

The 787 and A350 allow airlines to operate non-stop, ultra long-distance routes. These allow many operators to expand their long-haul networks, and make their route networks more cost-efficient. Charlotte Daniels examines their fleet and network planning strategies.

Deployment of the 787 & A350 on the global long-haul market

The 787 and A350 are medium-sized new-generation widebodies designed to provide unit costs per available seat-kilometre (ASK) that are on a par with large and ultra-large widebodies. This unit cost performance is delivered via fuel efficiencies and maintenance-efficient designs. If the desired economic performance of smaller widebodies has been achieved, the 787 and A350 will allow operators to optimise and expand medium- and long-haul and intercontinental route networks by opening low-density, long-distance routes that were not previously economic to operate with larger types at low service frequencies. Many of these routes will be from major hubs to secondary airports, rather than the traditional long-haul route structure of hub-to-hub services.

Deployment of 787s and A350s also coincides with the retirement of legacy aircraft, such as the 767-300ER, A340 and 747-400. New-generation aircraft have the potential to develop more efficient intercontinental route networks, while optimising revenue and traffic growth.

In November 2017, there were 340 787-8s and 269 -9s and 125 A350-900s in service. 44 operators have taken delivery of the 787-8 and -9, while 17 airlines have the A350-900. The 787-10 and A350-1000 have yet to enter service, although each has a substantial orderbook. The promised operational and technological capabilities of the 787 and A350 have been extensively explored (*see 787 market focus: how is the*

aircraft being deployed? Aircraft Commerce, February/March 2016, page 17; and Assessment of the 200- to 400-seat widebody market, Aircraft Commerce, June/July 2017 page 22). The 787-8 has a range of 7,355nm, with suggested two-class seating for 242 passengers, while the 787-9's range is 7,635nm with a two-class seat capacity of 290. Seat numbers vary depending on the layout of passenger accommodation (LOPA) chosen by each operator, and its first-, business- and economy-class sections. While the aircraft complements, and serves as a suitable replacement for, 767 and 757 long-haul activities, Boeing has also noticed operators looking to down-gauge operations from 747 and A380 fleets.

The A350-900 offers a range of 8,100nm and a typical three-class LOPA of 325 seats. Data provided by FlightGlobal suggests that operators are averaging seat numbers of: 265 seats on the 787-8; 296 on the -9; and 294 on the A350-900.

The main markets for which the 787 and A350 provide replacements include the 777-200/-200ER, A340-300/-500 and MD-11. It is expected that the 787 and A350 will be used on routes and networks previously served by these older types.

Order book

According to Flight Global FleetAnalyzer, 37 operators and lessors are yet to operate the 787 and A350, but have outstanding orders. Remaining order-

holders are included in the following operator summaries (*see table, page 20*). This table only includes order-holders not operating either aircraft.

Considerations

Airlines have different approaches towards incorporating new aircraft types into their fleets, depending on factors such as: the scale of their existing operation; whether the new type is replacing a legacy fleet; whether the operator wants to substantially increase its network and long-haul operations; and whether the type will support existing capacity while providing more economical operation. Many operators, for example, will add a new aircraft type to an existing route upon delivery, to assess its impact on revenue; the availability of more business-class seats might positively impact revenues if the route is popular for business travel. Further considerations include alternating aircraft types on a given route depending on seat availability, establishing frequencies before upscaling a fleet, and adding frequencies during peak seasons.

Capacity provided in ASKs shows the size of an airline's operation. This article will explore the size and capacity of carriers' long-haul and intercontinental route networks by using data provided by FlightGlobal. For each route, available seats and total flights in 2017 are provided, with the route distance in kilometres (km), to calculate ASKs across all long-haul





Aeromexico has used the 787 to both enhance service frequencies on its existing long-haul network, but also to open new routes to Amsterdam and Seoul.

routes. Even if two operators perform the same route using the same aircraft and at the same frequency, their ASKs may vary due to seat layout. Some operators prioritise business-class or premium-economy cabins. With a smaller economy cabin, overall seat numbers are lower than in a configuration with a smaller premium cabin, and therefore a large economy class cabin. Carriers with a limited catchment, or flying to leisure destinations will have a smaller premium cabin and higher seat numbers, especially if they are small or low-cost carriers.

Data provided by FlightGlobal defines long-haul routes as being longer than 4,000km or between two continents. These are the focus of frequencies discussed below. The data is valid as of 30 November 2017. Attempts have been made to update the information provided where developments have since occurred.

2010 vs 2017 overview

A comparison of 787 and A350 operators' long-haul route network activity from 2010 to 2017 is made to show how the market has changed since the types entered service. All source data for long-haul and intercontinental flights and frequencies is provided by Flight Global. A summary of operational growth for each airline is also given where applicable.

In 2010, the global long-haul market was served by 1.28 million flights provided by 228 operators with about 343 million

seats and an average of 285 seats per flight.

The highest frequency service was New York (JFK) - San Francisco (SFO), operated on United Airlines' 757s. The highest ASK capacity was on Cathay Pacific's Heathrow (LHR) to Hong Kong (HKG) route, which generated about 4.3 billion ASKs, using the 747. The airline offered 1,151 one-way flights on the route with 440,833 seats.

The longest sector performed in 2010 was Newark (EWR) to Singapore (SIN), operated by Singapore Airlines (SIA) with the A340 over a distance of 15,250km. SIA operated 356 flights and offered 35,600 seats, generating 543 million ASKs.

From January to November 2017, 1.8 million flights were operated, with 504 million available seats, representing a 40% rise in long-haul and intercontinental market capacity over seven years. The average long-haul route length in 2017 was 6,911km, equivalent to Hong Kong to Australia. 12,835 bi-directional flights were operated, an increase of about 40%.

While the number of long-haul operators in 2017 is similar to 2010, some now operate the 787 and A350. EWR-SFO remained the busiest route in 2017. Routes generating the highest ASKs are now flown by the A380. The highest ASKs were achieved by Emirates: Dubai (DXB)-JFK and DXB-LHR with capacities of 5.6 billion ASKs and 5.89 billion ASKs. The longest route is Qatar's Doha (DOH) to Auckland (AKL) route, which is 14,500km and is performed by a 777-200LR.

In 2017, the 787 and A350 performed

1,973 of 12,835 long-haul services, equating to 15% of overall long-haul and intercontinental flights performed for the year. Unsurprisingly, the 787 accounts for a greater percentage of these flights, given the A350-900's relatively recent inception.

This article will show how operators used 787 and A350 fleets in 2017, and aim to show, where possible, which operators have incorporated the types onto new routes, and how these aircraft are changing long-haul and intercontinental operations.

787 – current operators

The operational 787 fleet includes the 787-8 and -9 series. According to Boeing, the -8 and -9 are responsible for 170 new routes being established by 28 of the in-service operators up to December 2017.

Information provided by FlightGlobal suggests that 243,000 787 flights were performed in January-November 2017 by 49 787-8 and -9 operators. Average route length was 7,483km, and the average number of seats per flight was 275. Routes offering the highest frequencies included Jakarta (CGK)-DOH with Qatar Airways, which performed 1,096 annual services. American Airlines' Chicago (ORD)-LHR route, which was flown 1,043 times from January to November 2017, was a high-frequency service at three flights per day.

The summaries below will focus on airlines with more than 10 787s in service, to show how they have used the aircraft to expand and develop long-haul routes. The size of long-haul operation and expansion in terms of routes, frequencies and ASKs will be added where possible.

Aeromexico

Based at Mexico City (MEX), Aeromexico operates nine 787-8s and five 787-9s, with four 787-9s on order. Its fleet also includes the 737 and 777.

Aeromexico offers 243 seats on its 787-8s: nine 'AM Plus' seats, 32 'Class Premier' seats, and 202 economy seats. Its 787-9s feature 27 AM Plus, 36 Class Premier and 211 economy seats.

In 2010, Aeromexico's long-haul routes were served by 767s and a legacy fleet of 777s. It operated nine routes from Mexico: Buenos Aires (EZE), Paris (CDG), Madrid (MAD), Barcelona (BCN), Santiago (SCL), Lima (LIM), Sao Paulo (GRU), Shanghai (PVG) and Tokyo Narita (NRT). It

PENDING OPERATORS OF THE 787 & A350 - ORDERS, LOCATION & LONG-HAUL ACTIVITY

OPERATOR	ORDERS PENDING					2017 CONTINENTS	LONG-HAUL ACTIVITY FOR OLDER-HOLDER		
	787-8	787-9	787-10	A350 -900	A350 -1000		FLIGHTS 2017	AVERAGE KM KM	LONG-HAUL FLEET
AER LINGUS				9		EUROPE, N AMERICA	7,940	5,798	A330, 757
AEROFLOT	18	4		14		ASIA, N AMERICA, EUROPE, CARIBBEAN	22,496	6,746	A330, 737, 777
AFRIQIYAH AIRWAYS				10					
AIR ASTANA	3					ASIA, EUROPE	2,895	4,566	757, 767
AIR NUIGINI	1					ASIA, AUSTRALASIA	1,106	5,020	737, 767
AIR TAHITI NUI		4				ASIA, AUSTRALASIA, N AMERICA, EUROPE	2,105	6,777	A340
AIR TANZANIA	1								
AIR ASIA X				10		AFRICA, ASIA, M EAST AUSTRALASIA, N AMERICA	12,429	6,911	A330
ARIK AIR		9				AFRICA, N AMERICA, EUROPE	228	5,734	A330, 737
AVOLON		17		8					
BIMAN	4					ASIA, EUROPE, M EAST	2,853	4,793	A330, 777
CAPITAL AIRLINES				2					
CHINA EASTERN				20		ASIA, AUSTRALASIA, EUROPE M EAST, N AMERICA	21,092	7,867	A330, 767, 777
EGYPTAIR		6				AFRICA, ASIA, EUROPE N AMERICA	4,036	6,382	A330, 737, 777
EVA AIR		4	20			ASIA, EUROPE, AUSTRALASIA N AMERICA	10,978	10,219	A330, 747, 777
GULF AIR		16				ASIA, EUROPE, M EAST	4,902	5,180	A330
IBERIA				16		AFRICA, ASIA, CARIBBEAN EUROPE, AMERICA	17,899	8,097	A330, A340
IRAN AIR					16	ASIA, EUROPE, M EAST	794	4,564	A300, A330, 747
IRAQI AIRWAYS	10					ASIA, M EAST	343	6,165	A330, 737, 767, 777
JET AIRWAYS		10				ASIA, EUROPE, N AMERICA	7,046	5,932	A330, 737, 777
KUWAIT AIRWAYS				10		ASIA, EUROPE, M EAST N AMERICA	5,647	5,209	A330, A340, 777
MALAYSIA AIRLINES				6		ASIA, AUSTRALASIA, EUROPE, M EAST	10,424	6,155	A330, A380, 737
NEOS		3				AFRICA, ASIA, AUSTRALASIA, EUROPE, M EAST, N AMERICA	417	7,236	737, 767
PHILIPPINE AIRLINES				6		ASIA, AUSTRALASIA, EUROPE M EAST, N AMERICA	9,044	8,293	A330, A340, 777
SAS				8		ASIA, EUROPE, N AMERICA	10,052	6,811	A330, A340, 737
SHANGHAI AIRLINES		10				ASIA, EUROPE	84	5,918	767
SICHUAN AIRLINES				3		ASIA, AUSTRALASIA, EUROPE M EAST, N AMERICA	2,345	8,066	A330
SRILANKAN AIRLINES				4		ASIA, AUSTRALASIA, EUROPE M EAST	4,654	5,415	A330
TIANJIN AIRLINES				2		ASIA, AUSTRALASIA, EUROPE	634	8,282	A330
WESTJET		10				CARIBBEAN, AMERICA, EUROPE	8,070	4,681	737, 767

DATA PROVIDED BY FLIGHTGLOBAL FLEETANALYZER. NOVEMBER 2017 DATA.

TABLE DOES NOT INCLUDE LESSOR ORDERS, OR ORDERS FROM AIRLINES WITH TYPES ALREADY IN-SERVICE.

operated just over 4,500 long-haul flights.

Aeromexico used the 787 to boost frequencies and long-haul capacity, offering 11 long-haul routes in 2017 from domestic bases: Tijuana (TIJ), Monterrey (MTY) and Mexico City (MEX), using 787s, 737s and 777s. 787-8s and -9s perform eight of these 11 routes: Amsterdam (AMS), CDG, EZE, LHR, MAD, NRT, SCL, Seoul (ICN) and PVG. This equates to almost 80% of

its long-haul network in 2017. Both AMS and ICN are new routes, added due to the 787's operational capabilities.

Aeromexico first incorporated the 787 by adding it to existing routes, including a daily MAD service, previously served solely by the 777, and the LHR route, initially served three times weekly with 767s. It introduced the 787 to this route by adding it as the third weekly frequency.

Aeromexico's first 787 route was to NRT, which it started to operate with 787s together with its 777s in 2013, before increasing from three to five services a week. By 2017 this was a daily service.

From January 2018 Aeromexico is deploying the 787 on its GRU frequency. Aeromexico says that acquiring the 787 has been key to increasing connectivity between Mexico and the rest of the world.



Air France

Air France has five 787-9s in service and two on order, due for delivery in 2018. It also has 21 A350-900s on order, with initial delivery scheduled for August 2019. Lower fuel burn and maintenance costs influenced Air France's decision to introduce both types to the fleet.

Air France's goal was to replace A340s, and in time 777-200s, and to add new destinations and develop existing ones. "We are still in a ramp-up phase," says a spokesperson. "The 787 is flying daily to Boston (BOS), Toronto (YYZ), Panama (PTY) and Bamako-Abidjan, and six times a week to Cairo (CAI) and GRU.

"So far the 787 has been used to replace older aircraft, and maintain service frequencies," adds the spokesperson. "As of April 2018 we will use it to open CDG-NBO with a three times per week service."

Air France first used the 787 on CDG-CAI, with six flights a week, in addition to a combination of flights to London.

Air India

Air India started 787-8 operations in 2013, receiving its last aircraft in October 2017. It now has 27 -8s in service.

As of November 2017, Air India's total long-haul capacity was more than 27.5 billion ASKs on 22 destinations served from hubs. These include LHR, EWR, Jeddah (JED), Stockholm (ARN), Vienna (VIE), Birmingham (BHX), CDG, Moscow (SVO), Rome (FCO), Frankfurt (FRA), Washington Dulles (IAD), JFK, MAD, Melbourne (MEL), Milan (MXP), NRT, ORD, PVG, SFO, SIN and Sydney (SYD).

In 2010, Air India's long-haul network equated to almost 21 billion ASKs. Since then, its long-haul capacity has risen by

almost 30%.

Air India's long-haul fleet includes the 747, 777-300ER/-200LR and 787-8; 787 fleet activity accounted for 14 billion ASKs in 2017, or 50% of its long-haul network. The 787-8 is mainly used on European routes, and some to Australasia and Asia.

As of November 2017, the 787 flew to 15 of Air India's long-haul destinations, including a daily service to LHR (2 billion ASKs). New destinations served by the 787 that were not operated by Air India in 2010 include: ARN (83 million ASKs), BHX (610 million), Copenhagen (CPH) (70 million), SVO (60 million), FCO (230 million) and MAD (280 million). The 787 has allowed Air India to perform new, non-stop routes from India to MEL and SYD.

The 787 operates daily frequencies to CDG, LHR, and FRA, and also serves VIE, PVG and NRT.

Air New Zealand

Air New Zealand's long-haul fleet includes the 767, 777 and, as of November 2017, 11 787-9s with two -9s on order.

The size of its long-haul operation is about 27 billion ASKs, with almost 11 billion provided by the new-generation fleet. The 787 is used on 11 of Air New Zealand's 14 long-haul destinations.

EZE is operated by the -9, with three or four weekly flights, depending on the season. Other destinations include Bali, Ho Chi Minh (SGN), Honolulu (HNL), Osaka (KIX), Perth (PER), PVG, SIN, Tahiti (PPT) and NRT. Air New Zealand has used the 787 to expand its Tokyo coverage, by adding three weekly services to Haneda (HND) to its existing daily service to NRT.

The 787-9 has replaced 777-200ERs on Auckland (AKL)-Houston, starting in December 2017. The 787-9 offers more

ANA's 787 fleet serves 17 global destinations. Since its inception, ANA has launched four daily non-stop services to San Jose, Dusseldorf, Brussels and Phnom Penh using the 787.

premium-economy capacity on this route, which is required as passenger numbers continue to rise. Air New Zealand has previously said that the route has bolstered traffic from the US since its launch in late 2015. In late 2017, Air New Zealand said there was potential for a new AKL to Adelaide (ADL) frequency in 2018.

American Airlines

American Airlines has 20 787-8s and 13 -9s in service, with a further nine 787-9s and 22 A350-900s on order.

In 2017, its long-haul network was 137 billion ASKs, up almost 50 billion ASKs, or 36%. Its US hubs are LAX, JFK, Charlotte, ORD, Dallas (DFW), Miami (MIA), IAD, Philadelphia (PHL) and Phoenix (PHX).

Of American's 2017 long-haul network, the 787 accounted for 25 billion ASKs; the rest are served by A320s, A330s, 737s, 757s, 767s and 777s. From the US, 787-8s and -9s fly to 15 Asia Pacific, Australasian, European and South American airports including: AKL, Dublin (DUB), FRA, SCL, LHR, MAD, CDG, GRU, ICN, PVG, SYD, NRT and HND.

In 2016, American announced the launch of a daily ORD-BCN route using the 787, which performed its first non-stop route from Chicago to Spain. In November 2017 it also opened LAX-Beijing (PEK).

American has expanded its Asia-Pacific network significantly in recent years thanks to the 787, while strengthening its presence at LAX. Since 2015, it has added 24 destinations from LAX including SYD, AKL, HKG, HND and PEK.

In May 2018, an ORD-VCE service is due to start with its 787-8 fleet.

All Nippon Airways (ANA)

ANA was a launch customer for the 787, taking delivery of its first 787-8 in 2011. It has 36 787-8s and 26 787-9s in service, with 18 -9s and three 787-10s on order. ANA is the largest 787-9 customer.

ANA's early operational activity with the 787 has been extensively summarised (*see 787 market focus: how is the aircraft being deployed? Aircraft Commerce, February/March 2016, page 17*). ANA serves 43 cities via 85 frequencies, with about 1,350 flights per week. From January to November 2017, its long-haul network generated almost 51 billion ASKs, with over 50% provided by its 787 fleet.

From Japan, ANA's 787 fleet covers 17

Norwegian's 787 fleet is due to double by 2020, with a further 21 aircraft still to be delivered. 11 new transatlantic routes have already been announced for 2018.

Asia Pacific, Australasian, European and North American destinations. It has opened four new daily non-stop services since incorporating the 787, including: NRT-San Jose (SJC) with its 787-8; NRT-DUS mostly with -9s, and NRT-BRU and NRT-Phnom Penh (PNH) with the -8s. These routes have added 2.4 billion ASKs to ANA's long-haul operation.

ANA's long-haul capacity has more than doubled since 2010, when its network comprised nearly 22 billion ASKs. The 767 and 747 have now been phased out of its long-haul fleet, and the 787's operational efficiency and range have allowed ANA to expand on international routes. 787s are also used from NRT to Manila (MNL), PVG, Mumbai (BOM), Bangkok (BKK), Honolulu (HNL), PEK and SGN.

From HND, the 787 flies to MNL and Kuala Lumpur (KUL). In 2017, ANA used the -8 to launch its longest route, NRT-MEX. It was the first airline to offer non-stop dailies between Japan and Mexico.

Avianca

Avianca has hubs in Bogota, Lima and San Salvador. As of November 2017, it operates 12 787-8s and three -9s, with 10 A350-900s on order. Its long-haul fleet also includes the A330.

Avianca's 787 fleet covers European and North American destinations. All European routes are served by 787s. International long-haul destinations served by the 787-8 and -9 include: BCN (daily), LHR (daily), LAX (daily) and MAD. Its Bogota-MAD frequency has increased to 20 weekly flights as of November 2017.

The 787 has allowed Avianca to increase frequencies. Its 787 fleet became the first to provide non-stop Colombia-Europe frequencies, adding over 40,000 seats. Since 2010, Avianca's long-haul network has increased from six billion ASKs to about 14.5 billion ASKs in 2017.

British Airways (BA)

In November 2017, BA had nine 787-8s and 16 -9s in service. The full-service provider has a further three -8s and two -9s pending delivery, in addition to 12 787-10s and 18 A350-1000s on order.

BA's long-haul fleet includes the A380, 747 and 777. The 787 formed part of BA's fleet renewal plan, aiding the retirement of 767s. BA has outlined plans to retire its remaining 747s by 2025; 777s remain a



major feature of its long-haul fleet.

BA operates about 70,000 long-haul flights across 90 destinations from its London hubs, generating about 140 billion ASKs on its long-haul network. The 787-8 and -9 fleet provides almost 20% of this capacity, or 23 billion ASKs. BA's 787 fleet covers 30 long-haul destinations from London, flying to Asia Pacific, Middle East, North and South American cities.

BA has announced a new twice-weekly Seychelles frequency using the 787-8, from March 2018; after 10 years, this is a re-entry to the route. BA is also launching a new route to Nashville (BNA), from May.

The 787 has further grown US capacity for BA, and enabled connections between major hubs. Its LHR-Austin (AUS) route opened European channels for the smaller US airport. The interest established since the introduction of the 787 to this route has led BA to use the 787-9 on it.

Etihad Airways

Etihad operates 18 787-9s, having taken delivery of its first 787 in January 2015. It will add A350s into its long-haul fleet. It has a further 23 787-9s, 30 -10s, 40 A350-900 and 22 -1000s on order.

Etihad's long-haul network was 96 billion ASKs, across almost 42,000 annual flights. As well as the 787, it has A320s, A330s, A340s, A380s and 777s in its long-haul fleet. The 787 flies from Abu Dhabi (AUH) to 18 African, Asia Pacific, Australasian, European and North American destinations. A new daily frequency offered on the 787-9 is AUH-Brisbane (BNE). This is now Etihad's longest route, and has added more than 1.5 billion ASKs to its long-haul capacity.

Etihad's 787s are operated to AMS (the 787 is used at peak times), BKK, PEK, SIN,

Johannesburg (JNB), MAN, MEL, and ICN. New frequencies include AUH to DUS (daily), PER (daily), Phuket, FCO, PVG, NRT (daily), IAD (daily) and Zurich (ZRH). The 787 is used on Etihad's daily AUH-MAD service. Etihad's AMS and MAD routes have seen growing demand, leading to a need for larger aircraft.

From January to November 2017 Etihad's 787 long-haul services provided almost 20 billion ASKs. Its overall long-haul ASKs have almost tripled since 2010, increasing from 35 billion to 96 billion.

Hainan Airlines

Hainan Airlines shows how the 787 can be used to perform non-stop LAX routes to more interior Chinese cities. Its size has provided the right capacity to trial under-developed routes for smaller carriers. In November 2017, Hainan had 10 787-8s and 14 -9s in service, with seven 787-9s on order. 10,000 long-haul flights were performed in 2017, across Hainan's fleet of A330s, 737NGs and 787s. Its 787 provides 14 billion of Hainan's 24 billion ASKs.

From China, the 787 serves 15 North American, European and Middle Eastern destinations: BOS, BRU, Calgary, ORD, Las Vegas (LAS), LAX, MAN, SVO, JFK, FCO, SJC, Seattle (SEA), St Petersburg, Tel Aviv (TLV) and YYZ. New 787 routes for Hainan are BOS, Calgary, LAS, JFK and SJC, with daily and weekly services.

The 787 has opened US East Coast destinations due to its ability to provide non-stop service. This has allowed Hainan to expand, by adding Chongqing and Chengdu (CTU) to its existing hubs, PEK and PVG. As a result, Hainan has expanded its long-haul capacity in recent years, increasing from 5 billion ASKs in 2010 to 24 billion by November 2017.



Japan Airlines (JAL)

JAL operates 25 787-8s and 11 787-9s aircraft with 13 787s on order, in addition to pending delivery of 18 A350-900 and 13 A350-1000s. JAL took delivery of its first 787 in 2012, launching NRT-BOS. This is now a daily service on the 787-9, performing 767 million ASKs in 2017.

JAL's 787 fleet serves BKK, LHR, SGN, HNL, LAX, BOS, CDG, Jakarta, DEL, DFW, SVO FRA, Helsinki, JFK, KUL, MEL, San Diego (SAN), SYD and Vancouver (YVR) from its NRT, Osaka (KIX) and Nagoya (NGO) hubs.

BOS and SAN are new routes for JAL, served from NRT, while LAX is served from KIX, having moved from NRT. JAL also recently announced plans to boost NRT-BKK to twice daily flights using the 787 from October 2017 to March 2018.

JAL's long-haul network has not really changed in recent years. As a major full-service carrier, JAL's primary focus has been fleet renewal rather than aggressive long-haul expansion, with the 787 serving as a replacement for most of its 767s.

KLM

KLM started 787-9 operations in late 2015. In November 2017, KLM had 10 787-9s in service, with 13 787-9s, eight 787-10s and seven A350-900s on order, as well as A330s, 747s and 777s.

KLM's long-haul network covered almost 92 billion ASKs in 2017. The 787 provided almost 12 billion of this capacity. Key new routes served by the 787 include AMS-Colombo (CMB) and AMS-SJO.

From KLM's AMS hub, the 787 now operates to 26 long-haul destinations in Africa, Asia, America and the Middle East.

2,700 787 flights were performed in January-November 2017. KLM also uses the 787 aircraft on seasonal frequencies.

The 787 formed part of KLM's fleet modernisation, rather than facilitated long-haul expansion. Since 2010, KLM has retired MD-11s from its long-haul fleet.

Norwegian

With hubs at Oslo Gardemoen and London Gatwick (LGW), Norwegian operates eight 787-8s and 13 787-9s, with 21 787-9s on order. The 787 has led the carrier to launch low-cost long-haul flights.

"We first started flights from Oslo to New York in 2013 and now offer more than 50 transatlantic routes operated by the 787. We have already announced 11 new transatlantic routes for 2018," says Thomas Ramdahl, chief commercial officer (CCO) at Norwegian.

These routes include new direct flights from London to ORD and AUS from March, all using the 787. "We also operate the world's longest non-stop route by a low-cost airline between LGW and SIN, and are gearing up to launch new London flights to EZE in February, our first route to South America," adds Ramdahl.

Norwegian is due to add another 11 787s in 2018. Ramdahl says it is not only focusing on expanding its network, but also adding frequencies to popular routes.

Norwegian is one of the world's fastest growing airlines, expanding from being a Scandinavian carrier to a global player, offering non-stop long-haul flights from 16 European cities to the US. It also flies from London to Singapore and Argentina, and from Scandinavia to Thailand.

The UK is an important focus for Norwegian, and will play a pivotal role in

Virgin Atlantic has used the 787 to open a new route from London Heathrow to Seattle, but mainly to replace the A340-600 and 747-400 on some frequencies on seven of its existing long-haul routes.

its future long-haul growth. In 2017, Denver, SEA and SIN became Norwegian's newest destinations. These will shortly be joined by EZE, ORD and AUS.

Across Europe Norwegian continues to add more major cities and deliver point-to-point traffic to the most popular US destinations. It recently announced new long-haul flights from MAD to JFK and LAX, while AMS and MXP will get non-stop flights to New York this summer.

Norwegian is expanding into Asia and South America. With 21 more 787s to be delivered by 2020, Norwegian's 787 fleet size will double.

United Airlines

United is a major US, full-service carrier. Its 2017 long-haul capacity was almost 180 billion ASKs across 107,500 flights. United's long-haul fleet comprises A320s, 737s, 747s, 757s, 767s, 777s and 787s. In November 2017, United operated 12 787-8s and 21 -9s, with four -9s, 14 -10s and 45 A350-900s on order.

United operates the 787 on 19 long-haul and international routes. It has used the 787 to expand its SFO operations and add routes into interior China, the success of which has led to increased frequencies.

The 787 operates mainly out of IAH, LAX and SFO, with a smaller presence in IAD and DEN. United has introduced seven new 787 routes in recent years. In 2013 it opened dailies from DEN-NRT with the 787-8. SFO expansion has included new frequencies from the hub to CTU, HGH, SIN, TLV and Xi'an (XIY). United is the first operator to open SFO-XIY, and now performs it three times a week.

LAX-SIN, which opened in October 2017, is United's longest flight, and is served with the 787-9. Overall, United's 787 fleet now serves Asia Pacific, Australasian, European, Middle Eastern and South American destinations. These have grown from circa 100 billion ASKs in 2010 to almost 180 billion ASKs in 2017.

Virgin Atlantic

Virgin Atlantic operates 11 787-9s, with three -9s and 12 A350-1000s on order. It took delivery of its first 787-9 in September 2014.

Virgin flew its first 787 to BOS, and then on other key routes from LHR to the US East Coast. In 2015, the 787 moved

Asiana operates intercontinental and Asia Pacific routes from Seoul's second main airport Gimpo. It has used the A350-900 to replace the 777-200ER on parts of its network.

onto DEL, LAX, JNB and PVG.

Adding the 787-9 has changed Virgin's long-haul capabilities. In March 2017, it started flying 787s to SEA, taking over from joint venture partner Delta Air Lines. Virgin flies the 787 to JNB, HKG, PVG, DEL, LAX, SFO and MIA which had been operated by the A340-600 or 747-400.

A350 – current operators

The A350-900 is the only A350 series in operation, with the -1000 pending service entry. It operated 235 long-haul routes for 17 airlines in 2017. It has not been operated for as long as the 787, so its networks are not as established. Airbus has said that the A350-900 allows airlines to grow or complement existing A330-sized operations. In July 2017, 85% of A350-900 customers were A330 operators.

In 2017, the average sector length performed by the A350-900 was 8,247km, and average seat capacity was 298. The highest frequency A350 routes were performed by Qatar Airways: DOH-LHR (602 times from January to November 2017) and DOH-SIN (1,095 times).

Air Caraibes

Guadeloupe-based Air Caraibes operates two A350-900s. More -900s and three A350-1000s are awaiting delivery. Six A330s operate other long-haul routes.

Air Caraibes' long-haul operation is centred on French-Caribbean connections. The A350 mostly supplements the existing, small, long-haul fleet, bolstering current services and increasing existing capacity. Air Caraibes flies to Paris Orly (ORY) from Cayenne (CAY), Martinique (FDF), Haiti (PAP), Havana (HAV), Guadeloupe (PTP), Punta Cana (PUJ), Santiago (SCQ), St. Maarten (SXM) and San Salvador (SAL).

The A350 operates three services a week to FDF and four to PTP. It covers 25% of the operator's long-haul network, providing almost 2.5 billion ASKs in 2017.

Over the past seven years, Air Caraibes' long-haul capacity has increased from 5.6 billion ASKs to 8.3 billion ASKs.

Air Mauritius

Air Mauritius operates one A350-900, since taking delivery of it in October 2017. Five -900s are on order.

Air Mauritius' long-haul routes are



performed by A330s, and A340s, as well as the A350-900. It performed more than 3,700 flights in 2017, generating about 7.5 billion ASKs. Its A350 has commenced initial frequencies to CDG, LHR and SIN.

The CDG route was increased to daily operations from November 2017 with the A350, while the LHR service is now thrice-weekly. The remaining long-haul fleet covers destinations to Asia Pacific, Africa, Australasia and Europe, including: PEK, Bengaluru, Cape Town (CPT), CTU, DEL, Geneva (GVA), Guangzhou (CAN), HKG, BOM, PER and PVG.

Air Mauritius has configured its A350 with 28 business- and 298 economy-class seats. While there is no significant change to operations yet, more A350s will allow it to expand or add to existing frequencies.

Asiana Airlines

Asiana Airlines is based at Gangseo-gu Gimpo airport in Seoul (GMP). It has three A350-900s in service, with nine -900s and 10 -1000s on order.

Asiana performed over 12,000 flights in 2017, establishing long-haul capacity of over 32 billion ASKs. Its fleet of A330s, A350s, A380s, 747s, 767s and 777s flies to 15 long-haul destinations in Asia Pacific, Australasia, Europe and North America. Cities include Almaty, ORD, DEL, FRA, Johor Bahru, LHR, JFK, CDG, Phuket, SFO, SEA, SIN, SYD and Tashkent.

From GMP, Asiana's A350 flies to LHR, SFO and SIN, performing 184 flights from January to November 2017, and providing almost 500 million ASKs.

Asiana will use the A350s on its SEA service, which was previously operated by the 777-200ER.

The A350-900 is also incorporated onto some of Asiana's shorter routes, such as Hong Kong, Manila and Osaka.

Cathay Pacific

Flight Global FleetAnalyzer shows that Cathay Pacific operates 22 A350-900s, with six -900s and 20 A350-1000s on order. The carrier also operates 777s and A330s on long-haul services.

According to the airline, the A350 has allowed Cathay to modernise and expand its network, particularly to secondary cities in Europe.

In terms of performance, the A350's non-stop range of 15,000km (8,100 nautical miles) and increased fuel efficiency (and increased cost-effectiveness) were attractive attributes.

Cathay took delivery of its first A350-900 in May 2016 and now mainly uses it on long-haul routes, including AKL, BNE, EWR, MAN, MEL, CDG, PER, SFO and YVR. Many of these were served by the 747 and the A340.

The A350 has also allowed Cathay to launch new routes from HKG and increase frequencies on others. The first new long-haul route launched with the A350 was to LGW in September 2016, followed by TLV (March 2017), BCN (July 2017) and Christchurch (CHC) (December 2017).

In 2018, Cathay will introduce new A350 services to BRU, CPH and DUB.

The first of 20 A350-1000s on order will be delivered in 2018. Cathay recently announced that HKG-IAD will be its first route operated by the A350-1000, starting in September 2018. This will be the longest route on Cathay's network.



China Airlines

China Airlines operates from Taipei (TPE), Taiwan. Its fleet of nine A350-900s operated over 1,000 long-haul services during 2017, covering eight destinations.

Its wider long-haul fleet includes the A330, A340, 747 and 777. It flies to Asia Pacific, Australasian, European and North American destinations with long-haul capacity of 24 billion ASKs in 2017.

From TPE, the A350 serves a mix of European, American and Australasian frequencies, including AMS, FCO, SFO, SYD, YVR and VIE. The A350 began operations to HNL in October 2017. TPE-LGW commenced at four flights weekly from December 2017.

SFO was the first US route for China Airlines, signalling trans-Pacific progression for the Taiwanese operator. The 777 is also used on its North American frequency.

China Airlines saw SYD operations increase to two flights per day since it introduced the A350. Its A350-900 LOPA accommodates 306 passengers.

China Airlines has announced plans to swap its 777-300ER for the A350 on its existing TPE-FRA network, commencing daily operations from Q2 2018. The A350 will be the only type serving China Airlines' European network. It has used the A350 to increase frequencies.

Delta

Delta Air Lines has worldwide intercontinental coverage with a long-haul network capacity of about 145 billion ASKs in 2017, via a fleet of A330s, 737s,

747s, 757s, 767s and 777s. As of November 2017, Delta operated three A350-900s, with 22 -900s on order. The first A350 was delivered in July 2017.

Trans-Pacific routes have been Delta's focus since the A350's inception. It has begun introducing new A350 routes, starting with Detroit (DTW)-NRT. ICN frequencies followed along with DTW-PEK. Meanwhile, ATL-ICN, DTW-AMS and DTW-PVG are due to start in early 2018. Delta has also said the A350 will move on to its LAX-PVG route, replacing existing 777-200LRs. The A350 will be phased in by performing alternating dailies until more deliveries allow the type to fully take over the service.

Finnair

As of January 2018, Finnair has 11 A350-900s in service, with eight on order. "The A350 was the right choice for us in terms of range, capacity, fuel economy and customer experience," says Jaakko Schildt, Finnair CCO. Finnair was the first airline in Europe to receive the A350, taking delivery of 11 units from October 2015 to autumn 2017. Schildt says its fuel economy has been in line with expectations.

"The A350s are deployed on our routes to PVG and PEK, which previously were operated by our A340s," explains Schildt. These destinations were followed by BKK, SEL, NRT, HKG and SIN. The decision to deploy the A350 on these routes first was due to passenger and cargo demand, and a desire to phase out the less economic A340. "We phased out the A340s from our fleet by January 2017, and our fleet now comprises A350s and

Finnair has used its A350s to replace A340s on its Shanghai and Beijing frequencies, after initially rolling the fleet out across its European network. Today, the A350 is primarily focussed on Asian-Pacific destinations for the airline.

A330s," he adds.

Finnair first incorporated A350s in its European network. "This allowed for efficient flights and offered customers the opportunity to see the aircraft and its new cabin features," says Schildt. "Feedback on this European roadshow was excellent. The first long-haul destination was PVG (daily), followed by PEK (daily) and then BKK (daily). Now that we have 11 aircraft in operation, we use them on Asia Pacific destinations. These are PVG, PEK, HKG, SIN, SEL, NRT, KIX SGN. We also use the A350 for London, HAV and Puerto Vallarta in Mexico. "This allows a consistent A350 customer experience for London-based customers travelling to many of our Asia Pacific destinations via Helsinki, and it also supports our cargo business," adds Schildt.

The A350 has improved the efficiency and economy of Finnair's existing routes, and enabled new routes to be launched to Puerto Vallarta and HAV. Finnair has also added frequencies to NRT and HKG.

Hong Kong Airlines

Hong Kong Airlines commenced A350-900 operations in Q3 2017 after taking delivery of the first aircraft in September. It now has two A350-900s in service and 16 -900s on order. It uses a tri-class LOPA of 334 seats in Business, Economy Comfort and Economy classes.

Hong Kong Airlines launched -900 service in December 2017. Its first long-haul route was HKG-LAX, which is set to grow into a daily service over the next few months. Frequencies to SFO and JFK are also set to launch in 2018. Its wider long-haul fleet of A330s flies to AKL, the Gold Coast (OOL) and YVR. Overall, long-haul operations have grown from 2010, when only one route longer than 4,000km was operated, HKG-SVO, by the A330-200.

Lufthansa

Lufthansa has six A350-900s in service and another 19 -900s on order. It operates A350s as part of its Munich-based fleet.

In 2017, destinations covered by Lufthansa's A350 fleet from MUC included primarily trans-Pacific routes, such as BOM, DEL, HKG, NRT and PEK. One transatlantic service was also performed via a daily service to BOS.

Lufthansa's first A350 flight was in

Ethiopian Airlines has selected the 787 and A350. It has used the aircraft to open new routes to Geneva, and Barcelona and Madrid. Its 787-9s will be used to replace the 777-200LR on some routes. The new aircraft will also be used to increase frequencies on other routes.

February 2017, on MUC-DEL. In 2017 this route, performed by the A350, generated 547 million ASKs for the airline.

MUC-DEL was an existing route for Lufthansa, having been primarily served by A340s. The airline maintains that routes and frequencies on its long-haul network have remained unchanged since the -900's inception, with the new type serving to replace A340-600s. One new route will be added in March 2018: MUC-SIN.

Singapore Airlines

SIA has a rapidly growing A350-900 fleet. To date, 18 A350-900s are in service, with SIA awaiting 49 787-10s and 49 more A350-900s. Its long-haul fleet includes the A330, A350, A380 and 777-200, -300 and -300ER, providing a combined network of almost 100 billion ASKs in 2017.

The first A350-900 was delivered in March 2016, performing an early long-haul route of SIN-AMS, and replacing a 777-300ER on a daily frequency. It is now used on 13 routes to Africa, Australasia, the Asia Pacific, Europe and North America.

SIN-BCN is a new service, launched as twice-weekly but increased to five times per week due to demand. It has replaced the A330-300 on SIN-BNE, starting with three dailies from January 2018. The A350-900 has also replaced the 777-300ER on SIN-DME, hiking frequency from two to five weekly services. SIN-DUS will increase from three to four weekly flights in March 2018. SIN-FCO is a new route, performed four times weekly.

The A350-900 has also replaced the 777-300ER and -200 on daily SIN-HND and SIN-JNB frequencies. SIA's SIN-MAN route has also been taken over by the A350, replacing the 777-200. This is a connecting flight to IAH, which has been switched from Moscow, and boosted to a five per week frequency. Other routes are SIN-MUC, SIN-MXP and SIN-SFO, which is SIA's longest flight. Last, SIN-MEL is operated by the A350, 777, 747 and A380.

SIA is a launch customer for the A350-900ULR (ultra-long range), with the first delivery due in 2018. SIA has disclosed the likely relaunch of its SIN-LAX and SIN-JFK frequencies, enabled by the aircraft's anticipated flight time of 19 hours. It is believed that the ULR variants' LOPA will not include economy class.



A350 & 787 operators

In November 2017, five long-haul operators had 350 and 787 aircraft in their fleets: Ethiopian Airlines, LATAM, Qatar, Thai Airways and Vietnam Airlines. Ethiopian, Thai Airways and Vietnam Airlines will be summarised.

Ethiopian Airlines

Ethiopian Airlines operates 19 787-8s, two -9s and six A350-900s. Two 787-9s and 18 A350-900s are on order. The rest of its long-haul fleet comprises the 777-200LR and -300ER. In January 2018, it announced expansion of its long-haul network to include a new 787-8 route: a thrice-weekly service from Addis Ababa (ADD)-GVA with a one-hour stop at MXP, commencing June 2018.

Ethiopian is also increasing frequencies on its FCO service to eight flights a week and incorporating ADD-BCN-MAD. Its 787-9 fleet will also take over Ethiopian's CDG service from its legacy 777-200LR. The 787-8 and -9 will be used to increase frequencies on ADD-VIE-BRU, going from five flights a week to a daily service.

Thai Airways

Thai Airways operates six 787-8s, two -9s and seven A350-900s, with five -900s on order. Thai has used both aircraft to expand numerous Australian frequencies, which were previously served by an ageing fleet of 777-200 and 747 aircraft.

In October, the A350 began BKK-MEL operations which allowed an increase in available seats over the 777-200 on the route. Thai Airways has a two-class layout

on its A350-900s, comprising 32 business-class seats in a 1-2-1 LOPA and 289 economy seats in a 3-3-3 LOPA. Thai has also announced intentions to incorporate the A350-900 onto a BKK-SYD service.

Meanwhile, the 787 is being used to rejuvenate customer service on Thai's BKK-BNE and BKK-PER frequencies. As more aircraft are delivered, Thai's networks and frequencies are expected to grow.

Vietnam Airlines

Vietnam Airlines operates 11 787-9s and nine A350-900s. Eight 787-10s and five -900s are on order. The rest of its long-haul fleet comprises A330s and 777s.

Vietnam uses its 787 and A350s across long-, medium- and short-haul routes, so it operates each type in more than one configuration, according to Seat Guru. The -9 is used on one domestic service (HAN-SGN) and Vietnam's routes to LHR, FRA, NRT, SYD and MEL. From January to November 2017, the 787-9 provided Vietnam with 7.5 billion ASKs. One LOPA is a two-class cabin (Business and Economy) at 311 seats, while the other is a three-class cabin (Business, Premium Economy and Economy) providing 274.

The A350-900 has two separate three-class configurations, which can seat 305 passengers. In 2017, the -900's only long-haul route for Vietnam Airlines was to CDG, while its short- and medium-haul routes included HND, ICN, PVG and KIX. CDG provided long-haul capacity of 3 billion ASKs for Vietnam Airlines. [AC](#)

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