



Transport for London

Note on Freight Connectivity

1. This note explains the approach taken to estimating the number of pure freighter air transport movements at the London airports in 2050 under three different scenarios of capacity growth:
 - Maximum use of existing capacity;
 - 2+2+2 – additional runways at each of Gatwick and Stansted;
 - New 4 runway hub.
2. The number of additional freighter movements required depends on the volume of passenger flights providing bellyhold capacity under the different scenarios. Under the constrained Max Use scenario, 48,000 pure freighter movements could be required, up from 14,000 at the London airports today. As there would be no spare runway capacity at the main London airports, this capacity would need to be provided from smaller airports serving the London area or from regional airports, with loss of economies of scale and producer efficiency, or through trucking to alternative hubs in Europe with implications for speed of transit.
3. With the provision of additional runways, increased bellyhold capacity reduces the number of additional freighter movements required to 28,000 and 21,000 respectively under the 2+2+2 and 4 runway hub scenarios. In both cases, we believe there will be sufficient runway capacity available to accommodate these freighter movements, albeit the 2+2+2 scenario will still result in dispersal of air freight capacity across a range of airports with the consequent loss of economies of scale and efficiency which could be attained at a single hub.

Freight Volumes

4. In 2012, the London airports handled 1,805,761 tonnes of freight¹. Only 17% of this freight was flown on pure freighter aircraft. 83% was flown in the bellyhold of passenger aircraft. This may be as a result of limited capacity for freighter operations at Heathrow, where the bulk of air freight consolidation activity is concentrated. However, it may equally reflect the scale of bellyhold capacity offered at Heathrow, which reduces the need for pure freighter capacity to serve the London market as a whole.
5. Using data from ACI EUROPE², the volume of freight flown from the London airports is compared with that flown from other key European cities in Table 1.

¹ CAA Airport Statistics.

² The small discrepancy to CAA Statistics is noted but it is not considered to be material. The * against Hahn indicates estimated freight taken from airport's own website.

Table 1

	Tonnes
Heathrow	1,464,596
Gatwick	97,565
Stansted	214,904
Luton	29,637
London	1,806,702
Paris CDG	1,935,180
Paris Orly	94,700
Paris	2,029,880
Frankfurt	1,986,180
Frankfurt Hahn*	223,000
Frankfurt	2,209,180
Amsterdam	1,483,450
Milan MXP	405,858
Milan LIN	15,513
Milan BGY	116,733
Milan	421,371
Brussels	394,870
Luxembourg	614,906
Madrid	359,360
Zurich	281,683
Vienna	178,128
Dublin	102,717
Lisbon	90,264
Helsinki	176,987

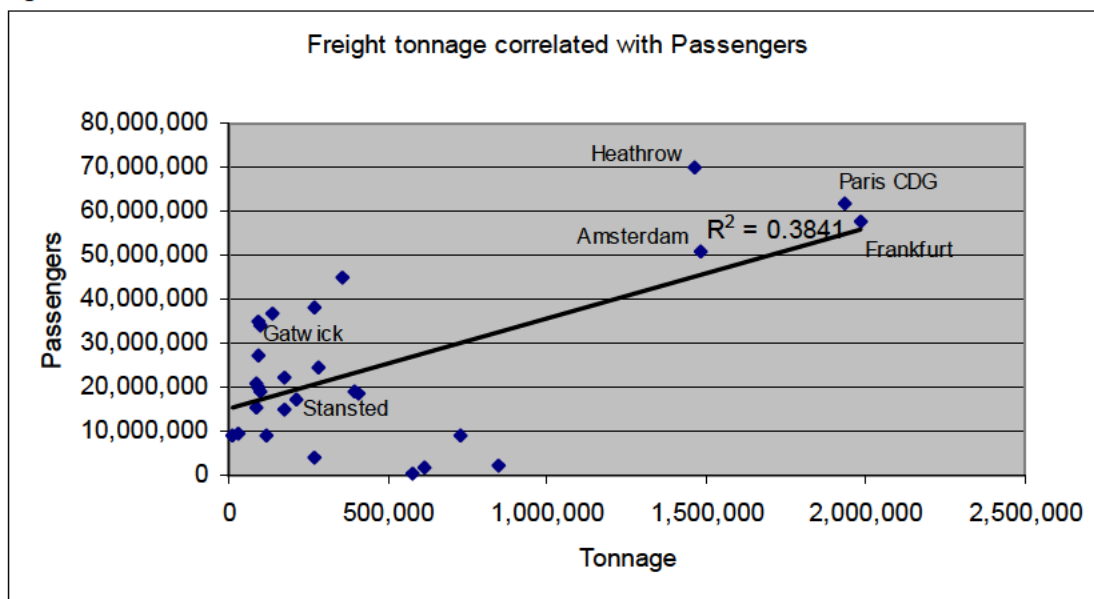
6. There is no clear evidence that London is currently disadvantaged in terms of air freight capacity as the majority of freight is flown from Heathrow in the bellyhold of passenger aircraft rather than in pure freighter aircraft. To the extent that there is a need for freighter capacity, it can be provided at Stansted where there is ample spare capacity for additional movements and areas are set aside to increase aircraft parking and freight handling facilities if required. Although it is possible that limitations on bellyhold capacity at Heathrow may force greater trucking of freight to Europe, this is not evident from a comparison of overall air freight carried compared to other major European countries. In any event, the fact that freight is trucked rather than flown to Europe may have only a marginal impact on total transit times and, hence, limited economic detriment.
7. As well as the main city airports, there are a number of other specialist freight airports in both the UK and western Europe. Those handling over 75,000 tonnes in 2012 are shown in Table 2.

Table 2

	Tonnes
Manchester	97,215
East Midlands	267,350
Cologne	730,040
Munich	272,203
Dusseldorf	86,729
Leipzig	846,086
Rome	135,777
Liege	577,226

8. Overall, on the basis of substantial air freight flows recorded by ACI EUROPE, the UK handled around 2.2 million tonnes of flown freight, France a similar amount, Italy around 600,000 tonnes and Spain around 500,000 tonnes. This does not suggest that the UK is disadvantaged in terms of freighter capacity overall currently.
9. However, the role of the low countries and Germany in acting as the major freight centre in western Europe is noticeable. In total, the main German freight airports handled almost 4.2 million tonnes of freight in 2012 which, when combined with the Netherlands and Benelux countries, amounted to 7.2 million tonnes of air freight flown. These airports have developed major and specialist air freight roles, with freight being trucked from all over Europe to feed these freight hubs. The integration of trucking with air freight should not be overlooked, even within the UK. In practice, it is unlikely that the UK could replicate this role, even with unconstrained airport capacity, due to its island location on the western edge of Europe.
10. There is some correlation between air freight flown to/from an airport and passengers carried as shown in Figure 1 below but this relates in large part to belly hold capacity. Figure 1 shows the correlation between flown freight and passengers across 29 European airports in 2012 as recorded by ACI EUROPE and which were either major airports in terms of freight handled or secondary airports serving the same cities.

Figure 1



Freighter Operations

11. The pattern of freighter operations is complex. As well as air freight carried in the bellyhold of passenger aircraft, there are freight charters for specialist and ad hoc consignments and large numbers of flights by the integrators (DHL, Fedex, UPS) etc. Obtaining detailed timetable information for freight operations is not possible as most do not publish timetables. Only scheduled freighter operations are shown in OAG and there is some uncertainty over whether this data is comprehensive.
12. Using OAG data for the week of 17th June 2013, the London airports have 49 scheduled freighter departures (98 freighter movements). According to CAA statistics for 2012, there were just over 14,000 freighter aircraft movements at the London airports or around 270 per week. This suggests that the OAG recorded movements account for only around 37% of total freighter aircraft movements to/from the London airports.
13. Similar data has been extracted for other western European airports. The table in Appendix A summarises the main pattern of freighter departures at airports with more than 30 freighter departures per week. This table also includes the principal UK freight airports and secondary airports serving major cities which in combination had more than 30 scheduled freighter departures per week in June 2013.
14. The number of scheduled freighter departures at the main freight airports is summarised in Table 3 along with the freight tonnage handled and passengers carried. It is evident that there is no clear correlation between freight tonnage handled and the weekly number of scheduled departures. This is illustrated in Figure 2. Amsterdam and Frankfurt have a high number of scheduled movements relative to the total volume of air freight whilst Paris and Heathrow handle similar volumes of air freight but with significantly fewer scheduled movements. We believe that the principal reason for these differences is in the relative importance of bellyhold freight but also the extent to which integrator activity is present; for example Fedex has its principal European hub in Paris and its movements are not recorded in OAG.

Figure 2

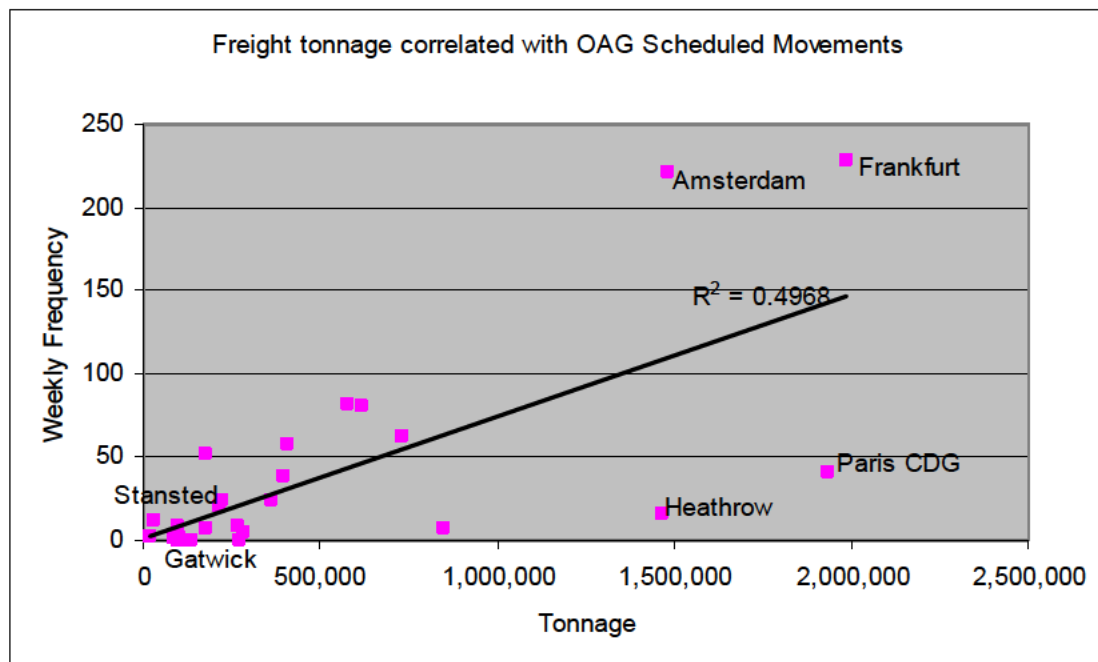


Table 3

	Freight tonnes	Pax	2013 wk freighters
Heathrow	1,464,596	70,038,804	16
Gatwick	97,565	34,222,405	0
Stansted	214,904	17,463,794	21
Luton	29,637	9,630,128	12
Manchester	97,215	19,841,747	8
East Midlands	267,350	4,086,849	9
Paris CDG	1,935,180	61,611,934	41
Paris Orly	94,700	27,232,263	0
Frankfurt	1,986,180	57,520,001	228
Frankfurt Hahn*	223,000		24
Cologne	730,040	9,280,070	62
Munich	272,203	38,360,604	0
Dusseldorf	86,729	20,833,246	1
Leipzig	846,086	2,279,221	7
Amsterdam	1,483,450	51,035,590	221
Milan MXP	405,858	18,522,760	58
Milan LIN	15,513	9,176,997	3
Milan BGY	116,733	8,888,017	0
Rome	135,777	36,980,161	0
Brussels	394,870	18,943,688	38
Liege	577,226	300,813	82
Luxembourg	614,906	1,912,806	81
Madrid	359,360	45,175,501	24
Barcelona	96,519	35,131,771	2
Zurich	281,683	24,751,649	5
Vienna	178,128	22,165,650	52
Dublin	102,717	19,096,572	1
Lisbon	90,264	15,301,236	1
Helsinki	176,987	14,859,981	7

*2011 data from airport website

15. Examination of the detailed information set out in Appendix A also shows how complex the pattern of freighter operations actually is. Few freighters, particularly those serving markets beyond Europe, operate on a strict point to point basis. Many transit more than one of the main European freight airports and a number of points overseas. Examination of arriving freighter patterns also reveals that the inbound pattern does not necessarily mirror the outbound pattern. Hence, there is already considerable flexibility to add new points if the market warrants.
16. Some freighters operate simple round trips. Others operate on a triangular basis, e.g. Lufthansa operating Frankfurt-Dallas-Detroit-Dallas-Manchester-Frankfurt. Inbound freight from the US to Manchester will be flown direct but outbound freight will transit Frankfurt. Other freighters operate effectively round the world journeys, e.g. British Airways operating Chicago-Houston-Stansted-Dammam-Dubai-Shanghai.
17. There is simply no way of knowing how much of the freight capacity on such aircraft is assigned to or used by freight originating in or destined for any airport, which may vary day by day. Freight departures are, hence, not a reliable proxy for how much air freight capacity is available to uplift goods to and from any country or city.
18. Overall, our analysis of current freighter operations suggests that it is hard to distinguish a relationship between freighter movements and tonnage of freight carried.

19. Nor is it evident that the UK air freight capability is adversely affected today by shortage of capacity at Heathrow. There is ample spare airport capacity at Stansted for pure freight aircraft to the extent that there is demand for such aircraft operations given the amount of bellyhold capacity available at Heathrow. The volume of freight uplifted probably reasonably reflects the UK market, allowing for transit freight, and the limitations of the UK acting as a hub for freight trucked from continental Europe based on its geographic position. The principal issue is one of producer efficiency as a consequence of splitting locations, with the bulk of freight forwarding/consolidator activity being located around Heathrow and freight needing to be trucked to Stansted, Luton, or continental hubs. Whilst concentrating all freight activity at the main hub might make additional freighter flights viable by facilitating onward connections between bellyhold freight and pure freight operations, it is not clear the extent to which this would result in higher volumes of air freight being carried to/from the UK (as distinct from transit freight) as the UK does not appear to be significantly underperforming in aggregate terms compared to countries such as France, Spain or Italy.

Predicting Future Freight Operations

20. In order to predict the volume of freighter activity in future at the London airports, we have developed a simple spreadsheet as set out in Table 4.
21. We have first projected forward total flown freight demand to and from London³ on the assumption that it grows in line with overall passenger demand growth at 2.1% per annum in the absence of any specific forecasts of freight tonnage from DfT. We note that the DfT 2013 forecasts only give information for expected growth in pure freighter movements at 0.4% per annum but the basis of this is not clearly stated. Prima facie, this appears to understate unconstrained demand for pure freighter movements over the period to 2050.
22. In contrast, OE have identified that the expected average freight growth to and from Europe would be in the range 3.37% (Boeing) to 3.99% (Airbus). However, this would lead to substantially higher estimates of freight tonnage growth than passenger growth. Recent trends would suggest this to be unlikely so we have adopted the more cautious approach of using the same underlying growth as for passengers.
23. We have then estimated the bellyhold capacity offered at the London airports in 2050 based on the current average tonnage carried per international movement in 2012 at Heathrow, including both EU and non-EU flights, based on CAA Airport Statistics assuming average tonnes per movement increase by 0.5% per annum. This allows us to estimate the residual volume of freight under each scenario which would need to be accommodated on pure freighter aircraft.

³ This is a simplifying assumption as it assumes the same proportion of UK regional air freight is trucked to London for uplift and the same proportion of freight is trucked to the continental freight hubs. On balance, this is likely to be a neutral assumption for the situation of unconstrained hub capacity as the proportion of regional freight flying direct from major regional airports might be expected to increase, particularly as more long haul flights develop, whilst the proportion being trucked from London to Europe might be expected to decrease with unrestricted capacity available.

Table 4

	2012	2050 Max Use	2050 2x2x2	2050 New Hub
Freighters 2012	14,123			
Freight in Freighters	310,022			
Total Freight	1,805,761	3,977,759	3,977,759	3,977,759
Tonnes per freighter	21.17	25.59	25.59	25.59
Tonnes per international bellyhold movement London	1.76	2.13	2.13	2.13
Forecast International Movements	834,725	1,051,034	1,298,981	1,375,452
Bellyhold Capacity	1,469,116	2,235,836	2,763,285	2,925,960
Freighter tonnage required		1,741,923	1,214,474	1,051,799
Freighter movement		68,077	47,463	41,106
Additional Freighters Required		53,954	33,340	26,983

24. We estimate that the number of freighters required to accommodate projected air freight demand would rise from 14,000 in 2012 to around 41,000 in the New Hub case, 47,000 in the 2+2+2 case and 68,000 in the Max Use case. In both the New Hub case and 2+2+2 case, we estimate there will be sufficient runway capacity available to accommodate these movements at 2050, at the New Hub and/or Stansted respectively. However, in the Max Use case, the London airports will, by definition, be full with passenger aircraft movements. Whilst we believe there will still be a small number of pure freighter operations accommodated in off-peak periods (as today at Heathrow), the number of freighter operations will be constrained.
25. It is reasonable to assume that around 14,000 freighters a year could still be accommodated in the vicinity of London by using capacity at airports such as Manston, which already handles some long haul freighters. However, capacity equivalent to an additional 54,000 freighter movements per year could be required to ensure demand is met, although this could be mitigated to an extent if the freighter capacity was prioritised for freight to and from the UK with less transit freight.
26. A key question is the extent to which such freighter capacity would be provided at airports such as East Midlands, Manchester and Birmingham. This could serve to reduce trucking movements from the regions to London, as take place today, with environmental benefits but it would reduce producer efficiency through split operations. In the absence of detailed data regarding freight trucking movements today, it is difficult to determine whether this would have positive or negative impacts overall..

27. In terms of the specific destinations of future freighter movements, our analysis of the existing patterns of service reveals the difficulty of defining market demand and aircraft routings. We do not believe it is sensible to attempt to determine the future geographic split by destination in either the constrained or unconstrained cases as a single freighter may serve a variety of markets as necessary. In the constrained case, it is likely that more freight would be trucked to the continental hubs as well as to UK regional points, which would potentially add to shipment costs.

Conclusions

28. Overall, we have made a best estimate of the number of freighter aircraft movements likely to be using the London airports (or near London airports) under each of the capacity scenarios. These are as follows:

→ Maximum use of existing capacity	14,000
→ 2+2+2 – additional runways at each of Gatwick and Stansted	33,000
→ New 4 runway hub	27,000

29. In the latter two cases, our assessment is that, across both bellyhold capacity and pure freighter activity, there would be sufficient capacity to meet expected demand for air freight to and from the UK. Our estimates for additional freighter capacity are substantially above those made by DfT. Hence, to the extent that our baseline is understated (although we do not believe this to be substantial) due to the current patterns of trucking freight to the continent, this will offset any overstatement as a consequence of assuming higher growth than DfT and by reductions in the amount of trucking to London from regional airports due to expected growth in their own freighter operations over the period to 2050.
30. The key difference between these two scenarios would be in terms of the efficiencies and economies of scale gained by the industry arising from the concentration of freight activity at a single hub. In both cases, the overall volume of air freight to and from the UK is expected to be broadly the same, although the actual freight carried including transit freight would be higher in the hub case. However, under the new hub scenario, savings from greater efficiency may be passed onto users, so reducing shipping costs and facilitating trade leading to higher freight volumes, but it is beyond the scope of the current exercise to assess this.
31. In the constrained, max use, case, there would be severe limitations of pure freighter movements at the London airports, which could amount to around 26% of the required air freight capacity to/from London. The extent to which this would act as a limitation on overall air freight volumes would depend on the extent to which the freight is still carried from regional airports or by truck. Clearly this would impact on the cost/efficiency of shipment, which in turn could impact on freight volumes carried. Again, it is outside the scope of the current exercise to assess these effects.
32. Overall, in assessing the economic value for air freight between the scenarios, the main difference is likely to lie in producer costs passed through to users and the impact that would have on business costs and hence output/freight generated. It would not be safe to assume that the reduction in cargo ATMs at the London airports necessarily translates to lost shipment value in its entirety.

23 May 2013

Appendix A

			Total Airport	Total City	Total Country
Heathrow	Amman	1			
	Amsterdam	1			
	Amsterdam	1 onwards to Sharjah and Singapore			
	Brussels	1			
	Copenhagen	1			
	Copenhagen	1 onwards to Sharjah and Singapore			
	Dubai	1			
	Frankfurt	1			
	Leipzig	1			
	Lisbon	1			
	Milan	1			
	Milan	2 onwards to Hong Kong			
	Paris	1 onwards to Delhi and Hong Kong			
	Seoul	2			
			16	49	71
Stansted	Amsterdam	1 originates in Bogota, Puerto Rico			
	Amsterdam	2 originates in Miami, Buenos Aires, Bogota and Puerto Rico			
	Cologne	1 onwards to Madrid and Johannesburg			
	Cologne	1 onwards to Tbilisi			
	Cologne	1 onwards to Tbilisi and Delhi			
	Dammam	1 originates in Chicago and Houston, onwards to Dubai and Shanghai			
	Dubai	1 onwards to Hong Kong			
	Frankfurt	1 originates in Chicago and Atlanta, onwards to Shanghai			
	Frankfurt	2			
	Frankfurt	1 onwards to Chicago			
	Frankfurt	1 onwards to Hong Kong			
	Frankfurt	2 originates in Seoul and Moscow			
	Frankfurt	1 originates in Atlanta, onwards to Delhi and Hong Kong			
	Frankfurt	1 Kong			

	Frankfurt	2	originates in Moscow, onwards to Seoul			
	Luxembourg	2	originates in Hanoi and Hong Kong			
	Zaragoza	1	onwards to Bahrain and Hong Kong	21	49	71
London Luton	Frankfurt	3				
	Istanbul	1				
	Istanbul	2	originates in Paris			
	Istanbul	2	originates in Cologne			
	Milan	4		12	49	71
Manchester	Amsterdam	1	onwards to Dubai and Hong Kong			
	Brussels	1	onwards to Dubai and Hong Kong			
	Dubai	1	originates in Amsterdam, onwards to Hong Kong			
	Frankfurt	2	originates in Detroit and Dallas			
	Frankfurt	1	onwards to Dubai and Hong Kong			
	Frankfurt	1	originates in Toronto and Houston			
	Milan	1	onwards to Hong Kong	8	8	71
East Midlands	Frankfurt	1				
	Keflavik	2	originates in Liege			
	Keflavik	2				
	Liege	2	originates in Keflavik			
	Paris	1		8	8	71
Prestwick	Los Angeles	1	originates in Luxembourg, onwards to Seattle			
	Luxembourg	1	originates in New York and Houston			
	Luxembourg	1	originates in Los Angeles and Seattle			
	Paris	2	originates in Chicago			
	Seattle	1	originates in Luxembourg, onwards to Calgary	6	6	71
Amsterdam	Abu Dhabi	4				
	Abu Dhabi	1	onwards to Taipei			
	Almaty	2	onwards to Hong Kong, Delhi, Sharjah			
	Bahrain	1	onwards to Mongolia, Hong Kong, Chennai			
	Baku	2	onwards to Kuala Lumpur			

	Bangalore	1	onwards to Singapore	
	Beijing	7		
	Beirut	2		
			onwards to	
	Budapest	2	Moscow	
	Chengdu	4		
	Chennai	1	originates Nairobi, onwards to Singapore	
	Chennai	1	originates in Chicago and Atlanta, onwards to Singapore	
	Chicago	2	originates in Doha	
	Chicago	7		
			onwards to	
	Chongqing	2	Shanghai	
	Copenhagen	1	originates in Nairobi, onwards to Sharjah and Singapore	
	Copenhagen	2	onwards to Sharjah and Singapore	
	Curitiba (Br)	1	onwards to Sao Paulo	
			originates in Nairobi, onwards to	
	Dacca	1	Singapore	
			originates in	
	Doha	1	Chicago	
	Doha	3		
	Dubai	2		
			originates in Eldoret and	
	Dubai	1	Nairobi	
			originates in	
	Dubai	1	Nairobi	
	Dubain	1	originates in Manchester, onwards to Hong Kong	
	Entebbe	1	onwards to Nairobi	
	Frankfurt	1	originates in Hong Kong	
	Frankfurt	1	onwards to Mumbai and Hong Kong	
	Gothenburg	3	onwards to Dubai	
	Guangzhou	5		
	Harare	3	onwards to Nairobi	
	Heathrow	1		
	Hong Kong	7		
	Houston	7		

	Jeddah	2	
	Johannesburg	1	onwards to Dar-Es-Salaam and Nairobi
	Khartoum	2	onwards to Nairobi
	Kigali	1	onwards to Nairobi
	Kuala Lumpur	1	
	Los Angeles	4	
			originates in Libreville, Brazzaville,
	Luxembourg	1	Nairobi
	Manchester	1	onwards to Dubai and Hong Kong
	Mexico City	7	
	Miami	2	onwards to Buenos Aires, Bogota, Puerto Rico and Stansted
	Miami	1	onwards to Buenos Aires, Quito and Guayaquil
			onwards to Santiago, Quito, Bogota and Puerto
	Miami	2	Rico
			onwards to Santiago, Quito and
	Miami	2	Guayaquil
	Milan	3	originates in Tokyo
			onwards to
	Milan	2	Moscow
	Milan	4	onwards to Tokyo
	Mongolia	2	onwards to Hong Kong and Chennai
	Moscow	2	
			onwards to
	Moscow	2	Shanghai
	Nairobi	1	
			originates in
	New York	3	Bahrain
			originates in
	New York	1	Bahrain
	New York	7	
	Paris	1	onwards to Mumbai and Hong Kong
	Puerto Rico	1	onwards to Bogota
	Puerto Rico	2	onwards to Quito
	Riyadh	1	
	Riyadh	2	onwards to Sharjah, Singapore and Kuala Lumpur

	Santiago	1			
	Sao Paulo	2	onwards to Buenos Aires and Santiago		
	Sao Paulo	1	onwards to Curitiba and Santiago		
	Seattle	1			
	Seoul	7			
	Shanghai	21			
	Sharjah	1	originates in Heathrow, onwards to Singapore		
	Sharjah	2	onwards to Guangzhou		
	Sharjah	1	onwards to Muscat and Hong Kong		
	Stockholm	2	originates in Seoul		
	Stockholm	4	onwards to Seoul		
	Taipei	1			
	Tel Aviv	1			
	Tenerife	1	onwards to Sao Paulo, Quito and Bogota		
	Tenerife	3	onwards to Sao Paulo, Quito and Guayaquil onwards to		
	Tianjin	15	Shanghai		
	Tokyo	1	originates in Frankfurt Hahn		
	Tokyo	5			
	Toronto	4			
	Tripoli	1			
			onwards to		
	Vienna	3	Shanghai	221	221 221
Brussels	Amman	1	onwards to Jeddah		
	Chennai	1	originates in Los Angeles and Dallas, onwards to Singapore		
	Dammam	1			
	Dubai	3	originates in New York		
	Dubai	1	originates in Frankfurt, onwards to Hong Kong		
	Dubai	1	originates in Manchester, onwards to Hong Kong		
	Heathrow	1			
			originates in		
	Istanbul	1	Jeddah		
	Kolkata	1	originates in Los Angeles, onwards to Singapore		
			originates in		
	Milan	2	Riyadh		

	Milan	1	originates in Jeddah			
	Mumbai	1	originates in Los Angeles and Chicago, onwards to Singapore			
	New Guinea	1	onwards to Seoul			
	New York	1	originates in Jeddah			
	New York	1	originates in Jeddah, onwards to Houston			
	New York	6	originates in Dubai			
	Riyadh	1				
	Riyadh	1	onwards to Jeddah			
	Seoul	1	originates in New York			
	Seoul	2	originates in New York			
	Sharjah	2	originates in Dallas, onwards to Singapore			
	Sharjah	1	originates in Chicago and Dallas, onwards to Singapore			
	Taipei	1				
	Tianjin	1	onwards to Seoul			
	Vienna	2	originates in Riyadh			
				36	36	118
Liege	Accra	2	onwards to Lagos and Addis Ababa			
	Addis Ababa	5				
	Bahrain	11	originates in New York			
	Bucharest	1	onwards to Tel Aviv			
	Dubai	12	onwards to Hong Kong			
	East Midlands	4	onwards to Keflavik			
	Entebbe	1				
	Istanbul	5				
	Keflavik	4				
	Keflavik	1	onwards to New York			
	Lagos	2	onwards to Addis Ababa			
	Lagos	1	onwards to Ougadougou			
	Lagos	1	onwards to Port Harcourt			

	Lome	2			
	Luxembourg	1	onwards to Congo, Addis Ababa		
	New York	1	originates in Tel Aviv		
	New York	2	originates in Tel Aviv		
	New York	5			
	Ougadougou	1	onwards to Congo		
	Shanghai	1			
	Shanghai	2			
	Siauliai				
	Lithuania	1			
	Singapore	1			
	Tel Aviv	3	originates in New York		
	Tel Aviv	1	originates in Chicago		
	Tel Aviv	6			
	Vienna	5		82	82 118
Luxembourg	Abidjan	1	onwards to Accra		
	Abu Dhabi	1	onwards to Taipei		
	Almaty	1	onwards to Hong Kong		
	Atlanta	1			
	Atlanta	1	onwards to Chicago		
	Atlanta	2	originates in Doha, onwards to Houston		
	Baku	1	onwards to Almaty and Shanghai		
	Baku	1	onwards to Hong Kong		
	Baku		onwards to Shanghai		
	Baku	4			
	Baku	1	onwards to Singapore and Hong Kong		
	Baku	1	onwards to Singapore and Kuala Lumpur		
	Baku		onwards to Taipei and Bangkok		
	Beijing	2			
	Beirut	1	onwards to Xiamen		
		1	onwards to Amman and Hong Kong		

		onwards to Amman and
Beirut	1	Istanbul
Chicago	1	onwards to Atlanta
Chicago	1	onwards to Los Angeles
Congo	1	originates in Liege, onwards to Addis Ababa
Dallas	1	
Dammam	1	onwards to Saigon and Hong Kong
Doha	1	onwards to Hanoi and Hong Kong
Doha	1	onwards to Singapore and Kuala Lumpur
		originates in
Doha	1	Houston
		originates in
Doha	1	Chicago
Dubai	1	onwards to Bangkok and Hong Kong
Dubai	1	onwards to Hong Kong
Frankfurt		
Hahn	3	originates in Shanghai
		onwards to
Indianapolis	1	Chicago
Indianapolis	1	onwards to Los Angeles, Calgary
Johannesburg	3	
Komatsu	2	onwards to Seoul
Kuwait	2	onwards to Hanoi and Hong Kong
Lagos	1	onwards to Port Harcourt and Kinshasa
Libreville	1	onwards to Brazzaville
		onwards to
Libreville	1	Kinshasa
Los Angeles	1	onwards to Seattle
Los Angeles	1	
Mexico City	1	
Mexico City	1	onwards to Guadalajara
		onwards to
Miami	2	Houston
Milan	1	onwards to New York and Chicago
Milan	4	

	Ndjamena	1	onwards to Lagos originates in Tel			
	New York	1	Aviv originates in Tel Aviv, onwards to			
	New York	1	Chicago			
	New York	1	onwards to Atlanta onwards to			
	New York	1	Houston			
	New York	1	onwards to Mexico City and Guadalajara			
	Prague	2	originates in Chengdu			
	Prestwick	1	onwards to Los Angeles and Seattle onwards to Seattle and			
	Prestwick	1	Calgary			
	Riyadh	1	onwards to Dammam and Hong Kong			
	Sao Paulo	1	onwards to			
	Sao Paulo	2	Curitiba onwards to			
	Sao Paulo	1	Manaus			
	Seoul	1				
	Sharjah	1	onwards to Karachi			
	Singapore	1	onwards to Kuala Lumpur			
	Taipei	2	onwards to Baku and Shanghai			
	Tbilisi	2				
	Yerevan	1		80	80	80
Paris	Beirut	1	onwards to			
	Cairo	1	Reunion			
	Chicago	5	onwards to			
	Cologne	2	Istanbul			
	Delhi	1	originates in Heathrow, onwards to Hong Kong onwards to			
	Djibouti	1	Reunion			
	Hannover	4				

	Heathrow	1			
	Istanbul	1			
			onwards to		
	London Luton	2	Istanbul		
	Mexico City	6			
	Milan	1	onwards to Delhi and Hong Kong		
	Mumbai	2	onwards to Hong Kong		
	Mumbai	1	originates in Amsterdam, onwards to Hong Kong		
			onwards to		
	New York	1	Chicago		
	Niamey	1	onwards to Ouagadougou and Bamako		
	Njamena	1	onwards to Bangui, Brazzaville and Port Harcourt		
	Porto	1	onwards to Mexico City		
	Seoul	2			
	Shanghai	2	originates in Copenhagen		
	Shanghai	2			
	Tokyo	2		41	41
					41
Cologne	Basle	4			
	Berlin	5			
	Bucharest	4			
	Bucharest	2			
	Istanbul	2	originates in Paris		
	Istanbul	2			
	Katowice	4			
	Keflavik	5			
	Ljubljana	4			
	Ljubljana	1	onwards to Zagreb		
			originates in		
	London Luton	2	Istanbul		
			onwards to		
	London Luton	2	Istanbul		
	Madrid	1	originates in Stansted		
	Prague	5			
	Sofia	1			
	Tblisi	1	originates in Stansted		

	Tblisi	1	originates in Stansted, onwards to Delhi			
	Tel Aviv	12				
	Zagreb	4		62	62	304
Frankfurt Hahn	Almaty	1	originates in New York			
	Almaty	6	originates in New York, onwards to Shanghai			
	Amsterdam	1	onwards to Tokyo			
	Amsterdam	1	originates in Tokyo			
	Atyrau	1	onwards to Almaty			
	Baku	3				
	Beijing	3				
	Chatearoux	1	onwards to Kabul			
	Doha	2				
	Johannesburg	2				
	Milan	1	onwards to Tokyo			
	Toronto	1	onwards to Mexico City			
	Yerevan	1		24	242	304
Frankfurt	Abu Dhabi	5				
	Almaty	1				
	Almaty	1	onwards to Guangzhou			
	Almaty	1	onwards to Hong Kong			
			onwards to			
	Almaty	2	Shanghai			
	Amman	2				
	Amsterdam	1	originates in Hong Kong and Chennai			
	Atlanta	4				
	Baku	1	onwards to Bangkok and Kuala Lumpur			
	Baku	2	onwards to Kuala Lumpur			
			onwards to			
	Bangalore	3	Chennai			
	Bangalore	1	onwards to Hyderabad and Guangzhou			
	Bangkok	2				
			onwards to			
	Beijing	3	Shanghai			
	Brussels	1	onwards to Dubai and Hong Kong			

	Cairo	3	
	Chicago	7	
	Chicago	1	onwards to Los Angeles
	Chicago	4	onwards to Mexico City
	Chicago	2	onwards to Mexico City and Guadalajara
	Chicago	1	originates in Stansted
	Coventry	10	
			originates in Dubai, onwards to Sao Paulo
	Dakar	3	
	Dammam	2	onwards to Sharjah and Hong Kong
	Delhi	4	onwards to Singapore and Bangkok
	Delhi	1	originates in Atlanta and Stansted, onwards to Hong Kong
	Detroit	2	
	Doha	1	
	Dubai	1	originates in Lagos and Accra
	Dubai	4	originates in Sao Paulo and Dakar
	Dubai	3	
	Dubai	1	originates in Dusseldorf
	Dubai	1	originates in Manchester, onwards to Hong Kong
	East Midlands	1	
	Heathrow	1	
	Helsinki	1	
	Hong Kong	3	
	Hong Kong	1	originates in Stansted
	Istanbul	6	
			onwards to Tel Aviv
	Istanbul	1	
	Jeddah	1	onwards to Sharjah, Hyderabad and Guangzhou
	Kabul	1	
	Krasnojarsk	1	
	Krasnojarsk	6	onwards to Beijing and Seoul
			onwards to Seoul and
	Krasnojarsk	1	Shanghai
			onwards to
	Krasnojarsk	y	Shanghai

	Krasnojarsk	7	onwards to Tokyo and Osaka	
	London Luton	3		
	Madrid	4		
	Malta	1		
	Milan	1	originates in Hong Kong and Dubai	
	Milan	1	onwards to Dubai and Hong Kong	
	Milan	1	onwards to Hong Kong	
	Moscow	10		
	Moscow	2	onwards to Tokyo	
	Moscow	1	onwards to Tokyo and Seoul	
	Mumbai	1		
			onwards to	
	Mumbai	1	Chennai	
	Mumbai	3	onwards to Hong Kong	
	Mumbai	1	onwards to Hyderabad	
	Mumbai	1	originates in Amsterdam, onwards to Hong Kong	
	Nairobi	5	onwards to Johannesburg	
	New York	5		
	Riyadh	3		
			onwards to	
	Riyadh	1	Dammam	
	Riyadh	1	onwards to Sharjah and Hong Kong	
	Sao Paulo	3		
			onwards to	
	Sao Paulo	1	Curitiba	
			onwards to Curitiba, Quito and Puerto	
	Sao Paulo	1	Rico	
			onwards to Manaus, Quito and Puerto	
	Sao Paulo	2	Rico	
			onwards to Montevideo and Buenos	
	Sao Paulo	2	Aires	
			originates in	
	Seoul	1	Vienna	
	Seoul	2	originates in St Petersburg	
	Seoul	12		

	Seoul	2	originates in Atlanta and Stansted			
	Seoul	1	originates in Moscow and Vienna			
	Shanghai	1	originates in Chicago, Atlanta and Stansted			
	Shanghai	18				
	Sharjah	2	onwards to Kolkata and Hong Kong			
	Stockholm	1	onwards to Dubai and Hong Kong			
	Stockholm	4	onwards to Seoul			
	Taipei	3				
	Tel Aviv	3	onwards to Istanbul			
	Toronto	1	onwards to Houston			
				218	242	304
Milan	Abu Dhabi	2				
	Almaty	1	onwards to Osaka and Hong Kong			
	Baku	1				
	Dammam	1				
	Delhi	1	originates in Paris, onwards to Hong Kong			
	Doha	2				
	Dubai	2	onwards to Hong Kong			
	Dubai	1	originates in Frankfurt, onwards to Hong Kong			
	Heathrow	5				
	Hong Kong	1	originates in Frankfurt			
	Hong Kong	2	originates in Heathrow			
	Hong Kong	1	originates in Manchester			
	Istanbul	1				
	Istanbul	2	originates in Lagos			
	Istanbul	1	originates in Tirana			
	Jeddah	1				
	Luxembourg	1	originates in Chicago and Los Angeles			
	Luxembourg	4				
	Luxembourg	1	originates in Chicago and New York			
	Madrid	1				
	Moscow	2	originates in Amsterdam			

	New Guinea	1	onwards to Seoul			
	Osaka	1	onwards to Hong Kong			
	Riyadh	1				
	Sao Paulo	1				
	Seoul	1	originates in Uzbekistan			
	Seoul	9				
	Shanghai	4				
	Tokyo	4	originates in Amsterdam			
	Tokyo	1	originates in Frankfurt Hahn	57	57	57
Vienna	Amman	1				
	Copenhagen	2	originates Seoul			
	Frankfurt	1	originates Seoul			
	Istanbul	2				
	Kiev	5				
	Liege	5				
	Milan	3	originates Seoul			
	Moscow	2	originates Seoul and onwards to Gothenburg or Frankfurt			
	Oslo	3	originates Seoul			
	Oslo	6				
	Riyadh	2				
	Seoul	1	via Frankfurt			
	Seoul	3	via Gothenburg			
	Seoul	1	via Tel Aviv			
	Seoul	4	via Copenhagen			
	Seoul	1	originates Moscow			
	Shanghai	3	originates Amsterdam			
	St Petersburg	1	originates Seoul and onwards to Gothenburg			
	Tel Aviv	1	originates Seoul			
	Timosoara	5		52	52	52