one percentage point decline in growth in China will result in a -1 percentage point decline in growth in HKC.

HKC's major top 5 trading partners (% of total trade) include China (51.2%), the United States (7.2%), Japan (5%), Chinese Taipei (4.4%) and Singapore (4.0%). Imports mainly come from China (49%), followed by Chinese Taipei (6.8%), Japan (6.4%) and Singapore (6.1%). HKC's open door policy has enabled it to become one of the largest trading economies in the world. HKC's free trade policy induces high volumes of import and export traffic in and out of HKC. The government does not impose

any import or export tariffs on goods. It is also considered an international financial and commercial centre providing services to the Asia-Pacific region and China (Trade and Industry Department, 2014).

3.1.3 Tourism

Tourism plays a major role in HKC's economy contributing to 5% of GDP and accounts for 7.2% of total local employment in 2013. Total visitors to HKC dropped by 2.5% in 2015 compared to 2014 figures. Total Tourism Expenditure associated to inbound tourism dropped by 7.5% in 2015 (HKD 332.3 billion dollars) compared to 2014 figures. In 2015, China remained the largest source for tourism, accounting for 77% of total tourist arrivals (HKTB, 2016).

2016 Visitor Arrivals (Year-to-date): 13,735,110			
Major Market Areas	**Mar 2015**	**Mar 2016**	**Growth (%)**
All Countries	4,405,298	4,213,801	-4.3
The Americas	163,919	165,609	+1.0
Europe, Africa & the Middle East	214,506	221,673	+3.3
Australia, New Zealand & South Pacific	57,592	60,864	+5.7
North Asia	201,681	199,024	-1.3
South & Southeast Asia	298,186	324,452	+8.8
Chinese Taipei	154,032	149,242	-3.1
Mainland China	3,240,825	3,017,173	-6.9

Source: Adapted from HKTB (2016)

3.2 Aviation demand

Hong Kong, China being major international commerce and financial centre in the Asia-Pacific region elicits the importance of air travel to and from HKC. Connectivity allows businesses based in HKC to gain better access to foreign markets as well as further promote exports.

3.2.1 Recent demand growth

Passenger air traffic to and from Hong Kong, China has grown at an average of 5.51% p.a. between 2005 and 2015. In 2006, passenger growth rate was at 8.91% before falling to -4.81% in 2009 before reaching 8.27% in 2015 (year on year growth rate). This demand growth is seen in the figure below.

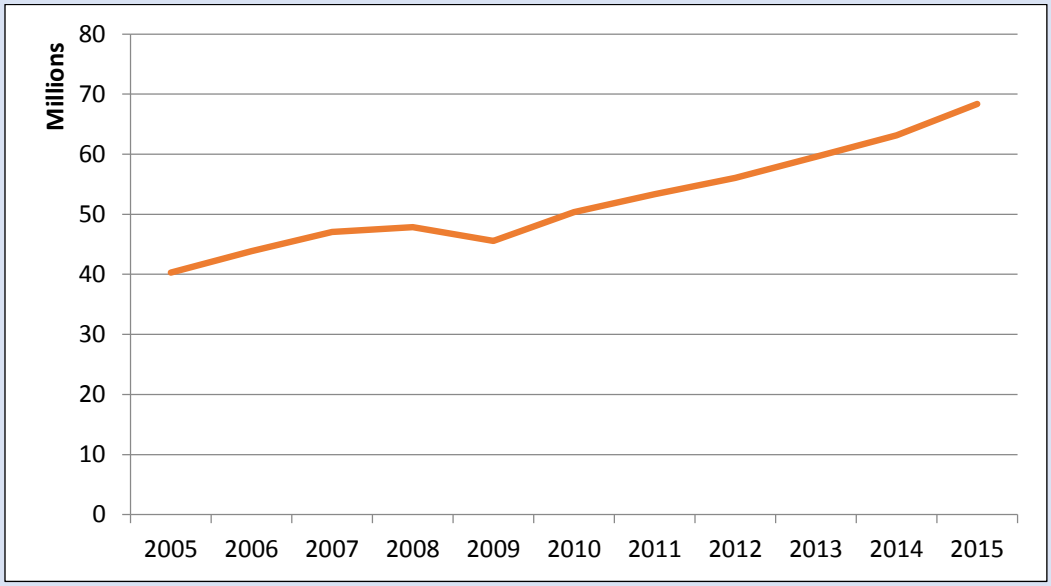

Figure 4: Total air traffic Hong Kong, China, 2005-2015 (Source: Albatross Airport, 2016).

Airfreight is another area which has seen significant growth. Its tonnage increases by over 41% between 2004 and 2014 as depicted in Table 6 (Albatross Airport, 2016). Hong Kong Air Cargo Terminals Limited operates the 'SuperTerminal 1', which is the world's second largest stand-alone air cargo handling facility; second to the West Cargo Handling Area at PVG. In 2009, shippers spent HKD74.0 billion on the transportation of air cargo. The cost of air transport services in real terms has fallen by 1% a year over the past 40 years and is expected to play a role in continue promoting airfreight services, as air freight services steadily become more competitive compared to other transportation modes.

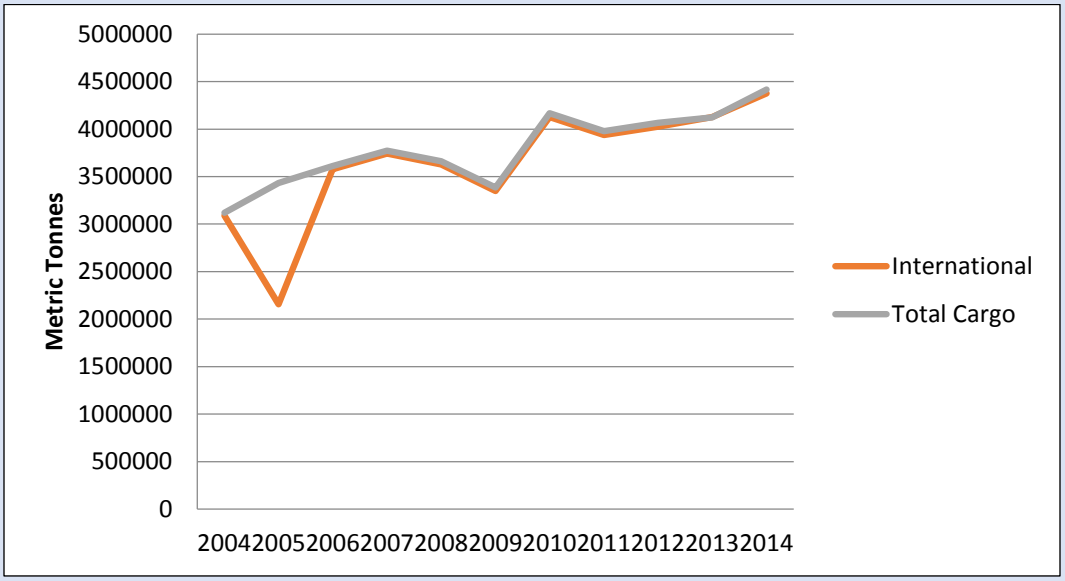

Figure 5: Cargo demand Hong Kong, China 2005-2015 (Source: Albatross Airport, 2016).

3.2.2 Current Air Services to Hong Kong, China

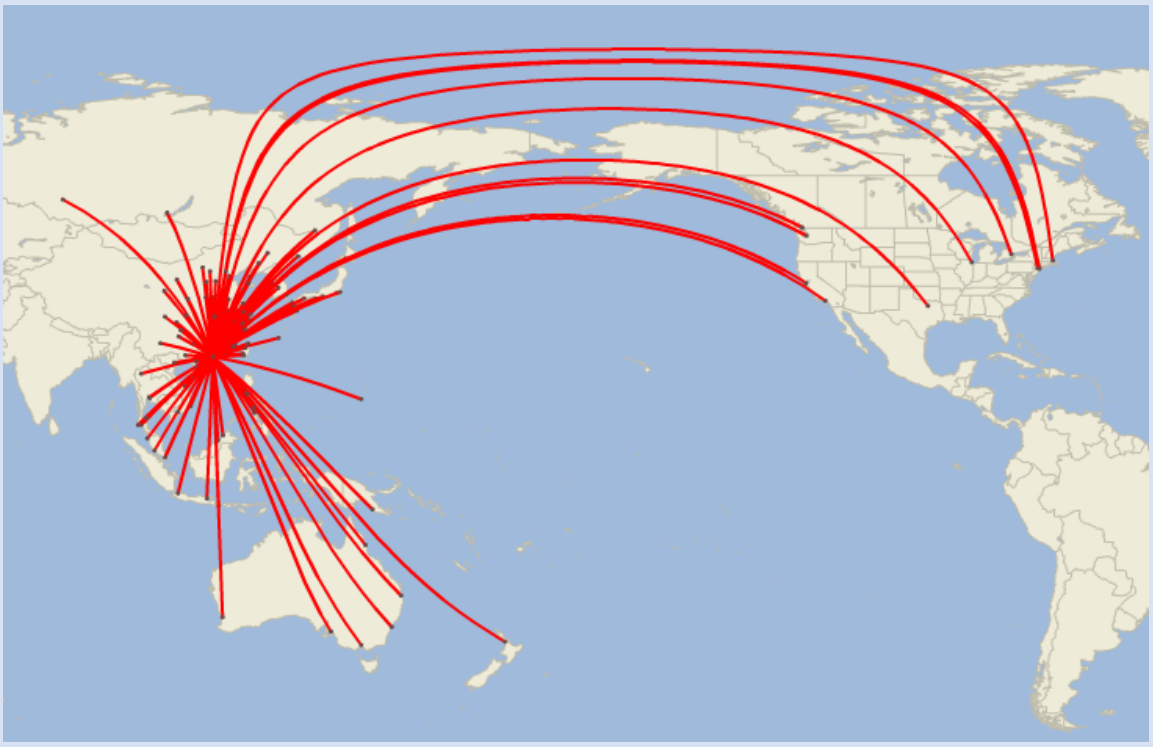

Figure 6: Non-stop service to and from Hong Kong, China and top APEC destinations March 2016 (Source: Airport IS)

3.2.3 Aviation and the Economy

Economic Footprint

In 2009, the aviation sector contributed HKD88.9 billion (5.5%) to Hong Kong, China's GDP (Oxford Economics, 2011). This comprises direct and indirect spending. Catalytic benefits through tourism are estimated at another 44.2 billion bringing the total benefits to HKD133.1 billion.

From an employment perspective the sector supports 153,000 jobs, directly and indirectly, and a further 101,000 people through the catalytic effects.

Consumer Benefits

The aviation industry has benefits for visiting friends and family and the shipping of high value products. In 2009, a total of 46 million passengers and 3 million tonnes of freight travelled to, from and within HKC by air.

It is estimated that the value of the benefit to travellers from the aviation industry is worth HKD191.2 billion a year (in excess of expenditures). Moreover, the estimated benefits to shippers exceed HKD30.8 billion (in excess of expenditures) (Oxford Economics, 2011).

Long-term impact

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

- Opening up foreign markets to Hong Kong, China exports;
- Lowering transport costs, particularly over long distances, helping to increase competition because suppliers can service a wider area and potentially reduce average costs, through increased economies of scale;
- Increasing the flexibility of labour supply, which should enhance allocative efficiency and bring down the natural rate of unemployment;
- Encouraging Hong Kong, China businesses to invest and specialize in areas that play to the economy's strengths;
- Speeding the adoption of new business practices, such as just-in-time-inventory management that relies on quick and reliable delivery of essential supplies;
- 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 a HKD1.0 billion per annum increase in long-run GDP for the Hong Kong, China economy.

3.2.4 Government position on aviation

As one of the regional hubs for Asia, Hong Kong, China is connected with most urban centres in Asia and half of the world's population within five hours of flight time. As such, Hong Kong, China has firmly and pro-actively implemented a policy of progressive liberalization of air services to promote consumer choice and competition and to provide airlines of Hong Kong, China and its aviation partners with opportunities for service expansion. As of June 2016, Hong Kong, China had signed air services agreements with 64 aviation partners.

3.3 Airport specific information

3.3.1 One of the busiest airports in Asia

The Hong Kong International Airport (HKG) is managed and operated by the Airport Authority Hong Kong (AAH), a statutory body wholly owned by the Hong Kong SAR Government. HKG has been operational since 1998, which replaced the former Kai Tak Airport. It is an important regional trans-shipment centre, cargo and passenger hub and gateway for destinations in China and the rest of Asia. It is located on the island of Chek Lap Kok, which largely comprises land reclaimed for the construction of the airport itself.

HKG is one of the busiest airports in Asia. Operated by the Airport Authority Hong Kong 24 hours a day, the airport is the primary hub for Cathay Pacific, Dragonair, Hong Kong Airlines, Hong Kong Express Airways and Air Hong Kong. The airport is also one of Oneworld alliance's major hubs, and one of the UPS Airlines' Asian-Pacific cargo hubs.

On 2 June 2011, the AA announced and published a 20-year blueprint for the airport's development, 'Hong Kong International Airport Master Plan 2030' to the public. On 20 March 2012, the Hong Kong Government adopted the expansion of a third runway as the official airport expansion plan. On 26 April 2016, the Chief Executive-in-Council granted the approval for the draft of the Chek Lap Kok Outline Zoning plan as well as the authorization for the reclamation of land for construction (Hong Kong International Airport, 2016).

The third runway is to be built in the north of the Chek Lap Kok, through land reclamation. With the associated facilities – additional terminals, airfield and apron facilities will be built accordingly, and combined with the new runway –, it is estimated that HKG would be able to handle a maximum of 620,000 flights per year (102 per hour, or about one flight every 36 seconds), and meet forecast annual passenger and cargo throughput of about 97 million and 8.9 million tonnes by 2030 respectively.

3.3.2 Principal airline operators

Cathay Pacific

Cathay Pacific is the flag carrier of Hong Kong, China and the third largest airline in the world. It is a founding member of the Oneworld alliance. Its operations include passenger and cargo services to 200 destinations in 52 nations. It has an extensive fleet of passenger aircrafts including Airbus A330-300, Airbus A340-300, Boeing 777-300, Boeing 747-400ERF, Boeing 777 -300ER, Boeing 777-200, Boeing 747-400 and is expected to include Boeing 777-X and Airbus A350-900 to its fleet. Freighters include the Boeing 747-400 and the Boeing 747-8 (Cathay Pacific, 2016).

Cathay Dragon

Cathay Dragon (formerly Dragon Air) is Cathay Pacific's wholly owned subsidiary, providing services to 44 destinations within the Asia-Pacific region. It is well recognized to have an extensive network and reach in China. It operates approximately 400 flights a week to China. Currently it owns and operates a fleet of 41 passenger aircrafts including 19 A330-300s, 8 A321s and 15 A320s (Dragonair, 2016).

Hong Kong Airlines

Hong Kong Airlines was established in 2006, with a network that is focused on covering major cities within the Asia-Pacific region. It currently operates flights to 30 regional cities. The current fleet includes 25 passenger aircrafts including 5 A330-300, 9 Airbus A330-200, and 11 A320. The air cargo fleet includes 5 freighters (Airbus A330-200Fs) (Hong Kong Airlines, 2016).

Hong Kong Express Airways

Hong Kong Express Airways is the first and only Hong Kong-based low-cost air carrier. It is a relatively new carrier, having operated its first flight in 2013. It is currently operating to nine destinations within Asia including Japan; Republic of Korea; Thailand; Chinese Taipei; People's Republic of China; Cambodia; and Viet Nam. Hong Kong Express Airways is expected to expand its current fleet of passenger aircrafts to over 30 Airbus A320 by 2018 (HKExpress, 2016).

Air Hong Kong

Air Hong Kong currently provides cargo services to 12 destinations in nine countries, including People's Republic of China; Japan; Malaysia; The Republic of the Philippines; Chinese Taipei; Singapore; Republic of Korea; Thailand; and Viet Nam (Air Hong Kong, 2016).

4. Medium-term new route opportunities

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

4.1 Service gaps

As part of the process, air services to Hong Kong, China were considered at both economy-pair and city-pair basis.

4.1.1 Economy-pair analysis

The following table outlines the supply and demand for air travel between Hong Kong, China 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/Destination Economy	O/D Demand (PDEW)	O/D Non-Stop Seat Offer (SDEW)	One Stop Seat Offer (SDEW)	Ratio of Demand to Supply
Australia (AUS)	1,806	3,765	235	45%
Brunei Darussalam (BD)	68	158	0	43%
Canada (CDA)	988	1,845	0	54%
Chile (CHL)	16	0	0	*
People's Republic of China (PRC)	13,952	26,059	392	53%
Hong Kong, China (HKC)	0	0	0	*
Indonesia (INA)	2,041	3,524	0	58%
Japan (JPN)	7,263	10,405	1,365	62%
Republic of Korea (ROK)	3,904	6,192	327	60%
Malaysia (MAS)	1,947	3,552	0	55%
Mexico (MEX)	35	0	0	*
New Zealand (NZ)	295	656	0	45%
Papua New Guinea (PNG)	64	74	0	86%
Peru (PE)	20	0	0	*
The Republic of the Philippines (PH)	2,566	5,353	0	48%
Russia (RUS)	73	130	0	56%
Singapore (SGP)	3,747	6,249	266	58%
Chinese Taipei (CT)	9,326	15,734	0	59%
Thailand (THA)	5,903	9,967	0	59%
United States (US)	3,178	5,026	540	57%
Viet Nam (VN)	950	1,909	0	50%

Table 6: Total demand-to-supply ratio PDEW (Source: IATA analysis of Airport IS Data)

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

**** Delineates an economy pair with no air services that 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%.

In some cases, the demand-to-supply ratio is under 60% but supply is still adequate, as the low percentage figure may be representative of high rates of connecting passengers flying between economies (not shown in the above table – only OD traffic is displayed).

Where demand-to-supply ratios are higher than 80%, seat offer should be increased between economy pairs (e.g. Hong Kong, China and PNG at 86% indicates the non-stop supply barely covers the total demand between the economies).

Based on the above analysis at the economy level, Hong Kong, China may have an opportunity to enhance services to Japan in the long term (highlighted in yellow in the above table), and could take actions to enhance connectivity to PNG in the medium term (highlighted in red).

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

4.1.2 City pair analysis by APEC economy

When considering the shortfall in service on city pair level, 15 routes have a demand of 30 or greater PDEW with no non-stop service, as illustrated in the table. These 15 routes are spread throughout the different economies identified at the economic pair analysis in the previous section. This section explains in greater details the economy pairs with air service development potential to Hong Kong, China.

Origin Airport	Origin Economy	Destination Airport	Destination Economy	2015 OD Demand
HKG	Hong Kong, China	YYC	Canada	48
HKG	Hong Kong, China	YUL	Canada	48
HKG	Hong Kong, China	KNO	Indonesia	36
HKG	Hong Kong, China	SRG	Indonesia	30
HKG	Hong Kong, China	JOG	Indonesia	27
HKG	Hong Kong, China	KCH	Malaysia	34
HKG	Hong Kong, China	CHC	New Zealand	31
HKG	Hong Kong, China	DVO	The Philippines	35
HKG	Hong Kong, China	HNL	United States	67
HKG	Hong Kong, China	LAS	United States	44
HKG	Hong Kong, China	MIA	United States	37
HKG	Hong Kong, China	ATL	United States	34
HKG	Hong Kong, China	BUF	United States	32
HKG	Hong Kong, China	DCA	United States	31

Table 7: APEC routes to Hong Kong, China with 30 or greater PDEW and no non-stop service (Source: IATA analysis of Airport IS data)

4.2 High-level feasibility considerations

City pairs with 30 PDEW (10,950 annual passengers one-way) were considered as the minimum threshold for analysis. 15 city pairs to and from HKG met this criterion as in the table above.

As a way to further define a potentially viable route, IATA used two metrics: distance and market size. Any city pairs over 15,000km apart from one another was eliminated due to aircraft range restrictions on distance. The second criterion used the application of induction and connection of potential rates (unique to each region and route type) to the existing OD demand in order to determine whether the route would garner of a minimum demand of 158P DEW for ultra-long-haul routes (over 12,000km), 130 PDEW for long-haul routes (between 4,000km and 12,000km), or 75 PDEW for short-haul routes (under 4,000km) in the coming three years with behind and beyond potential and OD stimulation factored in (see section 4.3 below for a detailed breakdown of the factors).

This filtering process led to the selection of one route, as 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	Proposed Route
HKG	Hong Kong, China	HNL	United States	67	138	✓	✓	Yes
HKG	Hong Kong, China	YYC	Canada	48	113	✓	✗	No
HKG	Hong Kong, China	YUL	Canada	48	113	✓	✗	No
HKG	Hong Kong, China	LAS	United States	44	107	✓	✗	No

Table 8: Demonstration of selection process based on high-level route feasibility considerations

4.3 Proposed route analysis

IATA narrowed the above selection to only the HKG to HNL route. This section decomposes the route potential and presents a forecast of the current demand in the medium term.

4.3.1 Route #1 HKG-HNL

HKG-HNL 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
HKG	HNL	United States	(A) 67	(B) 80%	(C) 56%	(D) 39%	
				(1) 54	31		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	84		(3) = 1+2
		HKG - HNL Total Market Potential (2015 Base)				(4) 138	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the HKG-HNL route presents a potential of 138 PDEW for a direct service between the two cities.

This potential would grow to 160 by 2018 as displayed in the short term forecast in the following table. This forecast uses the 2015 estimated demand and applies to it the IATA inter- and intra-regional global traffic forecast published by our Economics Division.

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

4.4 Proposed scheduled operations

This section considers the above route 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.

4.4.1 Route #1 HKG-HNL

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.

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 departing to and from HKG and is pleased to report that the connecting banks of the major airlines are generally very well aligned. There is still a small selection of connections improvements that can be suggested based on optimal connecting time-related considerations:

- Cathay Pacific flight 897 from LAX currently arrives at HKG at 15:25. Should the arrival time be brought forward by 30 minutes to 14:55, it will allow 9 extra connections to APEC economies in Southeast Asia, namely BKK, BKI, HGH, CGK, KUL, PVG, TPE, SGN and CEB.
- Similarly, Cathay Pacific flight 841 from JFK is currently missing 6 connections to BKK, MNL, SIN, TPE, HKT and PER. These connections can be made available if the arrival time is moved forward 35 minutes to 13:25.
- Cathay Pacific flight 870 departing for SFO currently leaves HKG at 14:15. By moving back the departure time by 40 minutes to 14:55, it will allow 6 more connections from other APEC economies cities: HGH, HAN, WUH, XMN, WNZ and TPE.
- Cathay Pacific flight 826 leaves HKG for YYZ at 17:10. By moving the departure time back by 45 minutes to 17:55, it will allow 9 more connections from TXG, CTU, XMN, KHH, SIN, NKG, NGB, and HKT.

5.2 Route frequency increase

IATA considered all of the international non-stop routes from Hong Kong, China to determine whether the current non-stop supply adequately matches the demand. There were a number of city pairs from HKG with inadequate non-stop service 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
HKG	Hong Kong, China	KBV	Thailand	41	23	18	175%
HKG	Hong Kong, China	SHE	China	86	71	15	121%
HKG	Hong Kong, China	ILO	The Philippines	75	64	11	117%
HKG	Hong Kong, China	CGQ	China	59	50	9	118%
HKG	Hong Kong, China	KLO	The Philippines	74	69	4	106%
HKG	Hong Kong, China	HIJ	Japan	31	28	3	112%
HKG	Hong Kong, China	BOS	United States	106	105	0	100%
HKG	Hong Kong, China	HFE	China	20	22	-2	93%
HKG	Hong Kong, China	CJU	Republic of Korea	91	93	-2	98%
HKG	Hong Kong, China	ZHA	China	85	91	-6	93%
HKG	Hong Kong, China	TNA	China	54	65	-11	83%
HKG	Hong Kong, China	YIW	China	52	64	-12	81%
HKG	Hong Kong, China	KOJ	Japan	53	66	-13	80%
HKG	Hong Kong, China	FUK	Japan	432	480	-48	90%
HKG	Hong Kong, China	CTS	Japan	518	603	-84	86%

Table 4: List of routes with potential for frequency increase

Strategies to improve the non-stop service could involve adding an additional weekly frequency or increasing the size of the aircraft serving the route. Each route has different operational constraints depending on the distance and type of market being served (short-haul vs. long-haul or business vs. leisure market).

5.3 Long-term new route opportunities

As the growing economy continues to drive air traffic growth, some routes identified in section 4 are expected to become viable in the longer term:

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 long term	Proposed Route
HKG	Hong Kong, China	YYC	Canada	48	113	✓	✓	Yes
HKG	Hong Kong, China	YUL	Canada	48	113	✓	✓	Yes
HKG	Hong Kong, China	LAS	United States	44	107	✓	✓	Yes
HKG	Hong Kong, China	MIA	United States	37	96	✓	✓	Yes
HKG	Hong Kong, China	KNO	Indonesia	36	76	✓	✓	Yes

Table 10: Long-term route opportunities

5.4 Development of aircraft technology

The latest aircraft available on the market, Airbus' A350-900 and Boeing's B787-9, are capable of flying ultra-long-haul routes. The technical capabilities of these aircraft will allow new direct routes to be

operated between APEC economies across the Pacific. The following map illustrates the range limit[1] of the A350-900 and B787-9.

Figure 7: Range limit for the latest generation of aircraft from Hong Kong, China (Source: GCMap)

6. Recommendations to improve air connectivity

The various recommendations to improve air connectivity 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 Hong Kong, China.
- Encourage airlines, in particular base airlines like Cathay Pacific, Cathay Dragon, Hong Kong Airlines, to explore the opportunities on the ultra-long-haul market when they take delivery of new generation of long-haul aircraft.

[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.

6.2 Specific recommendations

- Ensure that the necessary infrastructure, especially the third runway project, at HKG is built in time to cater for long-term traffic growth.
- Closely work with the airline industry to enhance sustainability and profitability of the industry.

6.3 How the APEC economy's regulator can help

- Work closely with different stakeholders, for example Hong Kong Tourism Board, the Chamber of Commerce, etc., to gain a deeper understanding of the development of the aviation demand
- Explore the possibility of relaxing visa requirements for APEC tourists.
- Reduce Passenger Movement Charge on air passengers.

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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