Asia-Pacific Economic Cooperation

Develop Air Connectivity in the APEC Region

PEOPLE'S REPUBLIC OF CHINA

Tourism Working Group | October 2016

APEC Project: TWG 01 2014A

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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, 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.

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.

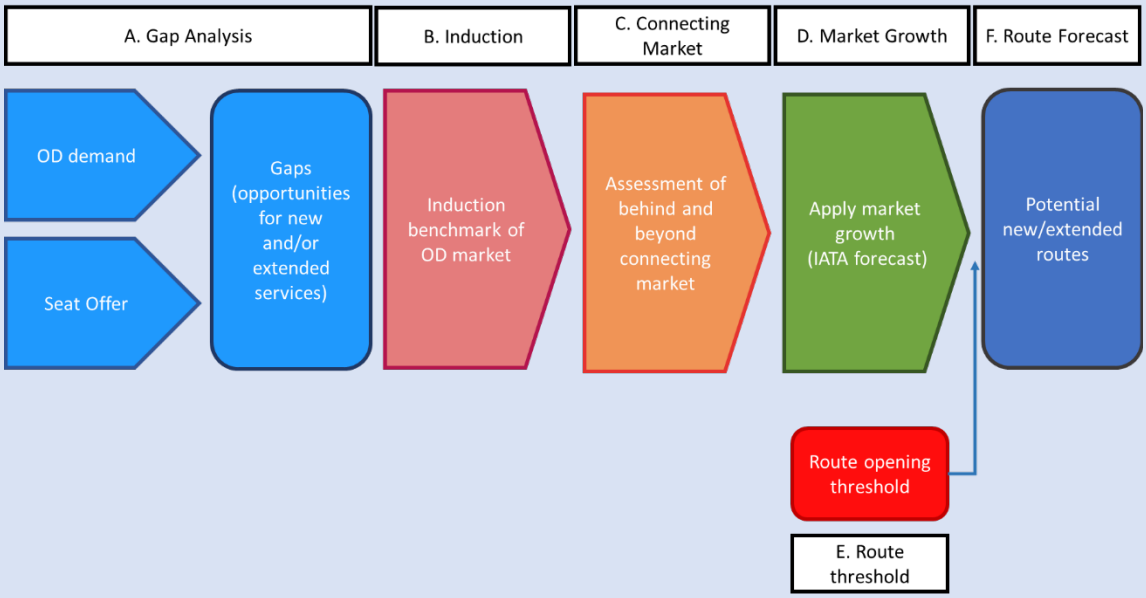

Figure 1: Process used to complete analytical work

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.

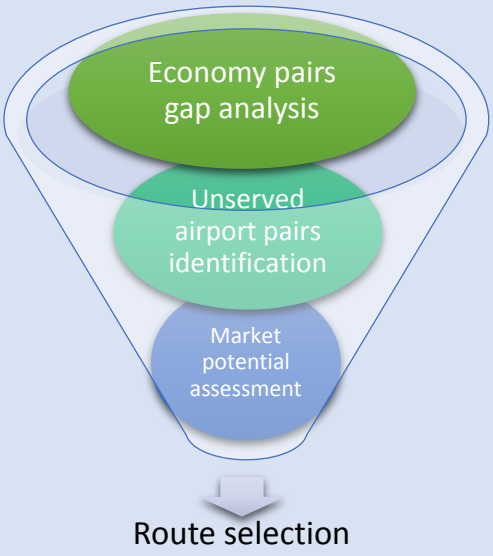

Figure 2: Funnel approach used to conduct analysis

The economy pair analysis allowed IATA to identify unserved markets.

As an example, this analysis showed that there was an average daily demand of 3,418 Passengers Daily Each Way (PDEW) in 2015 that flew via existing connecting routings between Australia and China, while only an average 3,247 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 markets between the two economies.

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

Origin Airport	Origin Economy	Destination Airport	Destination Economy	2015 OD Demand (PDEW)	Currently Served Non-Stop?	1-Stop Seat in 2015 (SDEW)
SHE	China	SIN	Singapore	104	No	278
DLC	China	BKK	Thailand	99	No	197
SHE	China	BKK	Thailand	97	No	45
FOC	China	JFK	United States	95	No	90
PEK	China	FUK	Japan	79	No	305
PVG	China	PEN	Malaysia	70	No	0
CGO	China	SIN	Singapore	69	No	169
PEK	China	BNE	Australia	66	No	0
CTU	China	LAX	United States	66	No	57
DLC	China	SIN	Singapore	63	No	97
XIY	China	NRT	Japan	60	No	233
SHE	China	LAX	United States	59	No	0
PVG	China	LAS	United States	59	No	157
TAO	China	LAX	United States	59	No	0
PVG	China	BNE	Australia	57	No	0
PVG	China	MEX	Mexico	57	No	107
CGQ	China	SIN	Singapore	57	No	31
HRB	China	NRT	Japan	50	No	0
SHE	China	HKT	Thailand	50	No	85
SHE	China	HKT	Thailand	50	No	86
PEK	China	USM	Thailand	50	No	0
SHA	China	BKK	Thailand	46	No	0
PVG	China	USM	Thailand	45	No	0
PVG	China	ATL	United States	45	No	54
PEK	China	LAS	United States	40	No	94
PVG	China	LGA	United States	39	No	131
PEK	China	PER	Australia	39	No	0
XIY	China	LAX	United States	39	No	0
PVG	China	MCO	United States	38	No	96
CGQ	China	BKK	Thailand	37	No	9

Table 1: Top 30 unserved routes from 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 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 economies	130%	42%	18%
Long-Haul	101%	36%	16%
Short-Haul	150%	50%	21%
NAFTA-China	137%	55%	
Australasia - China	65%	15%	5%
Asia - China	175%	67%	
South East Asia - China	203%	78%	
China - North East Asia	140%	52%	25%
Within Asia	160%	55%	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 China's hubs were estimated based on traffic from various APEC regions flying through PEK, CAN, PVG, CTU as well as the foreign hubs being flown to and from China.

APEC Region	PEK	CAN	PVG	CTU
North America	21.2%	39.6%	10.0%	1.4%
Australasia	29.5%	66.3%	21.1%	41.6%
Asia	4.5%	5.3%	6.7%	0.8%
South East Asia	10.6%	17.5%	9.3%	1.6%
China	3.9%	4.1%	5.8%	0.7%
North Asia	10.6%	7.9%	9.9%	1.0%
Russia	5.5%			

Table 3: Connecting potential rates used when flying to/from APEC regions (left) and the listed Chinese 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 China 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 SHE-SIN 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**
SHE	SIN	Singapore	(A) 104	(B) 80%	(C) 35%	(D) 15%	
				(1) 83	29		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	112		(3) = 1+2
		SHE - SIN Total Market Potential (2015 Base)				(4) 132	(4) = 3/(1-D)

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

3. China

A summary of China's economy and demographics, aviation demand, and airport-specific information is presented in this section.

3.1 Economy and demographics

China, officially the People's Republic of China (PRC), is a sovereign economy in Asia. Based at the capital city of Beijing, the Chinese government exercises jurisdiction over 22 provinces, five autonomous regions, four direct-controlled municipalities (Beijing, Tianjin, Shanghai, and Chongqing), and two, mostly self-governing, special administrative regions (Hong Kong, China and Macau).

Covering approximately 9.6 million square kilometres, China is the world's second largest economy by land area, and either the third or fourth-largest by total area, depending on the method of measurement. The economy's landscape is vast and diverse, ranging from forest steppes and the Gobi and Taklamakan deserts in the arid north to subtropical forests in the wetter south. The Himalaya, Karakoram, Pamir and Tian Shan mountain ranges separate China from South and Central Asia. The Yangtze and Yellow Rivers, the third- and sixth-longest in the world, run from the Tibetan Plateau to the eastern seaboard. China's coastline along the Pacific Ocean is 14,500 kilometres (9,000 mi) long, and is bounded by the Bohai, Yellow, East and South China Seas.

3.1.1 Demographics

According to the UN, China's population was estimated at 1.375 billion in 2015, making it the most populous economy on earth. The population is mostly concentrated along the eastern seaboard and stretches inland particularly around the capital Beijing and along the Yangtze from Shanghai to Sichuan province in the south western part of China. Large populations are also concentrated in the South along the Pearl River in Guangzhou province north of Hong Kong, China. Inland, the Great Tibetan Plains are mostly un-inhabited. Overall the population density is approximately 145 inhabitants per square kilometre.

The population has been growing at around 0.46% per annum over the last five years and is expected to continue growing at historical rates to reach approximately 1.38 billion by 2026. (United Nations, 2015)

Major urban centres and populations include:

City-Region	Population (millions)
Shanghai	34
Guangzhou	25
Beijing	24.9
Shenzhen	23.3
Wuhan	19
Chengdu	18.1
Chongqing	17
Tianjin	15.4
Hangzhou	13.4
Xi'an	12.9
Changzhou	12.4
Shantou	12
Nanjing	11.7
Jinan	11
Harbin	10.5
Zhengzhou	9.7
Qingdao	9.6
Shenyang	7.7

Table 4: China's largest urban areas (OECD Urban Policy Review, 2015)

3.1.2 Economy

China's economy is the world's second largest economy by nominal GDP, and the world's largest economy by purchasing power parity (PPP). Until 2015 (when it was overtaken by India), China was the world's fastest-growing major economy with growth rates averaging 10% over 30 years. (IMF, 2016).

China is a global hub for manufacturing, and is the largest manufacturing economy in the world as well as the largest exporter of goods in the world and plays a vital role in international trade. It became a member of the World Trade Organization in 2001. It has free trade agreements with several economies, including Australia; Korea; New Zealand; ASEAN, Switzerland and Pakistan.

On a per capita income basis, China ranked 77th by nominal GDP and 89th by GDP (PPP) in 2014 (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 largest trading partners are Hong Kong, China; Japan; the Republic of Korea; Chinese Taipei; the United States and the European Union. (WTO, 2015)

China is the largest producer of coal, gold zinc, lead and iron ore.

3.1.3 Tourism

In 2015, 20.3 million foreigners visited China, representing a decrease of 2.5% compared with the same period of 2014. By contrast, there were 120 million outbound visitors in 2015, representing an increase of 12% compared with 2014 (China Tourism Research Institute, 2016). The largest destination markets include: Thailand (15%); Hong Kong, China (13%); Korea (12%); Japan (11%); and Chinese Taipei (8%).

The direct contribution of Travel & Tourism to China's GDP was CNY1,407bn (2.1% of total GDP) in 2015 and is forecast to rise by 6.1% 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 & Tourism to GDP was CNY5,366bn (7.9% of GDP) in 2015, and is forecast to rise by 6.3% in 2016, and to rise by 7.0% p.a. to CNY11,225bn (9.4% of GDP) in 2026. (World Travel and Tourism Council, 2015).

3.2 Aviation demand

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

3.2.1 Recent demand growth

Passenger air traffic to and from China has grown at an average of 13.0% p.a. between 2004 and 2015. This growth slowed in 2008 to 4.9% but has grown strongly since then, averaging 11.1% p.a. In 2015, 914,773,311 passengers were recorded using the airports of China, up by 9.7% from the previous year. This demand growth is seen in the figure below. If such rates were to continue for the next ten years, airports traffic could exceed 2.5bn passengers by 2026 (Civill Aviation Administration of China , 2016).

Air freight, by contrast, has shown 8.6% average annual growth in 2004 and 2015. In 2015, 8.5 million tonnes of air cargo were recorded, an increase of 8% compared to the year earlier. (Civill Aviation Administration of China , 2016)

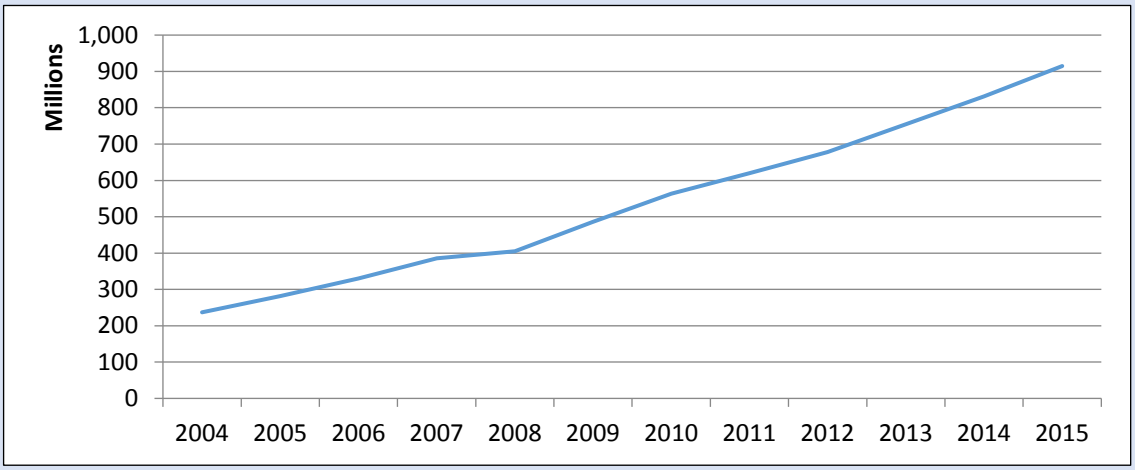

Figure 4: Total air traffic China 2004-2014 (Source: CAAC, Albatross Airport, 2016).

3.2.2 Current air services to China

There were 814 individual routes connecting China to various destinations around APEC (including Hong Kong, China) in 2015 and 760 routes excluding Hong Kong, China. These are shown in the below figure.

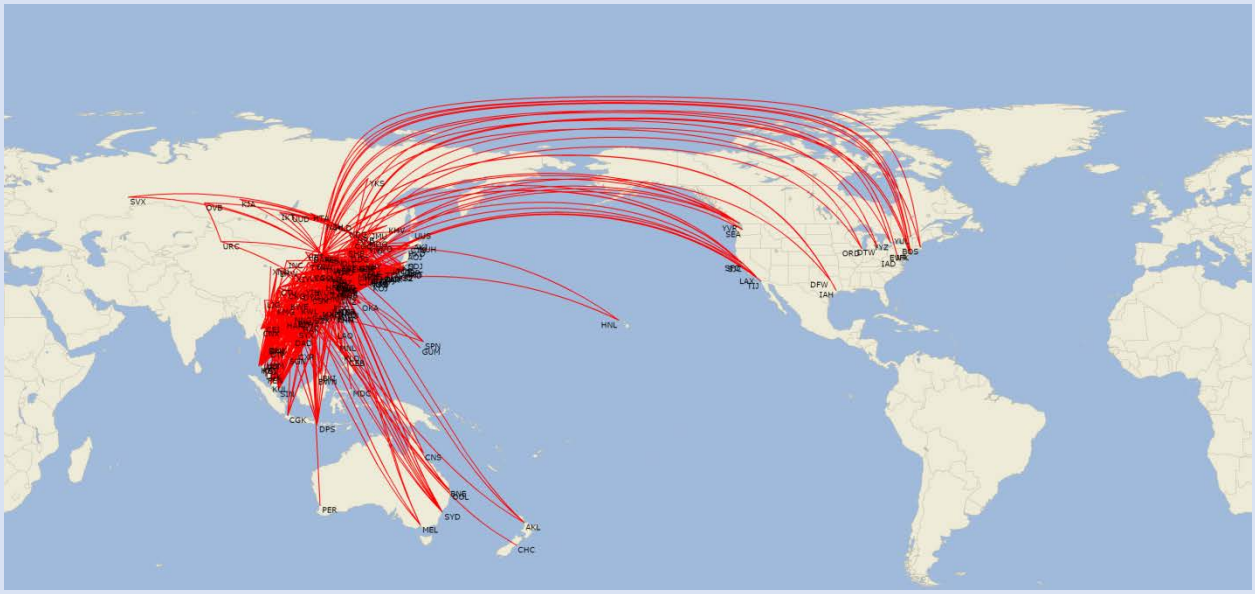

Figure 5: Non-stop service to and from China and top APEC destinations March 2016 (Source: Airport IS)

International capacity to China has grown from 26.6 million outbound seats in 2004 to 72.4 million in 2015. Growth over this time period has been driven from Australia; Chinese Taipei (which did not have direct air services in 2004); Thailand; the United States; Viet Nam; and United Arab Emirates.

In 2015, China-APEC capacity was up by 13.9%, with the strongest direct aviation capacity growth in Japan (up by 31%); Thailand (up by 63%); and Viet Nam (up by 42%).

3.2.3 Aviation and the economy

Economic Footprint

In 2009, the aviation sector contributed ¥329 billion (0.8%) to Chinese GDP, equivalent to 0.8% of the Chinese economy (Oxford Economics, 2011). This total comprised:

- ¥126 billion directly contributed through the output of the aviation sector (airlines, airports and ground services);
- ¥135 billion indirectly contributed through the aviation sector's supply chain;
- ¥69 billion contributed through the spending by the employees of the aviation sector and its supply chain.

In addition, there are ¥61 billion in catalytic benefits through tourism, which raises the overall contribution to ¥390 billion or 1.0% of GDP.

From an employment perspective the sector supports 4.8 million jobs, directly and indirectly, and a further 1.2 million people through the catalytic (tourism) effects.

Consumer Benefits

The aviation industry has benefits for visiting friends and family and the shipping of high value products. Passengers spent ¥1,800 billion (inclusive of tax) on air travel in 2010 and shippers spent ¥210 billion on the transportation of air cargo. With its speed, reliability, and reach there is no close alternative to air transport for many of its customers. (Oxford Economics, 2011).

Long-term impact

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

- Opening up foreign markets to China's exports;
- Lowering transport costs;
- Increasing the flexibility of labour supply;
- Speeding the adoption of business practices such as just-in-time-inventory management;

- It is estimated that a 10% improvement in connectivity relative to GDP would see a ¥25.4 billion increase per annum in long-run GDP for the Chinese economy.

3.2.4 Government position on aviation

The Chinese government has played a major role in shaping its aviation industry amidst a fast transforming economy. In the past decade, three particularly important policy decisions were made: airline consolidation; opening of domestic aviation market; and adoption of liberal international aviation policy (IATA Economics, 2011).

In 2002, the Chinese government instigated airline consolidation among the carriers. This created three equally sized and spatially balanced airline groups, namely Air China, China Southern and China Eastern, in the hope of building a strong and profitable airline industry that was capable of opposing foreign competition.

Afterwards, the Civil Aviation Administration of China (CAAC) lifted its restriction on private investment for domestic airlines. By the end of 2008, the CAAC approved 14 new scheduled passenger carriers, with the majority of them being controlled by domestic private investors. In 2014, 12 new entrants launched services, bringing the number of passenger airlines to 45 by the end of the year (Civil Aviation Administration of China, 2014).

The CAAC also advanced the development of international air transport. In 2014, domestic airlines launched 131 new international routes. There were 12 foreign cities with newly-added and restored scheduled flights. A total of 37 foreign airlines opened 80 new scheduled passenger routes to and from China (CAAC, 2014).

The CAAC also puts great emphasis to infrastructure development. It has plans to add an additional 80 new airports by 2020, including a $14.5 billion second airport in Beijing. Upgrades to existing facilities are also in the works.

3.3 Airport-specific Information

3.3.1 Busiest airports in China

China's air traffic is rapidly developing, and necessary operational facilities are significant. Airports are continually increasing capacity in other aspects of the operations, including roadways, car parking, baggage handling and terminal space.

Rank	Airport	IATA Code	Passengers 2015	Share of Total Traffic China
1	Beijing / CAPITAL	PEK	89,939,049	9.8%
2	Shanghai Pudong /	PVG	60,098,073	6.6%
3	Guangzhou / Baiyun	CAN	55,201,915	6.0%
4	Chengdu / Shuangliu	CTU	42,239,468	4.6%
5	Shenzhen / Baoan	SZX	39,721,619	4.3%
6	Shanghai Hongqiao /	SHA	39,090,865	4.3%
7	Kunming / Long Water	KMG	37,523,098	4.1%
8	Xi'an / Xianyang	XIY	32,970,215	3.6%
9	Chongqing / Jiangbei	CKG	32,402,196	3.5%
10	Hangzhou / Xiaoshan	HGH	28,354,435	3.1%
11	Xiamen / Takasaki	XMN	21,814,244	2.4%
12	Nanjing / Lukou	NKG	19,163,768	2.1%
13	Wuhan / Milky Way	WUH	18,942,038	2.1%
14	Changsha / Yellow	CSX	18,715,278	2.0%
15	Urumqi / Diwobao	URC	18,506,463	2.0%
16	Qingdao / Liuting	TAO	18,202,085	2.0%
17	Zhengzhou / Xinzheng	CGO	17,297,385	1.9%
18	Sanya / Phoenix	SYX	16,191,930	1.8%
19	Haikou / Meilan	HAK	16,167,004	1.8%
20	Tianjin / Binhai	TSN	14,314,322	1.6%
21	Dalian / Zhoushuizi	DLC	14,154,130	1.5%
22	Harbin / Taiping	HRB	14,054,357	1.5%
23	Guiyang / Longdongbao	KWL	13,244,982	1.4%
24	Shenyang / Taoxian	SHE	12,680,118	1.4%
25	Fuzhou / Changle	FOC	10,887,292	1.2%
26	Nanning / Wu Wei	NNG	10,393,728	1.1%
27	Jinan / Yaoqiang	TNA	9,520,887	1.0%
28	Taiyuan / Wusu	TYN	8,842,987	1.0%
29	Changchun / Ka Long	CGQ	8,556,182	0.9%
30	Lanzhou / Zhongchuan	LHW	8,009,040	0.9%
42	Wuxi/ Shuofang	WUX	4,609,344	0.5%
47	Jieyang	SWA	3,204,464	0.4%
56	Yanji / Chaoyangchuan	YNJ	1,458,440	0.2%

Table 5: Major airports in China (Source: CAAC, 2016).

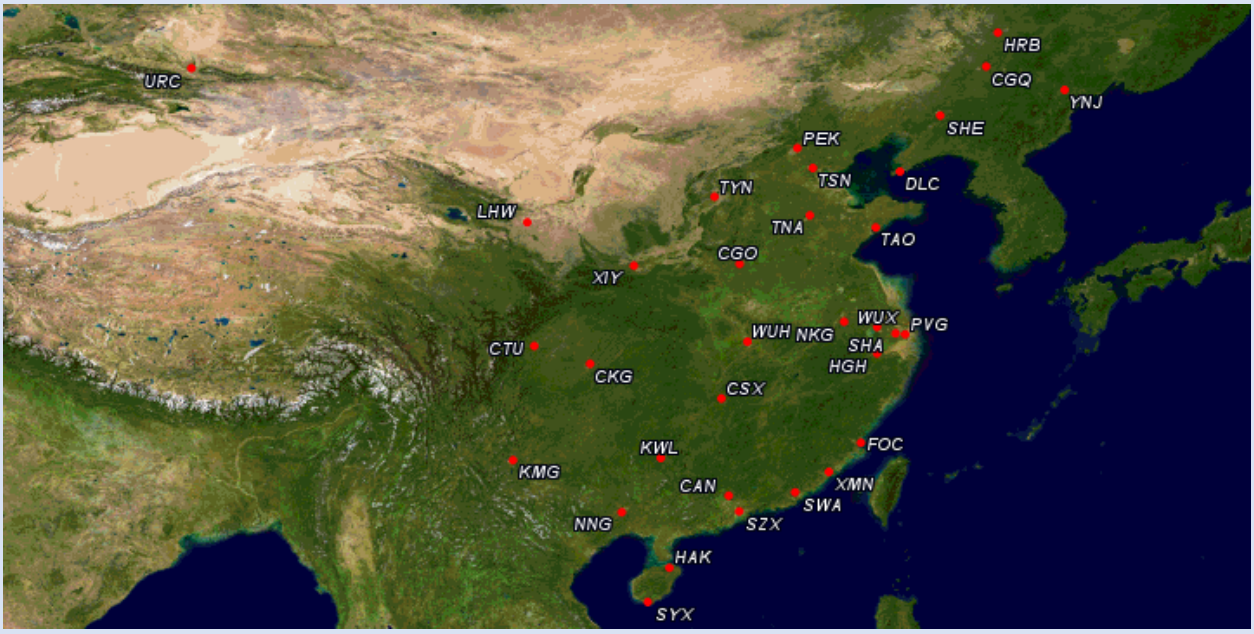

Figure 6: Map of China's busiest airports (Source: Great Circle Mapper)

3.3.2 Relevant airport information

Beijing Capital International Airport (PEK)

Beijing Capital International Airport is the main international airport serving Beijing. It is located 32km northeast of Beijing's city center. The airport is owned and operated by the Beijing Capital International Airport Company Limited, a state-controlled company. The airport has grown rapidly in the past decade and is now the second largest airport in the world (after ATL). It has three parallel runways and three terminals and according to the airport, Terminal 3 is the second largest airport terminal in the world after DXB.

PEK is the main hub for Air China, the flag carrier of the People's Republic of China, China Eastern Airlines, Hainan Airlines and China Southern Airlines also use the airport as their hub. The largest international destinations it serves include HKG, ICN, SIN, BKK, NRT, TPE, DXB and SVO.

Shanghai Pudong International Airport (PVG)

Shanghai Pudong International Airport is the larger of the two airports serving the city of Shanghai. The airport mainly serves international flights, while the city's other major airport, SHA, mainly serves domestic and regional flights. The airport is operated by Shanghai Airport Authority. It has two main passenger terminals, flanked on both sides by four parallel runways.

The airport is the main hub for China Eastern Airlines and Shanghai Airlines, and a major international hub for Air China. It is also the hub for privately owned Juneyao Airlines and Spring Airlines. The largest international destinations it serves include HKG, ICN, NRT, TPE, KIX, BKK and SIN.

Zhengzhou Xinzheng International Airport (CGO)

Zhengzhou Xinzheng International Airport is the principal airport serving Zhengzhou, the capital of Henan Province. It is operated by Henan Province Airport Group Co., Ltd, a large state-owned enterprise directly under the People's Government of Henan Province. It has two terminal buildings (one recently opened at the end of 2015) and two parallel runways.

The airport is a focus airport for China Southern Airlines, Shenzhen Airlines and China Eastern Airlines. The largest international destinations it serves include TPE, HKG, BKK and KHH (Kaohsiung, Chinese Taipei).

Dalian Zhoushuizi International Airport (DLC)

Dalian Zhoushuizi International Airport is the airport serving the city of Dalian in Liaoning Province, in the north of China. It is operated by Dalian Zhoushuizi International Airport Co., Ltd.

It has a single terminal and one runway. Currently the new Dalian Jinzhouwan International Airport is being built on reclaimed land to the north of the city.

The airport is the hub for Dalian Airlines, a subsidiary of Air China (CA) and a focus city for China Southern Airlines and Hainan Airlines. The largest international destinations served include HKG, ICN, NRT, KIX and TPE.

Shenyang Taoxian International Airport (SHE)

Shenyang Taoxian International Airport is an airport serving Shenyang, capital of Liaoning province in northeastern China. It is operated by Shenyang Taoxian Airport Authority. It has one runway and a modern terminal facility.

The airport is a focus city for China Southern Airlines and Shenzhen Airlines. The largest international destinations served include ICN, TPE, PUS, NRT and CJJ.

4. Medium-term new route opportunities

This section of the report is dedicated to explaining the potential future air service developments to and from 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 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 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)	3,418	215	599	17%
Brunei Darussalam (BD)	40	0	0	*
Canada (CDA)	2,227	194	0	72%
Chile (CHL)	35	30,744	2,556	67%
People's Republic of China (PRC)	13,952	0	0	*
Hong Kong, China (HKC)	2,638	0	0	*
Indonesia (INA)	16,728	0	0	*
Japan (JPN)	20,464	0	0	*
Republic of Korea (ROK)	4,243	0	0	*
Malaysia (MAS)	133	0	0	*
Mexico (MEX)	689	435	0	90%
New Zealand (NZ)	4	448	0	8%
Papua New Guinea (PNG)	44	0	0	*
Peru (PE)	1,381	1,864	0	50%
The Republic of the Philippines (PH)	702	0	0	*
Russia (RUS)	6,246	0	0	*
Singapore (SGP)	17,116	0	0	*
Chinese Taipei (CT)	16,194	0	0	*
Thailand (THA)	10,119	0	0	*
United States (US)	1,178	1,766	1,036	42%
Viet Nam (VN)	1	0	0	*

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 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%.

In some cases, the demand-to-supply ratio is under 60%, however this 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. Indonesia and the Philippines at 95% where the non-stop supply is barely enough to cover the total demand between the economies).

4.1.2 Economy pair analysis summary

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

- Australia
- Indonesia
- New Zealand
- Chinese Taipei

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

- Brunei Darussalam
- Canada
- The Republic of the Philippines
- Russia
- Singapore
- Thailand
- United States
- Viet Nam

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 of greater than 39 PDEW (14,235 annual passengers one-way) was considered as the minimum threshold level for any service. 26 city pairs to and from China meet this criterion. These are shown in Table 7 below.

Origin Airport	Origin Economy	Destination Airport	Destination Economy	2015 OD Demand
PEK	China	BNE	Australia	66
PVG	China	BNE	Australia	57
PEK	China	PER	Australia	39
PEK	China	FUK	Japan	79
XIY	China	NRT	Japan	60
HRB	China	NRT	Japan	50
PVG	China	PEN	Malaysia	70
PVG	China	MEX	Mexico	57
SHE	China	SIN	Singapore	104
CGO	China	SIN	Singapore	69
DLC	China	SIN	Singapore	63
CGQ	China	SIN	Singapore	57
DLC	China	BKK	Thailand	99
SHE	China	BKK	Thailand	97
SHE	China	HKT	Thailand	50
PEK	China	USM	Thailand	50
SHA	China	BKK	Thailand	46
PVG	China	USM	Thailand	45
FOC	China	JFK	United States	95
CTU	China	LAX	United States	66
SHE	China	LAX	United States	59
PVG	China	LAS	United States	59
TAO	China	LAX	United States	59
PVG	China	ATL	United States	45
PEK	China	LAS	United States	40

Table 7: APEC routes to China with over 39 PDEW and no non-stop service (Source: IATA analysis of Airport IS data).

4.2 High-level feasibility considerations

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

- distance viable for non-stop flights with current technology
- market size

Aircraft range capability has improved considerably over recent years; however, few carriers are keen to operate aircrafts to airports over 15,000km apart from one another. For this reason, the analysis 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
- 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.

All routes were feasible according to the distance criterion but only eight routes were deemed to have adequate market size, as presented in the table below. More details are presented in the next section.

#	Origin		Destination		Demand		Feasibility		Propose Route
	Airport	Econ	Airport	Economy	OD	Estimated Market Potential	Distance	Market Size	
1	SHE	China	SIN	Singapore	104	132	✓	✓	Yes
2	PVG	China	MEX	Mexico	57	118	✓	✓	Yes
3	DLC	China	BKK	Thailand	99	117	✓	✓	Yes
4	SHE	China	BKK	Thailand	97	116	✓	✓	Yes
5	FOC	China	JFK	United States	95	107	✓	✗	No
6	PEK	China	FUK	Japan	79	103	✓	✓	Yes
7	CGO	China	SIN	Singapore	69	101	✓	✓	Yes
8	DLC	China	SIN	Singapore	63	97	✓	✓	Yes
9	PVG	China	PEN	Malaysia	70	96	✓	✓	Yes
10	CTU	China	LAX	United States	66	93	✓	✗	No
11	CGQ	China	SIN	Singapore	57	91	✓	✗	No
12	PEK	China	BNE	Australia	66	88	✓	✗	No
13	SHE	China	LAX	United States	59	87	✓	✗	No
14	TAO	China	LAX	United States	59	86	✓	✗	No

#	Origin		Destination		Demand		Feasibility		Propose Route
	Airport	Econ	Airport	Economy	OD	Estimated Market Potential	Distance	Market Size	
15	PVG	China	LAS	United States	59	86	✓	✗	No
16	XIY	China	NRT	Japan	60	83	✓	✗	No
17	PEK	China	USM	Thailand	50	82	✓	✗	No
18	PEK	China	LAS	United States	40	79	✓	✗	No
19	PVG	China	USM	Thailand	45	77	✓	✗	No
20	SHA	China	BKK	Thailand	46	76	✓	✗	No
21	HRB	China	NRT	Japan	50	75	✓	✗	No
22	PEK	China	ATL	United States	36	74	✓	✗	No
23	PVG	China	ATL	United States	45	74	✓	✗	No
24	SHE	China	HKT	Thailand	50	73	✓	✗	No
25	PVG	China	BNE	Australia	57	70	✓	✗	No
26	PVG	China	LGA	United States	39	69	✓	✗	No
27	XIY	China	LAX	United States	39	68	✓	✗	No
28	HRB	China	SIN	Singapore	36	67	✓	✗	No
29	PVG	China	MCO	United States	38	67	✓	✗	No
30	CSX	China	LAX	United States	37	65	✓	✗	No
31	CGQ	China	BKK	Thailand	37	64	✓	✗	No
32	CGO	China	LAX	United States	35	63	✓	✗	No
33	WUH	China	LAX	United States	35	63	✓	✗	No
34	PEK	China	PER	Australia	39	61	✓	✗	No
35	CGQ	China	HKT	Thailand	36	58	✓	✗	No
36	FOC	China	SYD	Australia	33	42	✓	✗	No
37	XIY	China	SYD	Australia	24	37	✓	✗	No
38	XMN	China	SYD	Australia	19	33	✓	✗	No

Table 8: Summary of high-level route feasibility considerations

4.3 Proposed route analysis

IATA narrowed the above selection to eight different routes through China's airports of PEK, CAN, PVG, CTU as well as the foreign hubs being flown to and from China. 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 SHE-SIN

SHE-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
SHE	SIN	Singapore	(A) 104	(B) 80%	(C) 35%	(D) 15%	
				(1) 83	29		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	112		(3) = 1+2
		SHE - SIN Total Market Potential (2015 Base)				(4) 132	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the SHE-SIN route presents a potential of 132 PDEW for a direct service between the two cities. This potential is forecasted to grow to 155 PDEW by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
China-Singapore	SHE-SIN	132	139	146	155

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 DLC-BKK

DLC-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
DLC	BKK	Thailand	(A) 99	(B) 80%	(C) 37%	(D) 7%	
				(1) 79	30		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	109		(3) = 1+2
		DLC - BKK Total Market Potential (2015 Base)				(4) 117	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the DLC-BKK route presents a potential of 117 PDEW for a direct service between the two cities. This potential is forecasted to grow to 137 by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
China-Thailand	DLC-BKK	117	124	130	137

4.3.3 Route #3 SHE-BKK

SHE-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
SHE	BKK	Thailand	(A) 97	(B) 80%	(C) 38%	(D) 7%	
				(1) 78	30		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	107		(3) = 1+2
		SHE - BKK Total Market Potential (2015 Base)				(4) 116	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the SHE-BKK route presents a market potential of 116 PDEW for a direct service between the two cities.

This potential is forecasted to grow to 136 by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
China - Thailand	SHE-BKK	116	122	129	136

4.3.4 Route #4 PEK-FUK

PEK-FUK 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
PEK	FUK	Japan	(A) 79	(B) 80%	(C) 44%	(D) 11%	
				(1) 64	29		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	92		(3) = 1+2
		PEK - FUK Total Market Potential (2015 Base)				(4) 103	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the PEK-FUK route presents a market potential of 103 PDEW for a direct service between the two cities.

This potential is forecasted to grow to 120 PDEW by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
China-Japan	PEK-FUK	103	108	114	120

4.3.5 Route #5 PVG-PEN

PVG-PEN 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
PVG	PEN	Malaysia	(A) 70	(B) 80%	(C) 56%	(D) 9%	
				(1) 56	32		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	87		(3) = 1+2
		PVG - PEN Total Market Potential (2015 Base)				(4) 96	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the route PVG-PEN presents a market potential of 96 PDEW for a direct service between the two cities. This potential is forecast grow to 113 PDEW by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
China-Malaysia	PVG-PEN	96	102	107	113

4.3.6 Route #6 CGO-SIN

CGO-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
CGO	SIN	Singapore	(A) 69	(B) 80%	(C) 57%	(D) 15%	
				(1) 55	32		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	86		(3) = 1+2
		CGO - SIN Total Market Potential (2015 Base)				(4) 101	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the CGO-SIN route presents a market potential of 101 PDEW for a direct service between the two cities. This potential is forecasted to grow to 119 PDEW by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
China-Singapore	CGO-SIN	101	107	113	119

4.3.7 Route #7 DLC-SIN

DLC-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
DLC	SIN	Singapore	(A) 63	(B) 80%	(C) 63%	(D) 15%	
				(1) 50	32		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	82		(3) = 1+2
		DLC - SIN Total Market Potential (2015 Base)				(4) 97	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the DLC-SIN route presents a market potential of 97 PDEW for a direct service between the two cities. This potential is forecasted to grow to 113 PDEW by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
China-Singapore	DLC-SIN	97	102	107	113

4.3.8 Route #8 PVG-MEX

PVG-MEX 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
PVG	MEX	Mexico	(A) 57	(B) 80%	(C) 66%	(D) 36%	
				(1) 46	31		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	76		(3) = 1+2
		PVG - MEX Total Market Potential (2015 Base)				(4) 118	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the PVG-MEX route presents a market potential of 118 PDEW for a direct service between the two cities.

This potential is forecast grow to 137 PDEW by 2018 as shown in the following table:

Economy Pair	City Pair	2015 Base	2016	2017	2018
China-Mexico	PVG-MEX	118	124	130	137

4.3.9 Route summary

The following table is a summary of the identified routes:

Origin Airport	Origin Economy	Destination Airport	Destination Economy	2015 OD Demand	2018 Estimated Market Potential	Distance	Market Size	Proposed Route
SHE	China	SIN	Singapore	104	155	✓	✓	Yes
PVG	China	MEX	Mexico	57	137	✓	✓	Yes
DLC	China	BKK	Thailand	99	137	✓	✓	Yes
SHE	China	BKK	Thailand	97	136	✓	✓	Yes
PEK	China	FUK	Japan	79	120	✓	✓	Yes
CGO	China	SIN	Singapore	69	119	✓	✓	Yes
DLC	China	SIN	Singapore	63	113	✓	✓	Yes
PVG	China	PEN	Malaysia	70	113	✓	✓	Yes

Table 9: Identified route opportunities

4.4 Proposed scheduled operations

This section considers the above routes 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 Potential airline operators

A number of major airlines are based in China, including the four major groupings Air China, China Eastern, Hainan and China Southern.

CA: Air China

Air China Limited is the Chinese flag carrier and one of the major airlines of the PRC, with its headquarters in Beijing. The airlines flight operations are based at PEK. The airline is a member of the Star Alliance. It currently serves around 44 international destinations, supplying ICN, HKG, KIX and NRT with the greatest frequencies daily.

CA is in joint venture with Dalian Airlines, which operates services from Dalian International Airport (DLC).

Its international activity is heavily concentrated at PEK and PVG, where it typically provides 56 and 14 daily international operations respectively.

MU: China Eastern Airlines

China Eastern Airlines is an airline headquartered in Shanghai. Its main hubs are at PVG and SHA, with secondary hubs at PEK, Kunming and Xi'an. It is China's second-largest carrier by passenger numbers. It is a member of SkyTeam Alliance.

China Eastern Airlines operates 59 international destinations, the largest number of any Chinese carrier, supplying ICN, HKG, BKK and TPE with the greatest frequencies daily. Its international activity is heavily concentrated at PVG and KMG, where it typically provides 73 and 13 daily international operations respectively.

CZ: China Southern Airlines

China Southern Airlines is headquartered in Guangzhou. Its main hubs are at PEK and CAN with focus cities across China, especially at URC and CKG. It is a member of the SkyTeam Alliance.

China Southern Airlines operates 50 international destinations, supplying ICN, BKK, TPE, KIX and NGO with the greatest frequencies daily. Its international activity is heavily concentrated at CAN with 62 international flights daily. It also operates 8 daily international operations from DLC, 7 from SZX and 6 from SHE, URC, WUH and CGO.

HU: Hainan Airlines

Hainan Airlines is headquartered in Haikou. It is the largest privately-owned air transport company in PRC. Its main base is HAK, with a hub at PEK and several focus cities including DLC, CAN, HGH, SZX, TYN and URC.

The carrier operates a diverse set of 14 international destinations, including TPE, ORD, TXL, SEA, BOS and NRT. Its international activity is heavily concentrated at PEK, where it typically provides 10 daily international operations.

9C: Spring Airlines

Spring Airlines is headquartered in Shanghai. It functions as a low-cost operator and is principally centred on PVG for international operations but has a diverse international route network from over 20 points of origin in China.

It is particularly focussed on BKK and KIX but also on Nagoya (NGO) and Jeju (CJU).

ZH: Shenzhen Airlines

Shenzhen Airlines is headquartered in SZX in Shenzhen. It is a member of Star Alliance.

The carrier operates to 11 international destinations including BKK, ICN, KIX and TPE.

Other Airlines

The destinations indicated by the analysis would prompt responses potentially from the following large and significant international carriers:

- SQ: Singapore Airlines Singapore
- TZ: Scoot Private Limited Singapore
- TG: Thai Airways Thailand
- JL: Japan Airlines Japan
- NH: All Nippon Airways Japan
- AK: AirAsia Malaysia
- MH: Malaysia Airlines Malaysia
- AM: Aeromexico Mexico

These are carriers with the fleets, capacity and presence to consider the potential of operating routes to China.

4.4.2 Route #1 Shenyang (SHE)-Singapore (SIN)

SHE is a focus city for China Southern Airlines (CZ) and Shenzhen Airlines (ZH), which are clearly likely candidates to serve the route, however, only China Southern has a long enough aircraft capable of flying this distance. Similarly, in SIN, both Singapore Airlines (SQ) and Scoot (TZ) have capable aircrafts. Currently, SHE is served by Scoot with a one-stop service via Qingdao. Given the demand, it will be possible for TZ to switch the SHE route to a direct flight from SIN. With a B787-8 aircraft operating a 3-weekly service, it is estimated that the load factor will be around 82%:

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency per Week	Number of Pax per Flight	Load Factor
SIN-SHE	2017	Scoot	B787-8	335	3	273	82%

4.4.3 Route # 2 Dalian (DLC)-Bangkok (BKK)

DLC-BKK has a route distance of 3468km, which is typically within the range of medium-range aircrafts, such as the Airbus A320 and the Boeing B737.

DLC airport is the hub for Dalian Airlines, a subsidiary of Air China and operating under the same IATA code, CA, and is also a focus city for China Southern Airlines (CZ). Thai Airways (TG) is the principal carrier in BKK and a major focus city for Chinese carrier Spring Airlines (9C). All of these candidates have aircrafts capable of flying this distance, although for TG, the distance is longer than other routes to destinations in China.

Thai Airways is suggested as the carrier to operate this route due to its strong hub presence in Bangkok and experience serving numerous destinations in mainland China. Based on the distance and the market size, an A320 is recommended to serve the route.

Considering the 2016 estimated demand, service of 5 flights per week would adequately match demand to supply. This proposed service is estimated to operate at an average load factor of 91%, as illustrated below:

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency per Week	Number of Pax per Flight	Load Factor
BKK-DLC	Now	Thai Airways	Airbus A320	172	5	156	91%

In terms of air service agreements, IATA does not foresee any road blocker for this route to be operated is based on the current high-level policies in place in Thailand and China. This point should however be further validated based on the official bilateral agreements in place (not available for consultation to IATA).

4.4.4 Route # 3 Shenyang (SHE) - Bangkok (BKK)

The potential for the route SHE-BKK is similar to that for DLC. The route distance is slightly longer, 3,800km, which is still within the range of medium-range aircrafts such as the Airbus A320 and the Boeing B737.
The airport is a focus city for China Southern Airlines (CZ) and Shenzhen Airlines (ZH).

Thai Airways is suggested as the carrier to operate this route due to its strong hub presence in Bangkok and experience serving numerous destinations in mainland China. Based on the distance and the market size, an A320 is recommended to serve the route.

Considering the 2016 estimated demand, service of 5 flights per week would adequately match demand to supply. This proposed service is estimated to operate at an average load factor of 89%, as illustrated below:

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Week Frequency per week	Number of Pax per Flight	Load Factor
BKK-SHE	Now	Thai Airways	Airbus A320	172	5	154	89%

Finally, in terms of air service agreements, IATA does not foresee any road blocker for this route to be operated based on the current high-level policies in place in Thailand and China. This point should however be further validated based on the official bilateral agreements in place (not available for consultation to IATA).

4.4.5 Route # 4 Beijing (PEK) - Fukuoka (FUK)

PEK-FUK has a route distance of 1,428km, making it an attractive short-haul destination capable of being served by Airbus A320 and Boeing B737 aircrafts. It is currently served by a one-stop flight but the demand justifies a non-stop service.
Potential operators for this route include CA and China Eastern (MU), both with hubs at PEK and both serving FUK from other points in China. Japanese carriers JAL (JL) and ANA (NH) could potentially operate services to PEK with services currently on offer from three points in Japan. All four carriers have suitable aircraft.
This new route can be considered by Air China, using its A320 aircraft with a seat capacity of 158 seats. Running a daily service, it is estimated that the load factor will be 72%:

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency per Week	Number of Pax per Flight	Load Factor
FUK-PEK	2017	Air China	A320	158	7	114	72%

4.4.6 Route # 5 Shanghai (PVG)-Penang (PEN)

Penang, Malaysia, is one of the most popular beach tourism destinations in South Asia.
PVG-PEN has a route distance of 3,639km, which is typically within the range of medium-range aircrafts such as Airbus A320 and Boeing B737. PEN has only two routes with China, to CAN and to SYX.

The PEN-PVG route could be served by China Eastern, and act as a feeder service to China Eastern's trans-Pacific operations in PVG.

China Eastern can make use of its A320 aircraft configured with 159 seats. Considering the estimated market potential of 119 PDEW in 2017, the service could start with six times per week and provide an adequate load factor on the route. The proposed service would operate at an estimated average load factor of 75% as illustrated below:

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency per Week	Number of Pax per Flight	Load Factor
PEN-PVG	2017	China Eastern	A320	159	6	119	75%

In terms of air service agreements, IATA does not foresee any issues for this route to be operated based on the current high-level policies in place between Malaysia and China.

4.4.7 Route # 6 Zhengzhou (CGO) - Singapore (SIN)

CGO is the principal airport serving Zhengzhou, the capital of Henan Province. It is a focus city for China Southern Airlines (CZ), Shenzhen Airlines (ZH) and China Eastern (MU), which are clearly likely candidates to serve the route.
SIN-CGO has a route distance of 3,811km, which is typically within the range of medium-range aircrafts such as Airbus A320 and Boeing B737.
Tigerair has commenced the SIN-CGO route in June 2016 with a three-weekly service on A320 aircraft.

4.4.8 Route # 7 Dalian (DLC)-Singapore (SIN)

DLC is the airport serving the city of Dalian in Liaoning Province, in the north of China.
The airport is the hub for Dalian Airlines, a subsidiary of Air China (CA) and a focus city for China Southern Airlines (CZ) and Hainan Airlines (HU). The largest international destinations it serves include HKG, ICN, NRT, KIX and TPE.
SIN-DLC has a route distance of 4,531km, which is still within the range of medium-range aircraft, such as Airbus A320 and Boeing B737.
Based on the projected demand in 2018 of 113 PDEW, the route would suit Airbus A320 (160 seats), A321 (180 seats) or B737-800 (165 seats) operating on a daily basis. This would give the attractive load factors of above 60% for the projected route.

It is likely that alliance considerations are to prevail, thus SIN is unattractive for SkyTeam member CZ. Therefore, HU could be the potential candidate for this route using a B737-800 aircraft.

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency per Week	Number of Pax per Flight	Load Factor
SIN-DLC	2017	China Southern	B737-800	161	5	120	75%

4.4.9 Route # 8 Shanghai (PVG)-Mexico City (MEX)

MEX is the commercial airport that serves Greater Mexico City. It has an elevation of over 2,340 meters above sea level.

PVG-MEX has a route distance of 12,916km, which would be further than any route currently operated from PVG. It would require long-range aircrafts such as Airbus A330, Boeing B777 or Boeing B787.

PVG is the main hub for MU and Shanghai Airlines (FM), and a major international hub for CA. HU operates long-range services from the airport. Similarly, in MEX, the principal long-range carrier is Aeromexico (AM).

Aeromexico has commenced the PVG-MEX route from February 2016 with a three-weekly service on a B787-8.

5. Conclusions and opportunities

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.

5.1 Connectivity improvement

IATA examined flights operating to and from three main Chinese hubs, namely PEK, PVG and CAN 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:

PEK – Beijing

- Air China flight 137 currently departing PEK for GMP at 18:45: Should the departure time be moved back by 15 minutes to 19:00, it would enable five more domestic connections (KHN, TAO, CKG, XIY and CGQ) and two more connections from the US (SFO, LAX).
- Air China flight 161 currently departing PEK for KIX at 16:25: Delaying the departure time by 15 minutes would enable more domestic connections arriving from KMG, NNG, NKG, ZUH and CAN.
- Delta Airlines flight 188 currently leaving PEK for DTW at 16:50 would benefit from delaying the departure time by 15 minutes. This would enable more domestic connections from XIY, SZX, WNZ, LPF and DLC.

- American Airlines flight 262 departing PEK for DFW at 16:25: Moving back the departure time by 15 minutes would enable additional domestic connections from KMG, NNG, FOC, JJN, HGH, NKG, ZUH, CAN, PVG and SHA.

PVG – Shanghai Pudong

- Air New Zealand flight 288 currently departing PVG for AKL at 14:15: Should the departure time be moved back by 15 minutes to 14:30, it would enable more connections from China (SHE, HUZ, JJN, HRB, KWL, JNZ) as well as from NRT and HKG.
- Shanghai Airlines flight 841 currently departing PVG for BKK at 22:30: Moving back the departure time by 15 minutes would enable more connections of flights arriving from China (CGQ, SHE, FOC, DLC, KHN and TSN) as well as from Japan (AKJ and NRT).
- China Eastern Airlines flight 719 currently departing PVG for NGO at 11:40: Should the departure time be moved back by 15 minutes to 11:55, it would enable more connections from domestic airports (PEK, NNG, XIY, LHW and WUH) as well as from HKG and TPE.
- China Eastern Airlines flight 759 currently departing PVG for PNH at 20:00: Should the departure time be moved back by 15 minutes, it would enable more connections from domestic airports (SHE, DLC, PEK, YNJ, HRB, TSN) as well as from ORD, FUK, SEA and AUK.

CAN – Guangzhou

- China Southern Airlines flight 329 currently departing CAN for YVR at 14:00: Should the departure time be moved back by 15 minutes to 14:15, it would enable more connections from domestic airports (NKG, GYS, CKG, WNZ and SWA) as well as from PEN and RGN.
- China Southern Airlines flight 381 currently departing CAN for BNE at 21:15: Should the departure time be moved back by 15 minutes to 21:30, it would enable more connections from domestic airports (LJG, SHA, NTG, CGQ, KMG and PEK).
- Thai Airways flight 669 currently departing CAN for BKK at 15:45: Delaying the departure time by 15 minutes would enable more connections of flights arriving from LHW, CTU, TYN and HGH.

5.2 Route frequency increase

IATA considered all of the international non-stop routes from China to determine whether the current non-stop supply adequately matches the demand. Numerous city pairs from China 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
PEK	China	HKT	Thailand	470	298	173	158%
PVG	China	BOS	United States	134	49	85	274%
PEK	China	MEL	Australia	177	98	79	181%
PVG	China	DPS	Indonesia	259	185	75	140%
PEK	China	CGK	Indonesia	191	117	74	163%
PEK	China	DPS	Indonesia	293	225	68	130%
NNG	China	TPE	Chinese Taipei	211	152	59	138%
NKG	China	BKK	Thailand	83	25	57	325%
FOC	China	NRT	Japan	102	46	56	223%
PEK	China	BOS	United States	217	167	51	130%
PEK	China	YUL	Canada	85	34	51	248%
PEK	China	KHH	Chinese Taipei	73	23	50	323%
PEK	China	SYD	Australia	284	234	49	121%

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

Destinations with the greatest capacity constraints include HKT, BOS, MEL, which all have multiple routes to China that could use extra capacity. The need for frequency increase is focused at the two busiest of China's airports (PEK and PVG).

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 economic growth is expected to continue within China and other destinations flown to, many 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	Potential Route in the long term
FOC	China	JFK	United States	95	107	✓	✓	Yes
PEK	China	BNE	Australia	66	88	✓	✓	Yes
CTU	China	LAX	United States	66	93	✓	✓	Yes
XIY	China	NRT	Japan	60	83	✓	✓	Yes
SHE	China	LAX	United States	59	87	✓	✓	Yes
PVG	China	LAS	United States	59	86	✓	✓	Yes
TAO	China	LAX	United States	59	86	✓	✓	Yes
CGQ	China	SIN	Singapore	57	91	✓	✓	Yes
HRB	China	NRT	Japan	50	75	✓	✓	Yes
SHE	China	HKT	Thailand	50	73	✓	✓	Yes
PEK	China	USM	Thailand	50	82	✓	✓	Yes
SHA	China	BKK	Thailand	46	76	✓	✓	Yes
PVG	China	USM	Thailand	45	77	✓	✓	Yes
PVG	China	ATL	United States	45	74	✓	✓	Yes
PEK	China	LAS	United States	40	79	✓	✓	Yes
PVG	China	LGA	United States	39	69	✓	✓	Yes

Table 11: 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 aircrafts 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 Beijing (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.

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 China airports.
- 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

- Work on solutions to reduce the significant delays faced by civil traffic; Chinese airspace is still military owned and costs commercial aviation significant time.

6.3 How the APEC economy's regulator can help

- Work closely with different stakeholders, for example China National Tourist Office, the Chinese General 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 for future traffic demand.
- Explore the possibility of relaxing visa requirements for tourists.

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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