

# Insights into Amazon Air 2020's Transportation Juggernaut

## Chaddick Policy Brief

by Joseph P. Schwieterman and Jacob Walls

May 22, 2020

### Our analysis indicates that Amazon Air is...

- ➔ Putting more emphasis on cargo-only airports than most other package-shipment providers
- ➔ More oriented toward daytime flights and point-to-point routes than FedEx and UPS
- ➔ Expanding its fleet to 70 airplanes by 2021 and could grow to 200 planes in 7-8 years
- ➔ Making Cincinnati (CVG), Chicago Rockford, Ontario, Tampa, and Wilmington (OH) focal points
- ➔ Creating a CVG megahub that greatly boosts its potential to be a multi-purpose delivery provider

**Amazon Air is 2020's transportation juggernaut**, flying above the turbulence facing most cargo and passenger airlines during the coronavirus epidemic. This wholly owned subsidiary of retailing giant Amazon is expanding rapidly to help handle surging online buying. Amazon Air's expansion marks one of the most significant developments in the U.S. air-cargo business in years and gives boost to airports seeking to cultivate freight traffic. Amazon Air is not to be confused with the retailer's experimental drone unit, which is known as Amazon Prime Air.

This briefing offers an overview of Amazon Air, providing insights on its size, scope and evolving logistics role. It draws upon data from four primary informational sources to illustrate its economic and geographic orientation.<sup>1</sup>

- Data on flight operations from flightaware.com and flightradar24.com
- Analysis of the proximity of Amazon Air airports to 170 fulfillment centers
- Fleet registration info from various sources, including planespotters.net
- Analysis of federal data on passenger and cargo traffic at the airports it serves.

Eight findings from our analysis stand out.



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Please refer to page 12 for author and research-team biographies.



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**Observation 1. The growth of Amazon Air is a cornerstone of the retailer’s push to expand its presence in the overnight and two-day home delivery market, a segment that has long been dominated by FedEx, UPS, and the United States Postal Service. Amazon Air’s orientation, however, differs from these more established carriers in several notable ways.**

Since making its maiden flight in 2016, Amazon Air has been on a rapid growth trajectory, having grown to 42 airplanes by May 2020 and announcing plans to have at least 70 airplanes by 2021. In just three years, it has become a major component of Amazon’s overnight and two-day delivery business. Amazon Air complements the retailer’s massive ground-based shipping network, which by one estimate now surpasses 20,000 trucks.<sup>2</sup> The carrier’s growth is being spurred by the expansion of Amazon Prime, which heavily promotes overnight and second-day delivery, and there has been speculation that the COVID crisis has accelerated the carrier’s expansion.



An Amazon Air Boeing 767-300 freighter, the larger of the two airframe models in the carrier’s fleet, operated by Atlas Air. Amazon Air was formerly known as Amazon Prime Air, as the plane’s livery shows. Photo credits: Flickr, [Nathan Coats](#)

Based on estimates by our DePaul team presented below, Amazon Air now operates almost 100 flights per day despite being still primarily confined to North America. The steady flow of investment to expand Amazon Air paves the way for the retailer to both reduce reliance on FedEx, UPS, and USPS and—eventually—possibly enter the *general* package delivery market (i.e., the business of delivering not only packages generated on the Amazon platform, but others as well) in competition with FedEx and UPS. If and when that occurs, however, remains a matter of speculation. Amazon has not announced plans to do so, and it took a modest step in the opposite direction in April when it temporarily stopped shipping packages from Amazon sellers who do not keep inventory in its warehouses, reportedly to allow it to focus on its own customers.<sup>3</sup>

Amazon Air, being largely designed to support purchases on the Amazon platform, has many of the qualities of a *private carrier*, much like the private trucking lines that serve Costco, Target, and Walmart. Data on the amount of cargo it ships is not publicly disclosed. Its flight network appears designed largely to *augment* the services of DHL International, FedEx, and UPS, such as by filling critical links between its fulfillment and sorting centers, rather than being designed to replace them outright (DHL primarily serves the international market).

Amazon Air has built large sorting facilities at numerous airports, including Chicago Rockford, Ontario, CA, Tampa, FL, and Wilmington, OH. In some cases, these facilities are adjacent to FedEx and UPS sorting centers, creating logistical synergy. If Amazon can’t ship you a product by the promised deadline using its own trucks and planes, the package can be turned over to one of the integrators or USPS.

The massive investment being made in a large hub at Cincinnati/Northern Kentucky International Airport, however, could change everything. This hub appears to be the lynchpin to Amazon’s efforts to

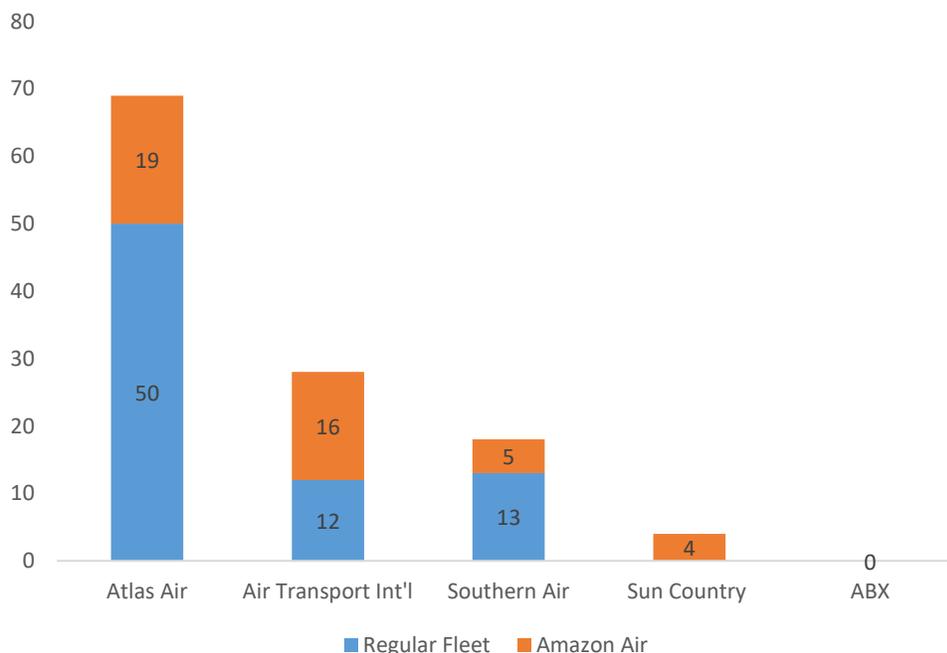
develop a comprehensive array of domestic delivery services across the United States. This hub, when complete, will likely have a role similar to the FedEx “megahub” in Memphis.

**Observation 2. Amazon Air is operated by five contractors: Atlas Air, Air Transport International, Southern Air, and Sun Country Airlines.**

The outsourcing approach used by Amazon Air follows the preferred strategy of its parent, which adheres to a similar approach for its familiar over-the-road delivery trucks and vans. Because its contractors do not report Amazon-specific data to a federal agency, statistics about how much Amazon Air traffic they handle are not available. Estimates of the general size of the contract carriers, with a projection of the amount of Amazon traffic they handle, however, appear at the end of this report.

Amazon Air flights constitute a large share of cargo operations by four of these carriers, accounting for more than half the fleet of **Air Transportation International (ATI)** and more than a third of the fleets of **Atlas Air** and **Southern Air** (Southern Air is a subsidiary of Atlas Air). ATI, in which Amazon is reportedly acquiring a minority equity stake, is part of Air Transport Services Group, a company based at Wilmington Air Park, OH.<sup>4</sup> Amazon Air accounts for all four of **Sun Country’s** freighters, although that carrier’s operations were launched only in late April. This Twin Cities-based carrier is predominantly a passenger airline, giving it a less cargo-centric orientation than the other contractors. The fifth carrier, **ABX**, is another subsidiary of Air Transport Service Groups. None of ABX’s planes, however, were identified in our analysis as being operated for Amazon Air, making its role unclear.<sup>5</sup> (The legal relationship of the above entities is complex and evolving.)

**Figure 1. Fleets operated by Contracted Carriers for Amazon Air**



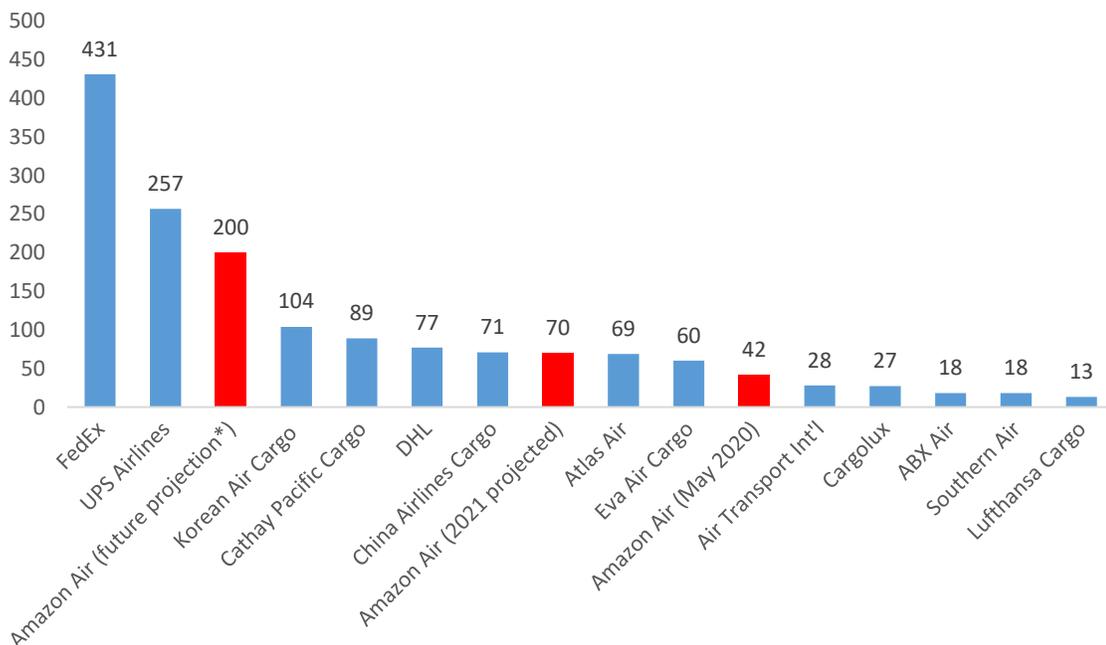
Caption: All four of Amazon Air’s contract carriers devote a significant share of their freighter fleet to serve the retailer. Sun Country is alone among the four to operate scheduled passenger service.

Among these four contractors, only Atlas Air operates a larger fleet of freighters unrelated to its Amazon business. Amazon made headlines this month when it announced it would begin using its own employees to load and unload some Amazon Air planes, which reportedly could cut substantially into contractor revenues.<sup>6</sup>

**Observation 3. Amazon Air’s fleet is still relatively small compared to those of FedEx and UPS, and it has shied away from jumbo jets, preferring instead mid-size freighters. By 2021, however, it could rank among the world’s largest cargo airlines and, we believe, it is reasonable to anticipate its fleet to grow to perhaps 200 airplanes within seven or eight years.**

The 42 airplanes presently operated for Amazon Air make it a mid-size cargo carrier—and one much smaller than the three dominant “integrators”, **FedEx** (463 planes), **UPS** (275), and **DHL** (77).<sup>7</sup> These air-freight integrators, however, operate *worldwide* networks, so their planes are spread throughout a half-dozen continents, whereas Amazon flights are largely confined to North America. Even so, Amazon Air already has a fleet that is larger than some prominent global cargo airlines, including **CargoLux** (27) and **Lufthansa Air Cargo** (a subsidiary of Lufthansa Airlines having 13 planes). Note, however, that there is much uncertainty about the actual fleets of some airlines, due to different reporting practices across the globe and the pervasiveness of outsourcing, which can result in fleet totals being understated.<sup>8</sup>

**Figure 2. Fleets of World’s Largest (and Selected U.S.) Cargo Airlines**  
Based on fleet counts from planespotters.net



Caption: For consistency, all estimates of fleet sizes are estimates of planes in service by the planespotters.net website. These estimates understate the fleet sizes of certain airlines due to the fact they exclude certain planes operated by contractors. Amazon’s fleet is projected by Morgan Stanley to grow to around 100 in 2025 and to 200 by 2028 by our study team.

\* See Appendix (page 13) for a discussion of this Chaddick Institute estimate.

If Amazon Air achieves its stated goal of having 70 planes by 2021, the carrier's fleet size will be similar to the present size of **DHL** (77) and **China Airlines Cargo** (71), potentially putting it in the top seven in the world (while reiterating there is considerable uncertainty in the above fleet-size estimates, and certain carriers may be missing from Figure 2). Other cargo airlines may grow as well, but, due to the pandemic, some appear poised to downsize or grow only cautiously.

Reports have been made that Amazon Air could eventually have 100 Amazon-branded planes serving the Cincinnati hub alone. Our analysis suggests that it is reasonable to expect Amazon Air's fleet to grow to 200 airplanes in the next 7 – 8 years. Although this is only a projection—the company has not to our knowledge made known its long-range plans—this estimate appears to be a conservative one, considering that Amazon may well aspire to give Amazon Air a *global* presence, and that its Cincinnati megahub could account for only a minority of flights. Growth from 39 planes to 200 planes



An Amazon Air Boeing 767-300 airplane, with a Boeing 747 of Atlas Air, one of its main air-cargo contractors, in the distance. [Nathan Coats](#)

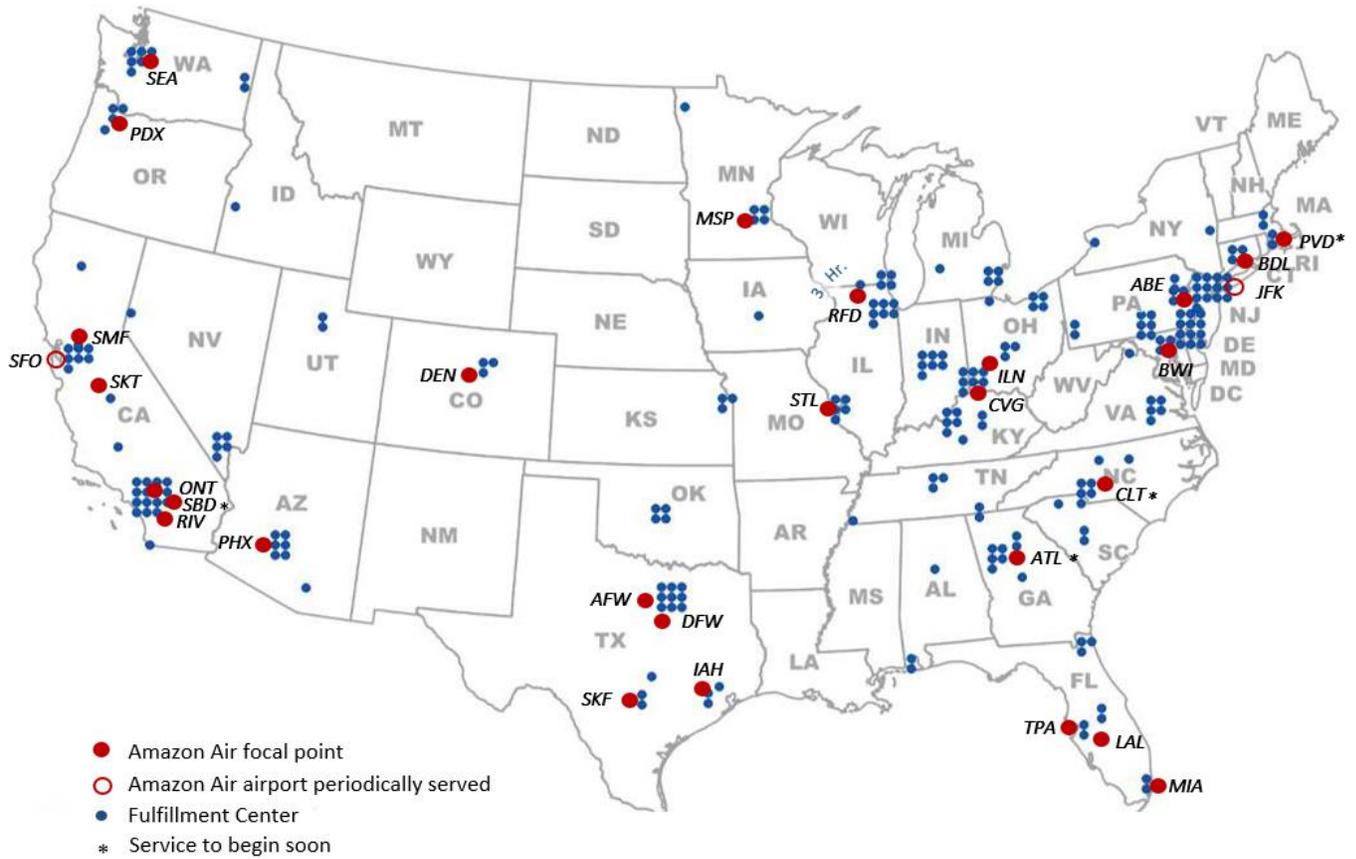
from 2019 to 2028 requires a 19.9% compound annual growth, less than half that previously achieved by the company since 2016. A Morgan Stanley estimate (made early in 2019) that Amazon could have 100 planes by 2025 requires a 17.0% compounding rate of growth.<sup>9</sup> Although our required growth rate is slightly higher, some of the expansion could be in the form of smaller airplanes (including twin-engine turboprops) or the acquisition of other cargo airlines (See detailed discussion of our projection in the Appendix, page 13).

When measured on the basis of the *available lift (cargo carrying capacity)* of its planes, Amazon Air has a lower ranking among cargo airlines. At present, Boeing 767s account for about 90% of its flights, with the remainder being Boeing 737s, both of which have less cargo-carrying capacity than the B747s, MD11s, A300s, and other large jets commonly used by other cargo airlines.

**Observation 4. The network of airports that Amazon Air serves is designed to link fulfillment and sorting centers rather than provide comprehensive coverage across all of North America. Although Amazon Air does not yet serve points within or near many major cities, its network puts the vast majority of the U.S. population within a day's truck drive of an airport that is served.**

Our research team prepared the following map that shows the juxtaposition of airports served by Amazon Air with its warehouses. The 170 warehouses identified are clustered by geographic region using GIS software (Figure 3).

**Figure 3. Juxtaposition of Airports Served and Fulfillment Centers for Amazon Air**



Caption: This maps shows the proximity of Amazon Air’s airports on the U.S. mainland to its fulfillment centers. The red circles designate airports with Amazon flights, based on a sample encompassing flights on a randomly selected day. Some airports with only periodic service are not shown.

**Airports on Map.** Lehigh Valley, Allentown-Bethlehem, (ABE), Baltimore/Washington (BWI), Charlotte (CLT), Chicago/Rockford (RFD), Cincinnati (CVG), Dallas/Fort Worth (DFW), Denver (DEN), Fort Worth Alliance (AFW), Hartford, CT (BDL), Hartsfield/Atlanta (ATL), Houston (IAH), John F. Kennedy (JFK), Lakeland Linder (LAL) Miami (MIA), Minneapolis (MSP), Ontario (ONT), Phoenix (PHX), Portland (PDX), Providence (PVD), Riverside, March Air Reserve Base (RIV), Sacramento (SMF), St. Louis (STL), San Antonio Kelly (SKF), San Bernardino (SBN), San Francisco (SFO), Seattle (SEA), Stockton (SCK), Tampa (TPA), Wilmington (ILN).

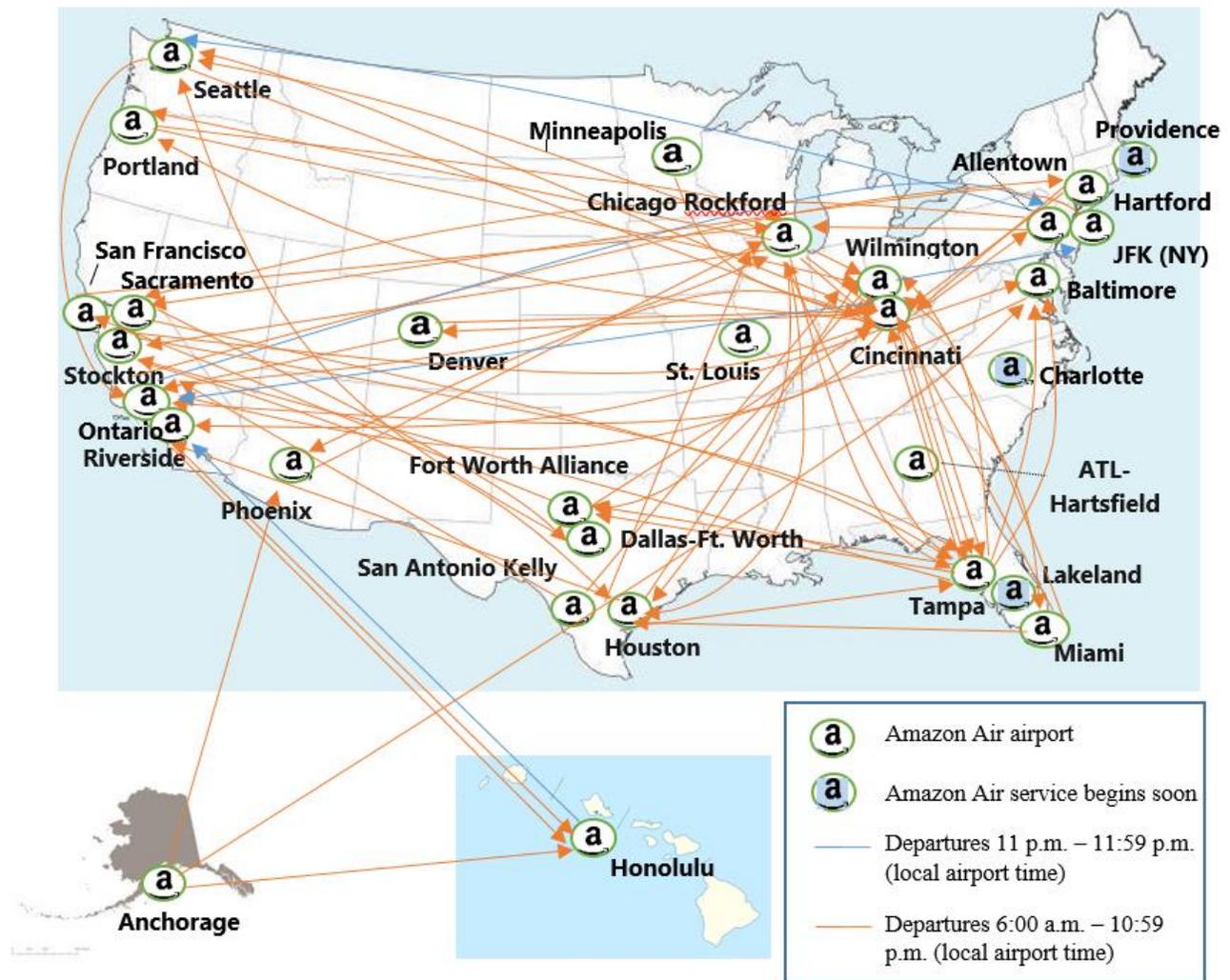
Amazon Air’s network emphasizes proximity to its fulfillment centers, many of which are a considerable distance from dense urban centers. The company has a network in which flights do not necessary arrive or depart at locations close to the customer but instead are integrated with Amazon’s vast network of trucking routes to close the spatial gaps. Several major cities, such as Detroit, MI, Kansas City, MO, Indianapolis, IN, and Salt Lake City, UT, for example, are not served by the airline but are within an eight-hour drive (and in most cases only a few hours) from one of its airports. Service to Charlotte, NC, Providence, RI, and San Bernardino, CA is expected to commence soon.

Amazon Air serves the enormous New York City market primarily from its hub at the relatively small Lehigh Valley International Airport, in Allentown-Bethlehem, PA, which is about 90 miles from

Manhattan and handles only about 2% of the passenger traffic as Newark Liberty International. Customers between Philadelphia and central Virginia are primarily served from its Baltimore/Washington International Airport hub. Both are endpoints for an expansive system of trucks and vans.

Our analysis also suggests that there could be a need for additional airports on the Amazon Air system in the Northeast and Mid-Atlantic regions, as well as in metropolitan Chicago. This analysis will be available in mid-summer 2020.

**Figure 4. Amazon Air Flight Network on a Typical Day, April 23, 2020**  
 Flights departing 6 a.m. – 10:59 p.m. in orange; overnight flights in blue



This map shows roughly 90% of Amazon Air’s flights on a typical day, based on itineraries from flightradar24.com on April 23, 2020. One transoceanic flight, linking Anchorage to Incheon, South Korea, is not shown. Our analysis indicates the Amazon Air planes make an average of 2.1 flights daily.

**Observation 5. Amazon Air’s network of flights gives it a highly decentralized orientation, although this is poised to change.**

Our research team has tracked the origins and destinations of Amazon Air flights on several occasions. Most recently, it recorded the itineraries of about three-quarters of Amazon Air flights on April 23, 2020 (Some flights could not be tracked due to missing information on airplane registration numbers). The airports with the most Amazon Air flights over the course of this day (Figure 5) showed that Cincinnati/Northern Kentucky International Airport is the busiest station (24 flights), followed by Tampa, FL (16), Chicago Rockford, IL (15), Wilmington, OH, and Ontario, CA (both 13). These totals may moderately understate flight activity due to airplanes we were unable to track. Please refer to the Appendix for a complete list.

**Figure 5. Busiest Amazon Air Airports  
April 23, 2020**

Airport	Total Flights	Notes
Cincinnati (CVG)	24	Emerging megahub; also DHL's primary hub
Tampa (TPA)	16	Traffic could diminish with opening of Lakeland-Linder
Chicago/Rockford (RFD)	15	Also a major hub for UPS
Wilmington (ILN)	13	Headquarters of contractor ATI
Ontario (ONT)	13	Also a major hub for UPS
Seattle (SEA)	9	Used for international flights to Asia
Houston (IAH)	9	One of four airports in Texas Triangle
Fort Worth Alliance (AFW)	8	Also a mini-hub for FedEx
Allentown/Bethlehem (ABE)	6	Serves New York City and Philadelphia regions

Note: These estimates may modestly understate flight activity due to lack of information on certain flight itineraries.

The above analysis illustrates the point made earlier that Amazon Air’s network does not yet have the breadth to allow Amazon to provide the same range of service as FedEx and UPS. It is designed partially to compete with—and partially complement—the services of these other companies. Such complementarity is reflected in the fact that three of the five airports having the most Amazon Air flights—CVG, Chicago Rockford, and Ontario—are major hubs for air-freight integrators.

Other schedule-related differences between Amazon and air-freight integrators are also noteworthy. Whereas FedEx and UPS flights are scheduled to support next-day shipments, much of Amazon Air’s design appears still oriented partially for *second-day delivery*, which makes having flights in the middle of the night less critical. About three-quarters of Amazon Air flights, our evaluation suggests, depart 6 a.m. – 10:59 p.m., local airport time, a virtual mirror image of the integrators, which are largely nocturnal creatures. Amazon Air schedules are also more dynamic. Although FedEx and UPS schedules are highly predictable, Amazon’s vary considerably from day to day.

At present, Amazon Air has a less hub-centric design than the integrators. Only about 20% of its domestic flights use the Cincinnati hub, less than the share of FedEx and UPS flights using their “superhubs” at Memphis and Louisville, respectively. As noted in Observation 6, however, this will likely change.

**Observation 6. Cincinnati/Northern Kentucky International Airport (CVG) is being equipped with specialized facilities for package sorting and transshipping to distant cities to allow the airport to become Amazon Air’s “superhub.” The new facilities are expected to be completed in 2021 and will likely dramatically change Amazon Air’s geographic profile.**

The development of the Cincinnati hub is facilitated by an agreement with DHL allowing for the cross-utilization of facilities. This will apparently allow Amazon to use DHL facilities primarily during the day, when they are generally underutilized. Several notable indications about the probable role of CVG stand out:

- Amazon is investing \$1.5 billion in a 3 million square foot building at the hub, with truck bays designed to support shipments across the country.
- The state of Kentucky is building a new interchange on I-275 to support this massive development, as well as widening several other highway routes.
- An estimated 200 flights per day are reportedly expected to use the hub.
- As many as 100 Amazon-branded planes could operate from CVG. The site being developed reportedly has capacity for 100 Amazon planes.<sup>10</sup>

The development of CVG, however, remains in a relatively early phase. Much of these needed facilities are not expected for completion until later in 2021. Expanding to 200 flights per day from these facilities (up from only about two dozen today) also likely requires a much larger fleet than the 70 planes anticipated to be on the Amazon Air roster by 2021.

**Observation 7. Amazon Air’s aggressive growth plans bode well for advocates of airports dedicated to handling freight traffic. The carrier is less focused on operating from airports with a mix of passenger and cargo traffic than the air-freight integrators.**

Airports oriented primarily toward cargo have had mixed success in recent decades. Many have been bypassed by the air-freight integrators, which have generally opted for creating hubs at airports with a mix of cargo and passenger traffic (such as Louisville and Memphis, each of which handles more than 3 million passengers annually). Six of Amazon’s roughly two dozen operational focal points, however, are airports with little or no passenger traffic: Chicago Rockford (in Rockford, IL), Fort Worth Alliance, Ohio’s Wilmington Air Park, San Antonio’s Kelly Airport, and California’s Stockton and Riverside airports. Among these six, only Chicago Rockford and Stockton have any scheduled passenger service, and neither handles more than 300,000 passenger per year.

Moreover, service is expected to begin soon to Lakeland Linder International, a general aviation airport

near Tampa, FL that has no scheduled passenger flights. Amazon Air will reportedly also start flights soon to San Bernardino International Airport, a cargo-only facility. As a result, more than a quarter of Amazon Air’s principal focus points could soon be cargo-oriented airports. This is a far greater share than that of FedEx or UPS, which operate large hubs at only two cargo-focused airports, Chicago Rockford (UPS) and Fort Worth Alliance (FedEx).

**Figure 6. Cargo Oriented Airports served by Amazon Air**



Caption: Amazon Air has a far greater orientation toward airports that have minor roles in scheduled passenger travel (defined as handling fewer than 300,000 passengers per year). Among the eight meeting this criterion, only Rockford and Stockton have any regularly scheduled passenger service at all (Amazon Air service to Lakeland and San Bernardino is expected to begin soon). Allentown/Bethlehem handles fewer than 1,000,000 passengers annually and thus also has a cargo orientation.

**Observation 8. Amazon Air’s growth trajectory will make it difficult for the retailer to maintain harmonious relationships with FedEx and UPS. Amazon’s decision to stop delivering packages not generated through its platform temporarily eases tensions, but the carrier is poised to eventually return to the broader business-to-consumer market.**

Amazon has an uneasy relationship with FedEx and UPS, which are taking steps to deal with its ever-growing presence in the home-delivery business. Amazon Air’s apparent low costs and its synergy with the retailer’s vast network of fulfillment centers suggest it is positioned to grow rapidly. FedEx decided not to handle certain Amazon traffic late last year for financial reasons.<sup>11</sup> On the whole, UPS appears to be more vulnerable to Amazon Air’s expansion than DHL or FedEx.<sup>12</sup>

According to the Global Research unit of Bank of America, “Amazon is approaching a truly vertically integrated logistics network on par with the largest delivery companies in the world.” However, as

previously noted, it has not achieved this yet: its network is still less well-developed than that of FedEx and UPS. In 2019, Amazon delivered an estimated 2.3 billion packages in the United States, which were largely comprised of goods purchased on its own platform.<sup>13</sup> That number, while impressive, is considerably below the 3.1 billion and 4.7 billion total packages delivered (and generated from many different buying platforms) on FedEx and UPS, respectively. The USPS delivered 6.2 billion.

The carrier’s growth will generate tensions with established operators—and surprises. Rival airlines and logistics operators will make strategic moves to protect their business as the fast-growing startup expands its fleet and grabs a bigger piece of the air-cargo pie. Long-established players may drive an ever-harder bargain in negotiations—to the extent their market position allows it.

But it is noteworthy that, at a time when many other airlines are downsizing due to the pandemic, Amazon’s push for faster and cheaper at-home delivery is moving ahead on an ambitious timetable. Amazon Air’s robust expansion makes it one of the biggest stories in the air cargo industry in years.



## Authors and Study Team



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## Appendix

**Figure 7. Arrivals and Departures on Amazon Air  
April 23, 2020**

Rank		767 flights	737 flights	Total
1	Cincinnati (CVG)	20	4	24
2	Tampa (TPA)	10	6	16
3	Chicago/Rockford (RFD)	7	8	15
4	Wilmington (ILN)	13	0	13
4	Ontario (ONT)	13	0	13
6	Seattle (SEA)	9	0	9
6	Houston (IAH)	5	4	9
7	Fort Worth Alliance (AFW)	8	0	8
8	Allentown/Bethlehem (ABE)	6	0	6
8	Portland (PDX)	4	2	6
8	Miami (MIA)	6	0	6
8	Baltimore/Washington (BWI)	6	0	6
12	Stockton (SCK)	4	0	4
12	Sacramento (SMF)	4	0	4
12	Riverside (RIV)	4	0	4
12	Phoenix (PHX)	2	2	4
16	Honolulu (HNL)	4	0	4
16	Denver (DEN)	4	0	4
16	Anchorage (ANC)	4	0	4
19	Windsor Locks (BDL)	2	0	2
19	San Francisco (SFO)	2	0	2
19	San Antonio (SKF)	2	0	2
19	Minneapolis (MSP)	2	0	2
19	John F. Kennedy (JFK)	2	0	2
24	Incheon, South Korea(ICN)	1	0	1

Note: these estimates are based on flights by 38 of the 42 planes reported as being part of the Amazon Air Fleet on April 23, 2020. Flight activity was monitored on [flightradar24.com](http://flightradar24.com), a prominent flight-tracking website.

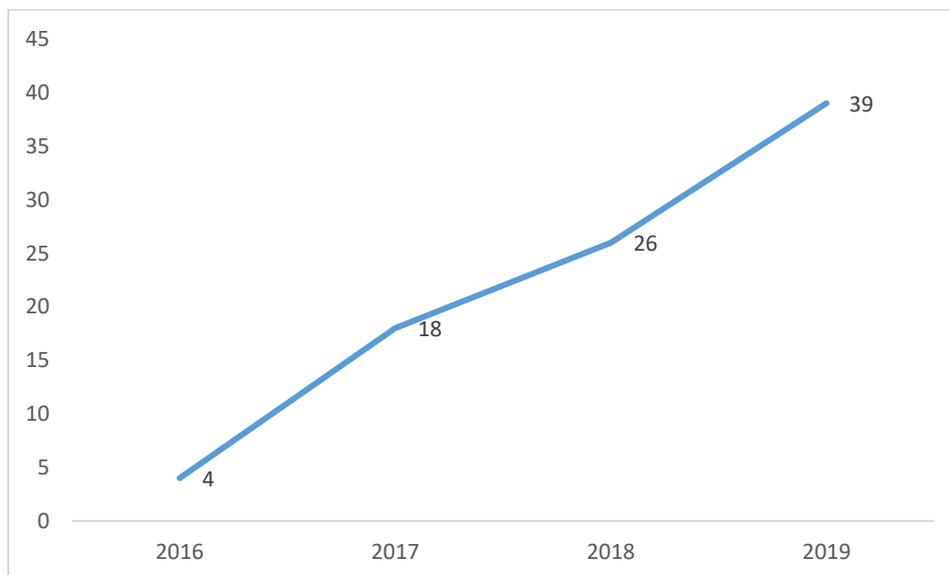
## Basis for projected fleet of 200 Amazon Air planes in 7 – 8 years

Amazon’s growth from 18 planes to 39 planes from 2017 to 2019 (Figure 8) resulted in a 47.2% compound annual growth. Growth from 39 planes to 200 planes between 2019 and 2028 requires a compound annual growth rate of 19.9%, less than half that previously observed. The completion of facilities at Cincinnati (CVG) and expansion in international markets could result in growth for the next several years well above 20%, allowing for more modest growth in the latter part of the period and still achieving the 200-plane threshold (As noted earlier in the report, only one international flight was among the 84 flight itineraries observed on April 23, 2020). Reports have indicated that the Cincinnati hub alone will have room for 100 Amazon Air planes.<sup>13</sup>

The Morgan Stanley estimate, publicized in early 2019, that Amazon could have 100 planes by 2025 requires 17.0% compounding rate growth between 2019 and 2025.<sup>14</sup> Although Chaddick’s projected growth rate is marginally higher, it should also be noted that some of the expansion could be in the form of smaller airplanes, similar to the those (including twin-engine turboprops or the Cessna 208B Super Cargomaster equipment used by FedEx Express) used on many feeder routes operated by contract carriers for FedEx, or through the acquisition of another cargo airline. It is unlikely that shortages of equipment will be a deterrent to growing at this pace. It would require Amazon Air to add, on average, about 1.5 planes per month through 2028.

If Amazon reaches the 200-plane threshold, its fleet would likely remain well under a third as large as FedEx’s, when equipment operated by contract carriers for this Memphis-based carrier is included. As such, there are compelling reasons to believe that the 200-plane estimate is reasonable.

**Figure 8. Growth of Amazon Air Fleet, 2016 – 2019**  
Number of Planes



Source: Historical estimates; planespotters.net.

## Issues in Aviation Law & Policy

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<sup>1</sup> The authors based all comments on publicly available data while acknowledging uncertainty that exists with regard to the growth trajectory of Amazon Air.

<sup>2</sup> A widely circulated report that Amazon's truck fleet has reached 20,000 is available at <https://www.thomasnet.com/insights/amazon-doubles-truck-fleet-to-20-000-in-one-year/>.

<sup>3</sup> A summary of Amazon's exit from the third-party delivery market for Amazon sellers who do not keep inventory in its warehouses is provided in this CNN.com article from April 8, 2020, available at <https://www.cnn.com/2020/04/08/tech/amazon-third-party-shipping-suspended/index.html>.

<sup>4</sup> The description provided of the legal relationships among Air Transport Services Group, ATI, ABX, and Amazon Air is based on secondary sources. These relationships are complex and evolving, and beyond the scope of this study. Readers may wish to consult Air Transport Services Group resources for details of its various holdings.

<sup>5</sup> None of the planes operated by Amazon Air are reported as being part of the ABX fleet on planespotters.net. It is possible, however, that ABX is using parts of its regular fleet for this purpose.

<sup>6</sup> The announcement that Amazon will handle much of the loading and unloading is reported in this Business Insider story, available at <https://www.businessinsider.com/amazon-in-housing-air-cargo-prime-airlines-earnings-partners-2020-5>.

<sup>7</sup> These estimates are based on tallies in planespotters.net. Totals do not include planes operated under contract. Estimates of the size of fleets differ between various sources.

<sup>8</sup> The practice of some cargo airlines to outsource makes definitive estimates of their sizes difficult. This article illustrates some of the issues surrounding competitive contracting: <https://www.aircargonews.net/airlines/freighter-operator/unions-call-for-halt-to-cargolux-outsourcing-plan/>. The practice of using contractors varies around the world, but it is particularly problematic for estimating the size of Amazon Air, which is operated entirely by contracted carriers that report only aggregate transportation statistics (both Amazon and non-Amazon traffic combined) to the Bureau of Transportation Statistics.

<sup>9</sup> A summary of the Morgan Stanley projection is provided in this Business Insider article, available at <https://www.businessinsider.com/amazon-100-planes-by-2025-2019-1>.

<sup>10</sup> A discussion of the proposed Cincinnati/Northern Kentucky International (CVG) hub is available at <https://www.bizjournals.com/cincinnati/news/2019/05/15/here-s-what-amazon-s-air-hub-at-cvg-will-look-like.html>.

<sup>11</sup> FedEx's decision to cease handling Amazon traffic (which was reported to have "minimal" impact on its revenues), is reported in this U.S. News & World Report article from June 7, 2019, available at <https://www.usnews.com/news/business/articles/2019-06-07/fedex-will-stop-air-shipments-of-packages-for-amazon>.

<sup>12</sup> For a more detailed discussion of the risks posed by Amazon Air's expansion to FedEx and UPS, please refer to this Barrons.com article, available at <https://www.barrons.com/articles/amazon-is-a-delivery-powerhouse-look-out-fedex-ups-usps-51587403739>.

<sup>13</sup> A discussion of the proposed Cincinnati/Northern Kentucky International (CVG) hub is available at: <https://www.bizjournals.com/cincinnati/news/2019/05/15/here-s-what-amazon-s-air-hub-at-cvg-will-look-like.html>.

<sup>14</sup> A summary of the Morgan Stanley projection is provided in this Business Insider article, available at <https://www.businessinsider.com/amazon-100-planes-by-2025-2019-1>.

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