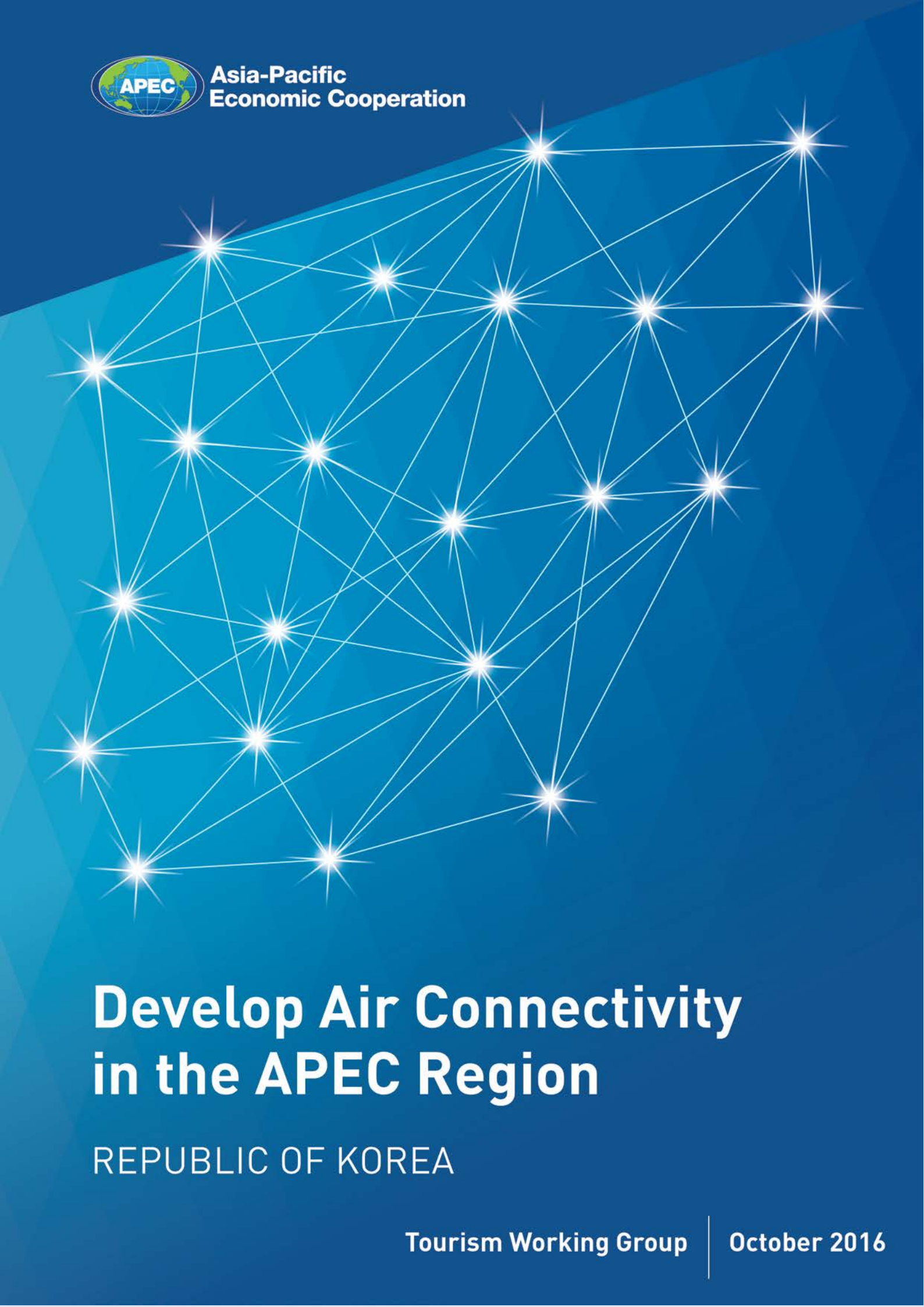

Develop Air Connectivity in the APEC Region

REPUBLIC OF KOREA

Tourism Working Group | October 2016

APEC Project: TWG 01 2014A

Produced by

International Air Transport Association

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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.

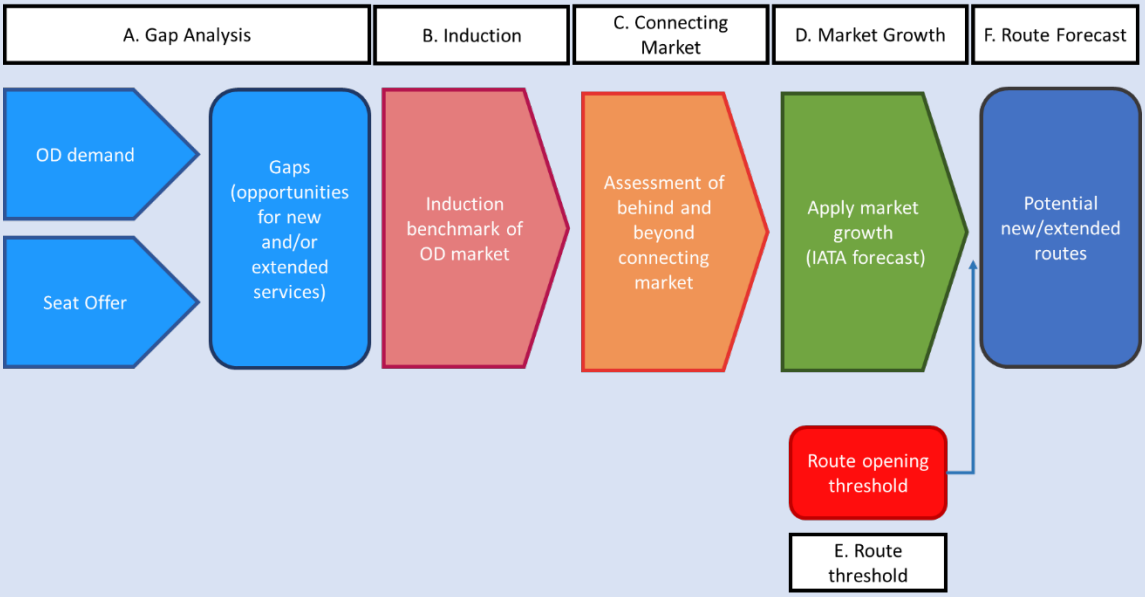

Figure 1: Process used to complete analytical work

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.

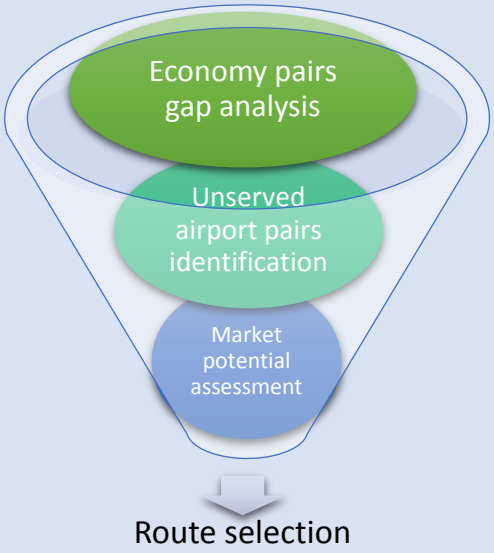

Figure 2: Funnel approach used to conduct analysis

The economy-pair analysis allowed IATA to identify unserved markets. As an example, this analysis showed that there was an average daily demand of 1,452 Passengers Daily Each Way (PDEW) in 2015 that few via existing connecting routes between the Republic of Korea and Singapore, while an average 2,235 direct (on non-stop service) seats daily each way were offered.

When extending the analysis down to the city-pairs, it was possible to identify the largest unserved markets between the two economies: 128 Passengers Daily Each Way (PDEW) travelled between PUS and SIN in 2015.

The top 20 underserved routes for the Republic of Korea 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)
PUS	Republic of Korea	SIN	Singapore	128	0	0
ICN	Republic of Korea	MEL	Australia	78	0	0
PUS	Republic of Korea	CGK	Indonesia	70	0	0
ICN	Republic of Korea	EWR	United States	53	0	265
ICN	Republic of Korea	BOS	United States	48	0	119
ICN	Republic of Korea	CUN	Mexico	47	0	0
ICN	Republic of Korea	LGA	United States	41	0	0
PUS	Republic of Korea	LAX	United States	40	0	0
ICN	Republic of Korea	PER	Australia	40	0	0
ICN	Republic of Korea	PEN	Malaysia	36	0	0
ICN	Republic of Korea	SUB	Indonesia	30	0	0
ICN	Republic of Korea	MEX	Mexico	30	0	0
RSU	Republic of Korea	MNL	The Philippines	30	0	0
ICN	Republic of Korea	OGG	United States	30	0	0
CJU	Republic of Korea	SIN	Singapore	29	0	0
CJU	Republic of Korea	TAO	China	29	0	0
ICN	Republic of Korea	LIM	Peru	28	0	0
ICN	Republic of Korea	WNZ	China	28	0	0
PUS	Republic of Korea	JFK	United States	27	0	0
CJU	Republic of Korea	CGK	Indonesia	26	0	0

Table 1: Top 20 unserved routes from the Republic of Korea, 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 the Republic of Korea. For some instances where inadequate data was available to conduct a region-pair analysis (less than 4

routes), other variables were considered including the average of all routes, 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%
NAFTA-North East Asia	80%	35%	19%
Asia - North East Asia	135%	55%	28%
South East Asia - North East Asia	165%	65%	18%
Australia - North East Asia	128%	53%	33%
Within Northeast Asia	161%	61%	34%

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 hubs were estimated based on traffic from various regions flying through ICN and PUS as well as the foreign hubs being flown to and from North Asia.

	ICN	PUS
North America	32.5%	12.8%
Australia	24.4%	
Asia	8.6%	2.8%
South East Asia	13.6%	3.5%
China	9.1%	3.2%
North Asia	6.9%	2.6%
Russia	56.3%	

Table 3: Average rate of connecting passengers at hub airports in Republic of Korea

	SIN	CGK	SYD	MEL	JFK/EWR	BOS
North Asia	18.3%	13.9%	20.7%	33.6%	9.2%	10.6%

Table 4: Connecting potential rates used when flying to/from North Asia to a selection of other main hubs

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 Republic of Korea 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 15,000 km 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 ICN-MEL 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
ICN	MEL	Australia	(A) 78	(B) 80%	(C) 33%	(D) 34%	
				(1) 62	21		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	83		(3) = 1+2
		ICN - MEL Total Market Potential (2015 Base)				(4) 125	(4) = 3/(1-D)

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

3. Republic of Korea

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

3.1 Economy and demographics

Korea is located in East Asia, located south of the Korean Peninsula. It shares borders with North Korea by land, China and Japan by sea.

3.1.1 Demographics

Korea's population is estimated at 51.4 million in April 2015. It is expected by 2020, population will grow to 53.2 million, with an annual growth rate of approximately 0.7%. Population density in Korea is approximately 514 inhabitants per square kilometre (Statistics Korea, 2016). It has an urbanization rate of 92%, with 42% of the population located in the capital of Seoul. As depicted in Table 4, the most populated cities in Korea include Seoul, Busan, Incheon, Daegu, Daejeon, Gwangju and Ulsan, in respective order. Urbanisation is estimated to be 0.71% per annum between 2010-2015.

City	Population (millions)
1. Seoul	10.09
2. Busan	3.52
3. Incheon	2.91
4. Daegu	2.49
5. Daejeon	1.53
6. Gwangju	1.48
7. Ulsan	1.17

Table 5: Largest Korean cities (Visit Korea, 2016)

3.1.2 Economy

Korea has a high-tech industrialized economy with GDP growth reaching 6% in 2010, however GDP growth has fallen to 2-3% per annum between 2012-2015 due to low domestic consumption and investment. Korea's economy grew by 2.6% in 2015 and expected to grow by 2.7% in 2016 (IMF, 2016).

Korea's trading partners are mainly focused in Asia and the United States. Its top export destinations include China; Hong Kong, China; Japan; Singapore; and the United States. Top import destinations include China; Japan; the United States; Saudi Arabia and Qatar.

Korea exports are highly diversified ranging from integrated circuits, refined petroleum, and passenger and cargo ships to LCDs (liquid crystal devices).

3.1.3 Tourism

Key tourism markets include China; Japan; the Philippines; Chinese Taipei; and the United States. Over 72% of international arrivals are leisure travellers. It is expected that annual growth of international visitors for Korea's top two markets, Japan and China will be respectively 28.4% and 14.9% per annum. Top tourist cities include Seoul, Busan and Jeju. The Korean government is open to foreign investments in the tourism industry and continues to promote and develop infrastructure and facilities to support this profitable industry (Visit Korea, 2016).

3.2 Aviation demand

Aviation plays a major role in Korea's economy given its geographical location and will opens more business opportunities as accessibility to major export markets increases.

3.2.1 Recent demand growth

Passenger air traffic to and from Korea has grown at an average of 6.25% p.a. between 2005 and 2015 (Albatross, 2016). This demand growth is seen in the table below. It is expected that the contribution of the Travel and Tourism industry to GDP will increase by 3.6% in 2016 and by 3.0% per annum in 2026 (WTTC, 2016).

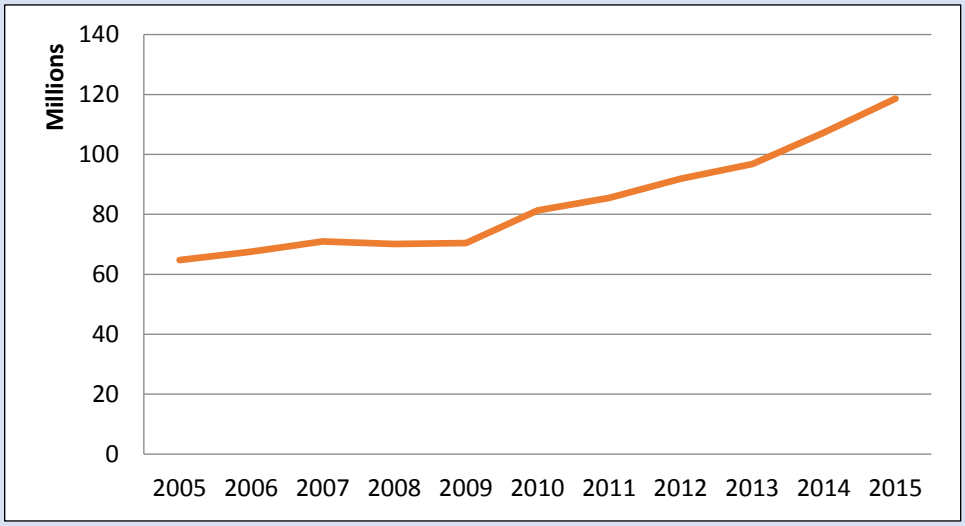

Figure 4: Total air traffic Korea 2005-2015 (Source: Albatross Airport, 2016).

Airfreight has experienced uneven growth between 2005 and 2015. The average growth rate between this period is 1.04% per annum. In 2013, the annual growth rate peaked at 33.35%, however in 2014, cargo traffic fell by 20.52%. This can be seen in Table 6.

Year	Value	% Growth Rate
2015	2,933,787	-1.61%
2014	2,981,693	-20.52%
2013	3,751,631	33.35%
2012	2,813,342	-6.13%
2011	2,997,179	-2.66%
2010	3,079,235	12.62%
2009	2,734,199	-3.59%
2008	2,835,896	-7.74%
2007	3,073,652	4.52%
2006	2,940,803	5.47%
2005	2,788,406	-2.23%

Table 6: Total air cargo traffic Korea 2005-2015 (Source: Albatross Airport, 2016).

3.2.2 Current air services to Republic of Korea

In 2010, more than 115,800 scheduled international flights departed the Republic of Korea destined to 135 airports in 42 nations (Oxford Economics, 2011). Currently the routes connecting Korea and other APEC destinations are as shown in the below figure6.

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

3.2.3 Aviation and the economy

Economic Footprint

In 2009 the aviation sector contributed KRW8,347 billion (0.8%) to the Korean GDP (Oxford Economics, 2011). This comprises of direct and indirect spending. Catalytic benefits through tourism are estimated at another KRW14,758 billion bringing the total benefits to KRW23,104 billion (2.2% of GDP).

From an employment perspective the sector supports 140,000 jobs directly and indirectly and a further 348,000 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 49 million passengers and 2.6 million tonnes of freight travelled to, from and within Korea by air (Oxford Economics, 2011).

A total of 2.6 million tonnes of freight are transported to and from Korea. The benefit to shippers, in excess of expenditure, is estimated at KRW5,012 billion. Korean shippers receive over half of this benefit (Oxford Economics, 2011).

Long-term impact

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

- Opening up foreign markets to Korean 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 labor supply, which should enhance allocative efficiency and bring down the natural rate of unemployment
- Encouraging Korean 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 KRW680 billion per annum increase in long-run GDP for the Korean economy.

3.2.4 Government position on aviation

The Korean government is in favour of aviation growth and continues to establish new bilateral agreements and expand capacity of existing agreements (CAPA, 2016). The government has provided extensive support to the aviation industry from the development of ICN in 2001 to the development of transportation and related infrastructure. ICN was established to replace GMP to become Korea's main airport, as it had reached capacity after Seoul Olympics in 1988. ICN has become Korea's largest airport and one of the busiest airports in the world since its opening.

The Korean government has continued to support the Korea Aerospace University and the Uljin Flight Academy to develop the industry's capabilities. The Korean government is transparent with its bilateral agreements making the available capacity and other details publicly available.

3.3 Airport-specific information

3.3.1 Busiest airports in Republic of Korea

Korean Air Traffic is concentrated in its top tourist destinations, with over 72% of international passenger arrivals being leisure travellers (Visit Korea, 2016). The top 5 busiest airports in Korea include ICN, CJU, GMP, PUS and CJJ as depicted in Table 8 (Albatross, 2016). Air traffic is expected to increase as Korea continues to promote the tourism industry and increase accessibility to its major markets. Airports are also increasing capacity in other aspects of the operations including roadways, car parking, baggage handling, and terminal space.

Rank	Airport	Annual traffic statistics	% of Total Korean Market
1	ICN	49,412,750	41.58%
2	CJU	26,041,115	21.91%
3	GMP	23,172,787.00	19.50%
4	PUS	12,418,428	10.45%
5	CJJ	2,118,492	1.78%

Table 7: Top 5 busiest airports in Korea (Source: Albatross Airport, 2016).

Figure 6: Map of Korea's busiest airports (Source: Google maps)

Seoul Incheon Airport (ICN)

Seoul Incheon Airport is the largest airport in Korea. It is located approximately 48 kilometers west of Seoul, the capital city of Korea. ICN serves as an international hub for both passenger and cargo traffic in East Asia. The airport is currently undergoing phase 3 of expansion plans to increase capacity to handle 62 million passengers and 5.8 million tonnes of cargo per year, from its current capacity of 44 million passengers and 4.5 million tonnes of cargo. Phase 3 is due to be completed in 2017. In 2020, it is Phase 4 will be completed and airport capacity will reach 100 million passengers and 7 million metric tonnes of cargo per annum.

Jeju Airport (CJU)

Jeju Airport is the second largest airport in the Republic of Korea. It is located in the city of Jeju, the largest island in Korea. It is a popular tourist destination. CJU serves flights to domestic destinations as well as international destinations such as China; Hong Kong, China; Japan; and Chinese Taipei.

Seoul-Gimpo Airport (GMP)

Seoul-Gimpo Airport is located 15 kilometers west of Seoul. It is the third largest airport in Korea. GMP primarily services domestic flights across Korea and provides limited international flight services to China; Hong Kong, China; Japan; and Chinese Taipei.

Gimhae International Airport (Pusan-Kimhae Airport) (PUS)

Pusan-Kimhae Airport is located in Busan. It mainly provides services to domestic destinations and offers limited international routes to China; Hong Kong, China; Japan; Chinese Taipei; and Viet Nam.

Cheongju Airport (CJJ)

Cheongju Airport is located in Cheongwon-gu, serving Daejeon and Sejong city. It offers domestic flights to Jeju and international services to China; Japan; Chinese Taipei; and Thailand.

3.3.2 Principal airline operators

Rank	Carrier	Total	%
1	Korean Air	14,478,247	37.15%
2	Asiana Airlines	9,793,704	25.13%
3	China Southern Airlines	1,158,424	2.97%
4	Cathay Pacific	1,046,374	2.69%
5	China Eastern Airlines	977,691	2.51%
6	Thai Airways International	855,970	2.20%
7	Jeju Air	792,972	2.03%
8	Air China	753,201	1.93%
9	Jin Air	654,672	1.68%
10	Singapore Airlines	598,304	1.54%

Table 8: Top 10 airline operators (Source: Albatross Airport, 2016).

In 2012, the top 5 airline operators included Korean Air, Asiana Airlines, China Southern Airlines, Cathay Pacific Airline and China Eastern Airline, as depicted in Table 8.
A number of major airlines are based in Korea, including Korean Airlines, Jeju Air and Jin Air. In 2012, Korea Air held 37.15% share of the total passenger market (Albatross, 2016).

Korean Air

Korean Air's headquarters are located in Seoul, Korea. It has a fleet of 158 aircrafts as of December 2015 and provides services to 46 countries and 129 destinations. Its fleet of aircrafts includes A380-800, B747-400, B747-8F, B747-8i, B777-F, B777-200ER/300ER/300, A330-200/300 and B737-800/900ER/900. Its main airport hub is ICN. In 2014, it carried 6.65 million domestic passengers and 16.61 international passengers. It also carried 143.4 thousand tons of international cargo and 9.4 thousand tons of domestic cargo. It is responsible for handling over 75% of all air cargo flowing into and out of Korea. (Korean Air, 2016).

Jeju Air

Jeju Air was established in 2005. It is a low-cost airline carrier. It provides services to both domestic destinations and international destinations within Asia. It operates from GMP and ICN. It uses one type of aircraft: B737-800 (Jeju air, 2016).

Jin Air

Jin Air was founded in 2008 and mainly focuses on providing domestic services between GMP and CJU. It is a low-cost carrier and operates a fleet of 20 aircrafts including 17 Boeing 737-800s and 3 Boeing 777-200ERs (Jin air, 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 Republic of Korea 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 Republic of Korea 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 Republic of Korea and other APEC economies. The data essentially shows the economy pairs where

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

Origin Economy	Demand (PDEW)	Non-Stop Seat Offer (SDEW)	One-Stop Seat Offer (SDEW)	Ratio of Demand to Supply
Australia (AUS)	679	739	0	92%
Brunei Darussalam (BD)	3	0	0	*
Canada (CAN)	523	674	0	78%
Chile (CHL)	18	0	0	*
People's Republic of China (PRC)	20,464	29,247	796	68%
Hong Kong, China (HKC)	3,904	6,190	327	60%
Indonesia (INA)	1,019	1,534	0	66%
Japan (JPN)	13,759	20,971	0	66%
Republic of Korea (ROK)	55,376	75,205	0	74%
Malaysia (MAS)	1,446	2,025	0	71%
Mexico (MEX)	110	0	0	**
New Zealand (NZ)	150	212	0	71%
Papua New Guinea (PNG)	1	0	0	*
Peru (PE)	29	0	0	*
The Republic of Philippines (PH)	3,965	5,765	0	69%
Russia (RUS)	399	846	0	69%
Singapore (SGP)	1,545	2,236	161	64%
Chinese Taipei (CT)	3,102	4,035	0	77%
Thailand (THA)	3,802	5,356	600	64%
United States (US)	5,465	10,246	1,231	48%
Viet Nam (VN)	2,748	4,353	0	63%

Table 9: 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 less than 60%, however 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. Republic of Korea and Australia at 92% where the non-stop supply is barely enough to cover the total demand between the economies).

Based on the above analysis at the economy level, Republic of Korea may have an opportunity to improve service to 12 economies in the long term (highlighted in yellow in the above table), and could take actions to improve service with Australia 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 to city pairs, 13 have a demand of 30 PDEW or more with no non-stop service, as illustrated in the table below. These 13 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 Republic of Korea.

Origin Airport	Origin Economy	Destination Airport	Destination Economy	2015 OD Demand (PDEW)
ICN	Republic of Korea	MEL	Australia	78
ICN	Republic of Korea	PER	Australia	40
PUS	Republic of Korea	CGK	Indonesia	70
ICN	Republic of Korea	SUB	Indonesia	30
ICN	Republic of Korea	PEN	Malaysia	36
ICN	Republic of Korea	CUN	Mexico	47
ICN	Republic of Korea	MEX	Mexico	30
PUS	Republic of Korea	SIN	Singapore	128
ICN	Republic of Korea	EWR	United States	53
ICN	Republic of Korea	BOS	United States	48
ICN	Republic of Korea	LGA	United States	41
PUS	Republic of Korea	LAX	United States	40
ICN	Republic of Korea	OGG	United States	30

Table 10: APEC routes to Republic of Korea with over 29 PDEW with no non-stop service (Source: IATA analysis of Airport IS data).

4.2 High-level feasibility considerations

City-pairs with 30 PDEW (1,095 annual passengers one-way) were considered as the minimum threshold for analysis. 13 city pairs to and from Republic of Korea met this criterion.

As a way to further define a potentially viable route, IATA used two metrics: distance and market size. Due to aircraft range restrictions, city-pairs more than 15,000km from each other were eliminated. The second criterion used the application of induction and connection potential rates (unique to each region and route type) to the existing OD demand in order to determine whether the route would garner demand of a minimum 158 PDEW for ultra-long-haul routes (over 12,000km), 110 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 detailed breakdown of the factors).

This filtering process led to the selection of two routes, which are presented in the table below with more details in the next section.

Origin Airport	Origin Economy	Destination Airport	Destination Economy	2015 OD Demand	2015 Estimated Market Potential	Distance viable for non-stop flight with current technology	Market size adequate for non-stop service in the medium term	Proposed Route
ICN	Republic of Korea	MEL	Australia	78	125	✓	✓	Yes
ICN	Republic of Korea	PER	Australia	40	56	✓	×	No
PUS	Republic of Korea	CGK	Indonesia	70	87	✓	×	No
PUS	Republic of Korea	SIN	Singapore	128	144	✓	✓	Yes
ICN	Republic of Korea	EWR	United States	53	57	✓	×	No
ICN	Republic of Korea	BOS	United States	48	59	✓	×	No
ICN	Republic of Korea	CUN	Mexico	47	53	✓	×	No
ICN	Republic of Korea	LGA	United States	41	47	✓	×	No
PUS	Republic of Korea	LAX	United States	40	55	✓	×	No
ICN	Republic of Korea	PEN	Malaysia	36	53	✓	×	No
ICN	Republic of Korea	SUB	Indonesia	30	49	✓	×	No
ICN	Republic of Korea	MEX	Mexico	30	79	✓	×	No
ICN	Republic of Korea	OGG	United States	30	39	✓	×	No

Table 11: Summary of high-level route feasibility considerations

4.3 Proposed route analysis

Based on the filtering process applied above, IATA narrowed the above selection to two routes. This section decomposes the route potential and presents a forecast of the current demand on the medium term.

4.3.1 Route #1 ICN-MEL

ICN-MEL 2015 total route potential definition:

				1	2	4	
Origin Airport	Destination Airport	Destination Economy	2015 OD Non-direct Demand	OD Captured Though Deorect Service	OD Stimulation	Behind/Beyond Connecting Potential	Caculations
ICN	MEL	Australia	(A) 78	(B) 80%	(C) 33%	(D) 34%	
				(1) 62	21		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	83		(3) = 1+2
		ICN - MEL Total Market Potential (2015 Base)				(4) 125	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the ICN-MEL presents a potential of 125 PDEW for a direct service between the two cities.

This potential would grow to 146 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
Republic of Korea-Australia	ICN-MEL	125	132	139	146

4.3.2 Route #2 PUS-SIN

PUS-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
PUS	SIN	Singapore	(A) 128	(B) 80%	(C) 15%	(D) 34%	
				(1) 103	15		(1) = AxB
				(2)			(2) = 1xC
			Subtotal	(3)	118		(3) = 1+2
		PUS - SIN Total Market Potential (2015 Base)				(4) 144	(4) = 3/(1-D)

Based on 2015 demand figures, IATA estimates that the above route presents a potential of 144 PDEW for a direct service between the two cities.

This potential would grow to 169 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
Republic of Korea-Singapore	PUS-SIN	144	152	160	169

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 ICN-MEL

The ICN-MEL route could be served by Korean Air using the 218 seats A330-200 aircraft. Considering the estimated market potential of 139 PDEW in 2017, the new service could start six times a week and operate at an estimated average load factor of 74% as illustrated below:

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency pe Week k	Number of Pax per Flight	Load Factor
ICN-MEL	2017	Korean Air	A330-200	218	6	162	74%

4.4.2 Route #2 PUS-SIN

The PUS-SIN route can be considered by Air Busan using an A321 aircraft configured with 195 seats. With a 6-weekly service to start with in 2017, it is estimated the load factor will be a healthy 77%:

Route (non-directional)	Minimum Opening Date	Airline	Aircraft	# of Seats	Frequency per Week	Number of Pax per Flight	Load Factor
PUS-SIN	2017	Air Busan	A321	195	6	149	77%

5. Conclusions and opportunities

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

5.1 Connectivity improvement

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

IATA examined flights operating to and from ICN for this analysis. A small selection of improvements can be identified for ICN suggested based on optimal connecting time-related considerations. Below is a summary of the potential optimizations:

- Korean Air flight 17 currently departs ICN for LAX at 15:00. Should the departure time be moved back by 25 minutes to 15:25, it will enable five more connections from NKM, PVG, CGO, TSN and KIX.
- Korea Air 641 bound for SIN currently leaves ICN at 18:40. By moving the departure time by 20 minutes to 19:00, it will allow more connections from North America, namely SEA, LAX, SFO and YVR.
- Asiana flight 741 currently leaves for BKK at 18:30. By postponing the departure time by 10 minutes, it will allow two more connections from SFO and LAX.
- Asiana flight 232 to HNL currently leaves ICN at 20:20 and is missing connections from PVG, PEK, SGN, WEH and NKM. These connections can be enabled should the departure time retimed by 40 minutes to 21:00.

5.2 Route frequency increase

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

Due to the fact that most aircraft 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
CJU	Republic of Korea	KMG	China	22	12	10	185%
CJU	Republic of Korea	CTU	China	29	18	11	159%
CJU	Republic of Korea	CAN	China	37	26	11	144%
CJU	Republic of Korea	WUH	China	42	31	11	134%
CJU	Republic of Korea	SHE	China	61	48	13	128%
CJU	Republic of Korea	BKK	Thailand	56	46	9	120%
CJU	Republic of Korea	BKK	Thailand	56	47	9	119%
ICN	Republic of Korea	HAK	China	42	38	4	111%
CJU	Republic of Korea	SZX	China	37	34	3	109%
CJU	Republic of Korea	DLC	China	69	71	-2	98%
CJU	Republic of Korea	HKG	Hong Kong, China	91	93	-2	98%
CJU	Republic of Korea	TPE	Chinese Taipei	55	56	-1	98%
CJU	Republic of Korea	CGO	China	28	30	-2	94%
CJU	Republic of Korea	CGQ	China	87	101	-13	87%
CJU	Republic of Korea	XIY	China	64	74	-10	86%
CJU	Republic of Korea	CSX	China	41	47	-7	86%

Table 12: List of routes with potential for frequency increase

Destinations with the greatest capacity constraints are within China. 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
PUS	Republic of Korea	CGK	Indonesia	70	87	✓	✓	Yes

Table 13: 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 A350-900 and B787-9:

Figure 7: Range limit for the latest generation of aircraft from Seoul-Incheon (Source: GCMap)

6. Recommendations to improve air connectivity

The various recommendations to improve 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 airports in Republic of Korea.
- Encourage airlines, especially Korean Air and Asiana 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

- Address terminal and runway capacity issues at CJU airport.
- International to domestic minimum connecting time at ICN is 100 minutes, which is relatively long compared with other regional hubs such HKG and NRT (60 minutes). Thus, connecting time should be minimized to enhance the hub function of ICN.
- Ensure that adequate planning is in place for major international airports 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 Republic of Korea Tourism Authority, the Chamber of Commerce, etc. to gain a deeper understanding of the development of the aviation demand.
- Ensure that the major international airports have the adequate investment and improvement program to cater for future traffic demand.
- Explore the possibility of relaxing visa requirements for tourists.
- Reduce Passenger Movement Charge on international 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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