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The Future of Northeast Ohio's Airports: Framing the Coming Debate

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**THE FUTURE
OF
NORTHEAST
OHIO'S
AIRPORTS:
FRAMING THE
COMING
DEBATE**



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EXECUTIVE SUMMARY

Over the course of the past ten or more years, community leaders have engaged in considerable debate regarding the future of Northeast Ohio's air service capabilities. No one has questioned the importance of providing superior air transportation in and out of the Northeast Ohio market; in fact, quite the opposite is true. Leaders are in strong agreement that air service is critical to the continued economic growth of this area.

They are *not* in agreement, however, as to how that service can best be delivered. While the cities of Brook Park and Cleveland have come to an agreement on the expansion of Cleveland Hopkins International Airport, ongoing discussions continue regarding the development of a new regional airport, possibly at the largely abandoned Ravenna Arsenal property. It is clear to me, however, that the best course of action is one that has not yet been discussed. The solution to volume constraints lies in maximizing existing air service capacity and in making incremental investments that improve the competitive position of *all* Northeast Ohio's airports.

I have drawn this conclusion for a number of reasons. First, members of the corporate community continue to express concern about the ability of even an expanded Cleveland Hopkins Airport to handle the region's future air travel demands. To achieve major airport status, Hopkins will have to increase its current volume of just over 11 million passengers per year by more than 8 million passengers—an increase of 72 per cent. Since Greater Cleveland itself cannot generate such a boost in numbers, most of this increase will have to come from passengers transferring from flights that are generated through expanded hub activities. Regardless of the source, however, Cleveland Hopkins—even after its planned expansion—will be incapable of handling the increased volume.

Secondly, the creation of a new regional airport is not feasible for five important reasons:

- The federal government indicated that Denver was the last new airport that will receive substantial funding. The burden of cost, therefore, would fall to Northeast Ohio and the state of Ohio.
- The fiscal opportunity cost would be tremendous—easily reaching into the billions of dollars. Additional infrastructure investments for adjacent roads, water, and sewers

would also be needed. These alone would consume much of the region's typical share of the state capital budget for a significant period of time.

- Financing a new airport with user fees is not possible. Airlines will not absorb the cost through substantially increased landing fees, and they will not impose passenger fees.
- Placing a major growth pole at the edges of the region would significantly distort current growth paths, feed suburban sprawl, and have a devastating impact on land values.
- Self-interest on the part of Summit and Cuyahoga counties (as well as their municipalities) dictates that they oppose a new outlying airport in order to protect their tax bases.

The solution to expanding the capacity of air service in Northeast Ohio lies in finding a regional answer to capacity constraints by developing coordinated niches for several of the region's airports.

While Northeast Ohio cannot afford a new regional airport, it also cannot afford to allow Hopkins to reach capacity after the new investments are completed. If that capacity is reached, fares will increase, the number of destinations will stagnate, and the competitive position of the region will erode when compared to Cincinnati, Detroit, Pittsburgh, and possibly Columbus and Nashville. Existing air facilities in the region must be crafted into—and operate as—a regional system, with Hopkins at its hub and Akron-Canton Regional Airport serving as the source of additional capacity.

Following this course of action would demand both vision and regional leadership. No region in the United States has attempted to knit a coordinated system of airports as a strategy for dealing with capacity constraints at a single airport. Northeast Ohio should pave the way in what is an inevitable national response to dwindling federal resources and increasing air service capacity constraints.

The most difficult aspects of this process will be tackling the issues of the governance and ownership of the facilities. Community leaders in Akron, Canton, and Cleveland must confront the challenge of forming a regional alliance to ensure the competitive position of this vital portion of our economic infrastructure. The keys to beginning this process are to make known information about the current capacity of each airport in the regional system, collectively identify the goals for the region's air service, and determine if the region's air

service goals are realistic when matched to those of our partners in this enterprise—the airlines themselves. Only when a cooperative, regional approach to Northeast Ohio's air service needs is undertaken can a workable, long-term solution be implemented.



THE FUTURE OF NORTHEAST OHIO'S AIRPORTS: FRAMING THE COMING DEBATE*

In early June of 1997, the cities of Brook Park and Cleveland reached a settlement over land uses around Cleveland-Hopkins Airport, and the city councils of both communities approved the deal a few weeks later.¹ This allows Continental Airlines to construct a regional jet facility and the airport authority to extend and expand its runway system, pending various federal approvals. Yet, this agreement and the expansion of Cleveland-Hopkins Airport do not end the discussion about the future of air services in Northeast Ohio. There is concern on the part of some members of the corporate community about the ability of the expanded Cleveland-Hopkins Airport to handle the region's air travel demands in the future, after the expansion is completed.² This discussion is complemented with suggestions that the largely abandoned Ravenna Arsenal be developed into a new regional airport. Meanwhile, federal funds were committed to help convert Youngstown's airport into a regional cargo facility that can handle wide-bodied aircraft and compete with Rickenbacker Airport in Columbus. There is also discussion about expanding the air cargo capacity at Lorain County's airport.

What is missing from this melange of actions, investments, and proposals is an analytical framework that sets the stage for a discussion of the region's development options based on an understanding of the air services markets in North America. Is the air services market important to the region's development? What is Northeast Ohio's position in the North American market? What additional information is required to analyze alternative development proposals? What does the region need to accomplish to move into the next tier of competitors?

^{*} I thank the committee of Leadership Cleveland's 1997 Regional Development Day for asking me to make the presentation on which this paper is based. Ken Silliman provided the airport data and gave me access to the details of the land use agreement reached between Cleveland and Brook Park. I also thank the W.E. Upjohn Institute for Employment Research for making their analysis of the air cargo market available to me.

¹ *The Economic Benefits of the Cleveland-Brook Park Settlement Agreement*, City of Cleveland, May 23, 1997.

² David R. Wasserstrom summarized the expansion plans for Hopkins Airport and the arguments in favor and against the establishment of a new regional airport, and described Denver's experience with its new airport in "Come Fly With Me," *Cleveland Magazine*, Inside Business, May 1997, pp.22-27.

Two assumptions underlie this paper:

- Discussions about the future of air services in Northeast Ohio must be based on an understanding of the structure of the North American air services market and Northeast Ohio's place in that market.
- The air services market is regional. Therefore, analysis of policies and potential investments relating to air services must be based upon a regional perspective. For this paper, data on individual airports within metropolitan areas were aggregated into regional air markets. For example, rather than discussing each of New York's or Washington's three airports, the data for all airports in each metropolitan area are aggregated and used as the units of analysis. What is important is each region's air services capacity—the capacity of its system of airports, not the capacity of individual airports in that system.

Data are available for only two airports in Northeast Ohio, Cleveland-Hopkins and Burke Lakefront.³ Therefore, the analysis incorporates only those two airports. However, planning for the future of air services in Northeast Ohio must include a seemingly underutilized resource—the Akron-Canton Regional Airport.

AIR SERVICES AND REGIONAL DEVELOPMENT

Air services have two functions in a region's economic development. First, it is an industry in its own right—generating wealth, income, and employment opportunities, and that industry is growing nationally. Second, it is part of the economic infrastructure required to maintain Northeast Ohio's position as an economic command and control center in the global economy, and it allows regional producers to be better integrated in the international economy. There are two travel-cost considerations that are important to

³ The first table in the Appendix lists all of the airports in North America for which data were available in the May 1997 North American Air Traffic Report and explains how they were combined into regional air markets. Twelve markets had data available for more than one airport. Air traffic out of the Akron-Canton Regional Airport is so low that data were not reported in these reports. Additionally, the Federal Aviation Administration publishes annual data on enplanements for each airport in the US. The most current data are for 1995. These show Cleveland Hopkins Airport as the 32nd busiest with 5,270,000 enplanements—these are passengers who got on an airplane, and Akron-Canton Regional Airport in 158th place with 212,665. (Report VP, "Primary Airport Enplanement Activity Summary for CY1995 Listed by Rank Order, Enplanements," Federal Aviation Administration's web site: www.faa.gov/arp/vp.htm)

business: the amount of time it takes to travel to a wide variety of destinations (market access) and the cost of airfares (the cost of that access). Secondary, but still an important concern to the regional economy, is the role that air travel plays in the region's visitor destination industry, which also involves both access and cost considerations.

The air services market offers a trade-off for mid-sized population centers such as Northeast Ohio: Increasing the number of destinations served means that demand must be concentrated on a single carrier. This allows the carrier sufficient volume to operate a hub and spoke system that generates a larger number of destinations. However, there is a cost in having one dominant airline in a market: As a carrier's market share increases, so does the amount of money that the carrier can charge for tickets on either monopoly or near-monopoly routes. (Interviews suggest that prices begin to escalate when a carrier controls about 70 percent of the passenger business at an airport.) Improving access to destinations comes at the expense of higher ticket prices, unless the market has sufficient local demand that the carrier needs the market more than the market needs the carrier.

Components of the Air Services Market

There are three components of the market for air services: local demand, transfers, and visitors.⁴

- *Local demand* consists of passenger origins and destinations from the local market—those who live in Northeast Ohio or are visiting people or businesses in the region—as well as air freight that originates (or is destined for) locations in or near Northeast Ohio.
- *Transfers* are people and freight that change planes or modes of transportation in the region, but their ultimate destination is elsewhere. There are two separate types of transfer operations in the air services market: domestic hubs and international gateways. Large coastal cities have an advantage over smaller, inland airports in attracting international flights because they are closer to international destinations and

⁴ These categories have not been used to analyze the flow of air customers, but they are a useful way of thinking about the composition of demand and the opportunities that exist for expanding demand.

have significant volumes of passengers and freight generated by their local markets.⁵ Inland hubs can compete for international traffic only if they offer substantially cheaper operating costs than coastal airports, have access to a national route system, and can support demand for multiple international flights to cover the fixed costs of the international service. The complicating competitive factor for inland airports is that the size of the metropolitan areas that serve as the primary international gateways—New York; Chicago; Los Angeles; Washington, DC; and San Francisco, dictates that airlines offer them direct international service, giving the airline a base on which to leverage their other international passengers. Smaller inland markets—with the exception of Detroit and Toronto—cannot offer the airlines this captive passenger base. The advantage of inland locations will improve only if coastal airports either experience capacity constraints, or if the cost of their operations becomes too high (here the cost is more than monetary cost to the airlines and includes congestion costs—delays in takeoffs and landings times, theft, and passenger inconvenience).

- *Visitor demand* consists of travelers who are primarily visiting attractions or attending meetings in the region. (There is some overlap between tourism and local demand in terms of visitors who are attending business meetings in the region.)

Providing air services is a volume business typified by high fixed costs and significantly lower marginal or incremental costs (i.e., the actual cost of operating a flight). Therefore, air carriers concentrate their capital and route structures around places where they can maximize passenger flow—trading volume against per-passenger operating costs. Regions that have large populations have a built-in advantage because of the numbers of people and businesses located there. Airlines want to serve those markets, generating competition; and if their profit margins get too high, the markets have enough volume to attract new competitors. Other regions have the advantage of being major tourist destinations and generating volumes through their attractions; this is true for Las Vegas and Orlando. Again, these volumes generate competition and a large variety of carriers.

⁵ This is a classic break-in-bulk locational consideration and the reason for interest in airports. Economic activity concentrates where shipments must be broken down and when the mode of transportation changes. It makes no difference if the cargo is freight or people. That is the reason why metropolitan areas with good international air connections tend to garner a disproportionate share of international businesses; the executives do not have to change planes to reach their destinations and waiting time is minimized.

Washington, DC, and Salt Lake City benefit from having business activities that generate a large number of trips—in Washington’s case, the generator is the federal government and in Salt Lake’s case, it is the Mormon Church coupled with outdoor recreation.

If the region wants to expand the number of destinations served by its airports, but does not have either a sufficiently large population base or large enough volumes generated by visitors to attract multiple carriers flying to a wide variety of destinations, then it can compete for the hub operations of a major carrier. At this point, passenger volumes, weather, operating conditions, and operating costs determine the competitive position of the regional market against other places. What is Cleveland’s position in the North American air market?

Northeast Ohio’s Position in the North American Air Services Market

There are several ways to show where Northeast Ohio is positioned in the hierarchy of regional air services markets in North America. The Cleveland-Akron Consolidated Metropolitan Area (CMSA), consisting of eight counties, is the 16th largest market in North America as measured by population. The CMSA is also the 15th largest market in the U.S. in terms of total metropolitan income—the region has total income of \$72.1 billion.⁶ (Table 1) The CMSA has the 18th highest per capita income in the U.S. However, the effective market for air services may be about half again as large as the CMSA in terms of population. The extreme northeastern edge of the state of Ohio splits its origin and destination business between Pittsburgh and Cleveland, with most of the Youngstown area traffic heading into Pittsburgh. The southern border of Cleveland’s market is halfway to Columbus, and the western edge is somewhere to the east of Toledo. The City of Cleveland’s airport consultants define the service area for Hopkins Airport as a 16- county region with 4.1 million residents, and they define Pittsburgh’s market as just the Pittsburgh Metropolitan Area (MSA).⁷ Notwithstanding the size of Northeast Ohio’s passenger catchment area, the May 1997 North American Air Traffic Report ranked Cleveland Hopkins Airport 32nd in passenger volume among all North American airports and 30th

⁶ The eight counties are: Ashtabula, Cuyahoga, Geauga, Lake, Lorain, Medina, Portage, and Summit.

⁷ Communication between Leigh Fisher Associates and the City of Cleveland on a draft of this paper, no date.

Table 1:

Characteristics of the 50 Largest North American Air

Service Markets

Metropolitan Area	Population		Total Metro Income US Rank	Total Metro Income 1995 \$ millions	Per Capita Income 1995	
	North American Rank	1995			US Rank	1995
New York-NJ-CT-PA	1	19,732,748	1	619,024	1	31,370
L.A.-Long Beach-Riverside	2	15,362,165	2	357,571	33	23,276
Chicago-Gary-Kenosha	3	8,589,913	3	234,889	7	27,345
Washington DC-Baltimore	4	7,107,116	4	204,023	4	28,707
S.F.-Oakland-San Jose	5	6,539,602	5	201,544	2	30,819
Philadelphia-PA-NJ	6	5,967,323	7	160,677	8	26,926
Boston-Worcester-Lawrence	7	5,768,968	6	164,718	5	28,552
Detroit-Ann Arbor-Flint	8	5,279,500	8	140,163	9	26,549
Dallas-Fort Worth	9	4,449,875	9	113,633	14	25,536
Toronto	10	4,344,000	*	*	*	*
Houston-Galveston-Brazoria	11	4,164,393	10	104,073	17	24,991
Miami-Ft.Lauderdale	12	3,443,501	13	80,095	34	23,260
Atlanta	13	3,431,983	11	87,956	11	25,628
Montreal	14	3,337,000	*	*	*	*
Seattle-Tacoma-Bremerton	15	3,265,139	12	85,826	10	26,286
Cleveland-Akron	16	2,903,808	15	72,102	18	24,830
Minneapolis-St. Paul	17	2,723,137	14	74,901	6	27,505
Denver-Boulder-Greeley ¹	18	2,698,972	16	69,021	13	25,573
San Diego	19	2,644,132	18	61,106	35	23,110
Phoenix-Mesa	20	2,563,582	19	58,036	38	22,639
St. Louis	21	2,547,686	17	63,929	16	25,093
Pittsburgh	22	2,394,702	20	57,518	25	24,019
Tampa-St. Petersburg	23	2,180,484	21	49,391	37	22,651
Portland-Salem OR, WA	24	2,021,982	22	48,170	26	23,823
Cincinnati-Hamilton	25	1,907,438	23	45,310	27	23,754
Vancouver	26	1,831,000	*	*	*	*
Kansas City	27	1,663,453	25	41,123	19	24,721
Milwaukee-Racine	28	1,640,831	24	42,025	12	25,612
Sacramento-Yolo	29	1,604,724	26	37,534	31	23,390
Norfolk-Virginia Beach	30	1,540,446	30	31,217	43	20,265
Indianapolis	31	1,476,865	27	36,402	21	24,648
San Antonio	32	1,460,809	33	29,313	45	20,066
Columbus, OH	33	1,437,512	28	34,614	23	24,079
Orlando	34	1,390,574	32	29,645	42	21,319
New Orleans	35	1,315,294	34	28,089	41	21,356
Charlotte	36	1,289,177	31	30,989	24	24,038
Salt Lake City, UT	37	1,199,323	42	23,739	46	19,794
Buffalo	38	1,184,052	36	26,766	39	22,605
Las Vegas	39	1,138,758	39	26,198	36	23,006
Greensboro-Winston-Salem	40	1,123,840	38	26,357	30	23,453
Hartford	41	1,115,223	29	32,169	3	28,845
Nashville	42	1,093,836	35	27,453	15	25,098
Rochester, NY	43	1,088,516	37	26,703	22	24,532
Memphis	44	1,068,891	40	25,222	28	23,596
Ottawa-Hull	45	1,022,000	*	*	*	*
Oklahoma City	46	1,015,174	46	20,474	44	20,168
Austin-San Marcos	47	999,936	45	22,338	40	22,339
Grand Rapids	48	997,895	43	23,232	32	23,281
Raleigh-Durham-Chapel Hill	49	995,256	41	24,596	20	24,713
Louisville	50	987,102	44	23,232	29	23,536

* Income data were not found for Canadian metropolitan areas.

¹ Data for Denver CMSAs and Colorado Springs MSA were added to correspond to definition of air market.

Sources: US population data were found at www.census.gov/population. Metropolitan area income data were found at www.bea.doc.gov/remd2

among all air services markets (the difference is that some air services markets have multiple airports with scheduled passenger service). In addition, the two Cleveland airports were 34th in cargo volume and 22nd in terms of flight operations when the ranking is done by air markets.⁸

The City of Cleveland's airport consultants, Leigh Fisher Associates, compared passenger volumes at Cleveland Hopkins to those at Pittsburgh's airport.^{9,10} Hopkins handles about 11.5 million passengers a year, while Pittsburgh's passenger volume is about 20.5 million. Despite its lower overall passenger volumes, Hopkins has more local origin and destination traffic than does Pittsburgh, 8.5 million passengers per year compared to 6.0 million. The reason why local traffic accounts for nearly three-quarters of Hopkins' passengers and only 30 percent of Pittsburgh's lies with the scale of the hub operations at each airport and the role that each airport plays in its hub airline's national route structure. The same would be true if Hopkins is compared with its two other major regional competitor airports, Cincinnati and Detroit.

At first glance the region is grossly under-performing when compared to the size of the market. However, what these gross comparisons miss is the segments of the air services market where Northeast Ohio is competitive. Northeast Ohio's airports can never be a competitor of New York, Chicago, or Washington. To understand the potential of the system of airports in Northeast Ohio, a strategic framework is required. This framework reveals Northeast Ohio's competitor locations and the volumes required for it to become a viable competitor to air markets with greater volumes of traffic.

⁸ Appendix Table 1 lists the major air services markets in North America and notes those with multiple airports that ranked among the 80 busiest, either in terms of passenger operations, cargo volume, or take-offs and landings. Appendix Table 2 lists the 80 busiest *air markets* by passenger volume, while Appendix Table 3 lists the 114 busiest *airports* by passenger volume.

⁹ Leigh Fisher Associates, *op cit*.

¹⁰ Data from the Federal Aviation Administration (FAA) shows that Akron-Canton Regional Airport enplaned an additional 213,000 passengers in 1995; not all of these enplanements need be on scheduled air service. If as many people got off of airplanes at Akron-Canton as got on them, then the airport serviced nearly 500,000 passengers in 1995 (Report V2, "U.S. Airport Enplanement Activity Summary for CY 1995 Listed by State and Rank Order Within State," Federal Aviation Administration's web site: www.faa.gov/arp/v2.htm)

THE AIR SERVICES HIERARCHY: SEVEN TYPES OF AIR MARKETS

Regions and their airports have different niches in the North American air services market based on the types of services provided and the scale of their operations. Examining data on hub locations, total passenger and freight volumes, and the scale of transoceanic operations reveals seven segments to this market.¹¹ Six share a hierarchical relationship. (The one niche that does not relate to the others is cargo. *Cargo specialists* are air markets with modest passenger volumes coupled with large volumes of air freight.) Regions that are further up the hierarchy provide all of the services available at regions on lower rungs and, in addition, provide qualitatively different services.

Following are the six types of air markets that form the hierarchy (from lowest to highest):

- *Local air services markets* are the vast majority of air markets. The volume of traffic in these markets is dictated by local origins and destinations.
- *Destination air markets* contain major tourist or convention destinations that supplement locally generated demand, and they do not have major hub operations. This means that passenger volumes are greater than would be expected based on the population size and total income of the region.
- *Regional hubs* are air markets where a single airline transfers a large volume of passengers between flights in a hub and spoke fashion. The majority of the flights are to destinations in that section of the nation with high volumes of flights to cities located further up the hierarchy. The larger regional hubs will have a limited number of transoceanic flights, usually operated by the hub airline. As the scope of the hub operation increases, so does the market share of the hub airline.
- *National hubs* are air markets where a single airline has a dominant hub and spoke operation that generates larger volumes of customers than do the regional hubs.

¹¹ The definitions and terminology used to segment air services markets in this paper does not conform to that used by the air services industry, the FAA, and airlines because it is based on the concept of air services market rather than airport. The typology could be refined if data on local origins and destinations were available as well as information on the percentage share of passengers in an airport that are flown on the airline with the largest market share.

These domestic flight operations are coupled with limited international operations. The airline's headquarters are often located in these cities.

- *International gateways* are air markets most often located on a coast with a high volume of international flights. The largest of the international gateways are not dominated by a single airline. Major domestic airlines have relatively large operations at these gateways to feed international and local passengers into their domestic route systems.
- *Pinnacle air markets* are at the top of the hierarchy. They combine the functions of all of the other types of air markets, coupling very high volumes of domestic and international passengers with large freight operations.

The aviation industry uses a different set of terms to categorize airports.¹² The largest difference is that my classification is based on the air services market while the industry bases its typology on airports. The industry's base designations are *origin and destination airports* and include markets that I classify as local air services markets and destination markets (thereby lumping together Orlando and Las Vegas with Hartford). The industry defines *regional hubs* as airports that contain a hub operation that is not the airline's primary hub. No distinction is made based on the overall scale of operations in the air services market. A group of airports are called "*mega*" *hubs*, *fortress hubs*, or *primary hubs*—all refer to the same airports. These airports have more than 300 daily jet departures and are the central connecting point for "major" airlines. This category includes air services markets that I have categorized as regional hubs, national hubs, and pinnacle air markets. The industry has a separate category for *international gateways* but allows overlaps with pinnacle and national air services markets so that an airport may carry two designations. The industry recognizes two types of cargo hubs, national sort facilities and regional air/truck distribution facilities (where more tonnage is shipped by truck than by air).

¹² Leigh Fisher Associates, *op cit*.

Table 2 lists air services markets according to where they are on the hierarchy. Data on each air services market's passenger and freight volumes in 1996 and their rank on these two data elements are also presented in the table. Each of the segments of the air services hierarchy is mapped and discussed in the following pages, with the exception of the regional air services markets, moving from the top of the hierarchy to the bottom. The maps are accompanied by tables that list the passenger and freight volumes for each region in 1996 and their passenger and cargo ranking among all of the air markets in North America.

Pinnacle Air Markets: New York, Chicago, and Los Angeles

Three regions sit at the top of the hierarchy of air markets: New York, Chicago, and Los Angeles. These three pinnacle markets incorporate all of the aspects of those air markets that are lower on the hierarchy and have substantially higher freight and passenger volumes than do any other type of air market; additionally they dominate the market for transoceanic business. The three New York airports have the largest volumes of both passengers, at nearly 81 million each year, and freight, transporting 2.7 million metric tons of goods. Chicago's three airports ranked second in passenger volume, with 79 million people, and seventh in cargo. Los Angeles was third in passenger volume and fourth in cargo. Each *market* is contested by several airlines, even if a specific airport in that market has a dominant airline. Neither New York nor Los Angeles is considered to be the national hub of any specific airline, and all major airlines have a presence in these two markets. United Airlines' headquarters and largest center of operations is at Chicago's O'Hare Airport, but it faces strong rivals in American Airlines' O'Hare operations and the airlines based at Midway Airport, which specializes in low-fare domestic carriers. Several of the major domestic airlines are present in the pinnacle markets and have substantial operations, and these markets service a disproportionate share of international air traffic.

Table 3 lists the international passenger volumes for 16 airports in the continental United States with the largest amounts of international traffic as of 1994.¹³ New York's Kennedy

¹³ Table 3 differs from the others in this paper because it reports data for airports, not air markets. Data for New York airport, presumably Kennedy and Newark airports, are also combined in these tables. Airports in the other air markets could not be combined because traffic figures were not available for all of the airports in those markets.

Table 2:

North American Air Service Markets by Specialization in 1996

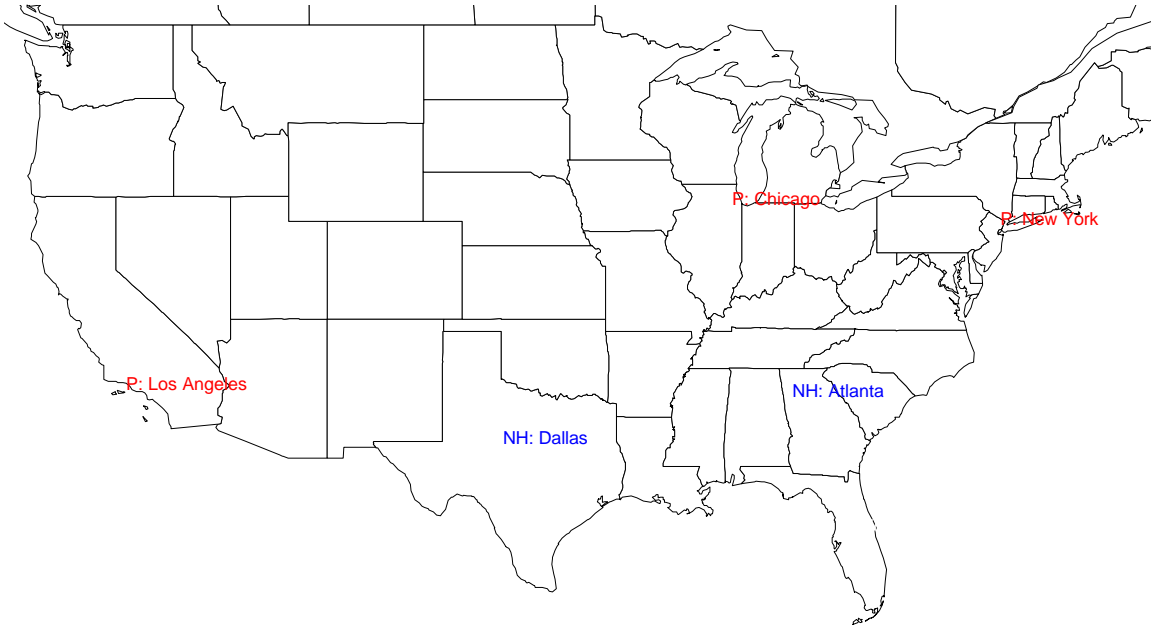
Type of Market		Metropolitan Region	Passenger		Cargo	
			Rank	Volume	Rank	Metric Tons
Pinnacle Air Markets		New York*	1	80,962,006	1	2,681,529
		Chicago*	2	79,127,250	7	1,286,962
		Los Angeles*	3	71,229,828	4	1,806,785
National Hubs		Dallas*	4	65,099,018	9	774,947
		Atlanta	5	63,303,171	8	800,181
International Gateways	First Tier	San Francisco*	6	58,995,828	5	1,418,973
		Miami-Ft. Lauderdale*	7	44,674,431	3	1,866,437
		Washington DC*	9	41,302,560	13	528,579
		Toronto	19	24,259,268	11	735,486
	Second Tier	Boston	16	25,167,741	17	405,582
		Seattle	18	24,324,596	18	388,218
	Third Tier	Philadelphia	24	19,317,220	14	493,532
		Vancouver	26	14,201,343	27	216,889
		Portland	29	12,593,013	25	265,083
		Anchorage	49	4,763,283	29	185,119
Regional Hubs	First Tier	Houston*	8	42,179,263	21	339,100
		Denver*	10	37,079,485	16	411,394
	Second Tier	Detroit	12	30,610,993	22	326,288
		Phoenix	13	30,411,852	24	283,665
		Minneapolis	14	28,771,750	19	361,448
		St. Louis	15	27,274,846	35	131,436
	Third Tier	Charlotte	21	21,849,879	30	184,070
		Salt Lake City	22	21,088,478	26	227,913
		Pittsburgh	23	20,533,660	32	156,619
		Cincinnati	25	18,864,206	23	288,823
	Cleveland*	30	11,582,164	34	131,600	
Destination Markets		Las Vegas*	11	31,374,749	53	56,747
		Honolulu	17	24,326,737	15	436,165
		Orlando	20	23,587,773	28	206,755
		San Diego	27	13,788,725	45	92,980
		Tampa	28	13,001,091	36	123,439
		Kansas City	31	10,454,857	31	163,217
		Montreal*	33	8,941,883		NA
		New Orleans	34	8,483,453	49	78,570
		San Antonio	35	7,135,291	46	87,335
		Nashville	36	7,099,103	55	53,608
		Cargo Specialists		Memphis	32	9,922,211
Louisville	53			3,559,340	6	1,368,520
Indianapolis	38			7,069,039	12	609,450
Dayton	71			1,977,243	10	767,255
Toledo	91			600,276	20	344,976

* Data are available on more than one airport in this air market.

Source: North American Air Traffic Report, May 1997.

Figure 1:

Pinnacle Markets and National Hubs



Type of Market	Metropolitan Region	Passenger		Cargo	
		Rank	Volume	Rank	Metric Tons
Pinnacle Markets	New York	1	80,962,006	1	2,681,529
	Chicago	2	79,127,250	7	1,286,962
	Los Angeles	3	71,229,828	4	1,806,785
National Hubs	Dallas	4	65,099,018	9	774,947
	Atlanta	5	63,303,171	8	800,181

source: North American Air Traffic Report, May 1997

Table 3: 15 Highest Volume International Passenger Gateway Airports in the Continental United States in 1994¹

Gateway City	Rank	Total Passengers	Percent Change from 1993	Percent on US Flag Carriers
New York-Newark ²	1	19,798,000	5.3	46
New York		16,317,000	4.7	46
Newark		3,481,000	8.3	44
Miami	2	12,663,000	2.0	53
Los Angeles	3	12,341,000	6.6	30
Chicago	4	6,069,000	3.0	61
San Francisco	5	4,968,000	15.1	52
Boston ³	6	3,189,000	0.9	55
Dallas	7	3,057,000	5.0	85
Houston	8	2,693,000	6.0	68
Atlanta	9	2,692,000	12.6	72
Washington	10	2,589,000	10.6	66
Detroit	11	2,162,000	11.0	84
Orlando	12	1,622,000	0.0	19
Seattle ⁴	13	1,313,000	-2.1	73
Philadelphia	14	1,057,000	2.5	73
Minneapolis	15	1,013,000	8.3	98

Source: U.S. Department of Transportation, Bureau of Transportation Statistics, Table 100, Segment Data.

1 A minimum of three carriers must report data before data for the city are disclosed.

2 Data for New York and Newark were added together.

3 Leigh Fisher Associates indicated that Boston is no longer a major international gateway, Northwest discontinued its international hub operations in 1994.

4 Leigh Fisher Associates indicated that Seattle is no longer a major international gateway, losing much of its international service to San Francisco and Los Angeles since 1994.

Airport services the largest volume of international travelers, and adding Newark's nearly 3.5 million international passengers to it clearly puts New York at the pinnacle of North American air services with nearly 20 million passengers per year. Dividing the 1994 international passenger data in Table 3 by the 1996 total passenger data in Table 2 provides a rough idea of the international specialization of each air market. Nearly one in four air travelers in New York is coming from or heading to an international destination. Miami services the second largest volume of international passengers, but is not considered to be a pinnacle market due its relatively smaller number of total passengers. Nearly 25 percent of Miami's passengers are international, resulting in that region's being classified as a top-tier international gateway. Los Angeles' 12.3 million international passengers puts it in third place (about 17 percent of total traffic in the market), followed by Chicago with 6.0 million international passengers (accounting for 8 percent of passenger volume).

National Hubs: Dallas and Atlanta

Two regional markets are considered to be the national hubs of airlines: Dallas, American Airlines' headquarters city, and Atlanta, the home of Delta. These two metropolitan areas have substantial volumes of passengers, but these volumes are markedly lower than those experienced by the three pinnacle markets. Atlanta transported 63 million passengers and Dallas 65 million. Dallas-Fort Worth International Airport is the seventh busiest international airport in the United States, with 3.1 million international passengers, and Atlanta is in ninth place, servicing 2.7 million international passengers. International passenger traffic accounts for between 4 and 5 percent of total passenger volume at these airports. What distinguishes the international business at these two airports is the large market share held by U.S. flag carriers, compared to airports with much larger volumes of international business. This indicates the importance of the connection between international passenger flows and the national route structure maintained by the headquarters airline in these national hub air services markets.

The airline industry considers Dallas-Fort Worth International Airport and Atlanta's airport to be "fortress" or "mega" hubs for their dominant airlines, due to both the scale of the hub airlines' operations and their market share. Other airlines could purchase market share at

these airports only after surviving punishing fare wars, and they could survive only if they have significantly lower cost structures than those of the hub airlines. The hub operations bring a wide variety of direct connections to these local markets and reinforce the desirability of these two places for national, international, and regional headquarters and distribution activities. This access comes at a price, however; and that price is relatively high fares that come from having a near-monopoly air carrier in the market place.¹⁴ Fares will not decline in Dallas until out-of-state flight restrictions at Love Field are rescinded. Delta's high-fare structure out of Atlanta explains why low-fare airlines frequently pop up in that market.

International Gateways: 3 Tiers With 10 Markets

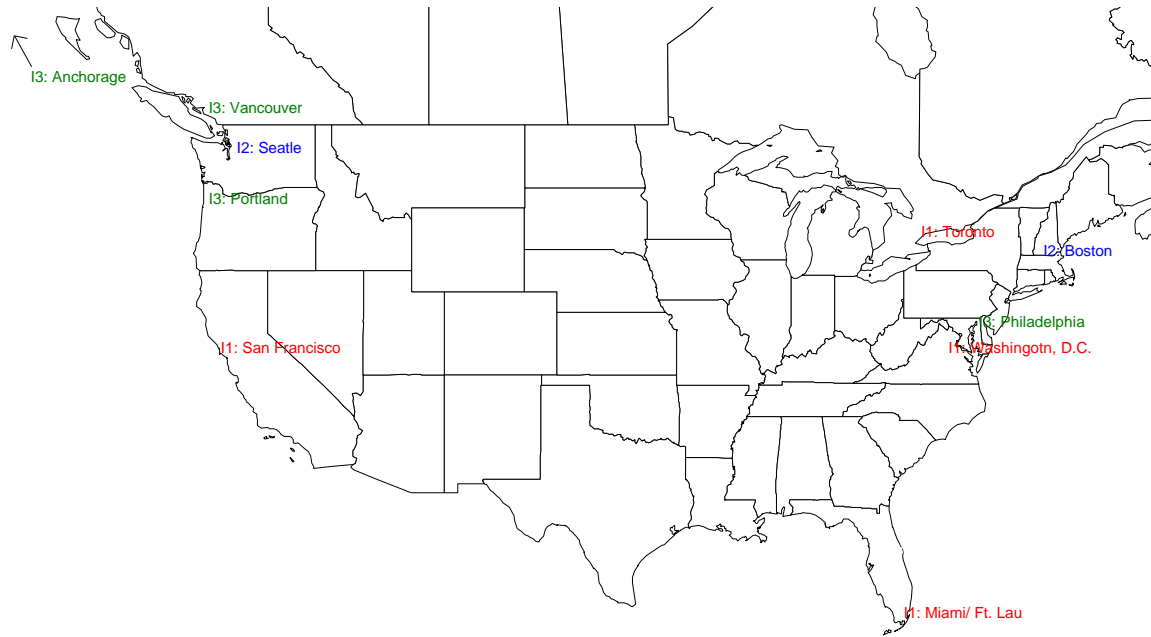
International gateways are differentiated from national hubs by having significantly more international flights and, at least for the larger of the international gateway markets, by the fact that a number of major domestic carriers are viable competitors. The data indicate that the international gateways can be split into three tiers based on their volumes and specializations. The first tier international gateways are composed of San Francisco; Miami-Fort Lauderdale; Washington, DC; and Toronto—the regions are ranked by their total passenger volume. The U.S. international gateways are ranked sixth through eighth in passenger volumes; Toronto is ranked 19th. On its face it is difficult to include Toronto as a first-tier gateway due to the fact that it only services about 60 percent of the passengers of the Washington, DC airports, and it is closer to Boston and Seattle in passenger activity. However, it is included with this group because Toronto and Vancouver handle most of Canada's transoceanic traffic and Toronto is the international hub of Air Canada.

Miami-Fort Lauderdale had the second largest number of international passengers in 1994

¹⁴ Steven A. Morrison and Clifford Winston examine airline economics in their article, "The Fare Skies: Air Transportation and Middle America," *The Brookings Review* (Fall, 1997): 42-45. They state that "medium" hubs are more competitive in terms of fares than are "large" hubs, which in turn are more competitive than small hubs and non-hubs. They estimate that load factors account for half of observed differences in fares, aircraft size accounts for an additional 40 percent of the fare difference, and competition accounts for the remaining 10 percent. They write: "Medium and large hubs are nearly equally competitive. But lower load factors and smaller aircraft at medium hubs should make their fares about 5 percent higher than fares at larger hubs. In fact, their fares are 4 percent lower ... because of the strong presence of new entrants (airlines) on their routes." (p.44) Also see Martin Dressner et al. "The Impact of Low-Cost Carriers on Airport and Route Competition," *Journal of Transportation Economics and Policy* 30(3) 1996:309-328.

Figure 2:

International Gateways



Type of Market		Metropolitan Region	Passenger		Cargo	
			Rank	Volume	Rank	Metric Tons
International Gateways	First Tier	San Francisco	6	58,995,828	5	1,418,973
		Miami-Ft.Lauderdale	7	44,674,431	3	1,866,437
		DC	8	41,302,560	13	528,579
		Toronto	19	24,259,268	11	735,486
	Second Tier	Boston	16	25,167,741	17	405,582
		Seattle	18	24,324,596	18	388,218
	Third Tier	Philadelphia	24	19,317,220	14	493,532
		Vancouver	26	14,201,343	27	216,889
		Portland	29	12,593,013	25	265,083
		Anchorage	49	4,763,283	29	185,119

source: North American Air Traffic Report, May 1997

(12.7 million) and was the third busiest freight market—reflecting its role as the gateway to South and Central America.¹⁵ The airports in the San Francisco Bay region—San Francisco, Oakland, and San Jose—transported 59 million total passengers and 1.4 million tons of freight. San Francisco International Airport handled nearly 5 million international passengers (about 8 percent of the market's passenger load).

Washington, DC's three airports serviced 41 million passengers and together are an example of airport specialization within a regional market. In other words, they form a system of airports. National Airport specializes in price-insensitive domestic travel, where travelers are willing to pay more money to save commuting time into the District. Dulles Airport specializes in international travel coupled with United's secondary domestic hub operations and business traffic to Northern Virginia. Baltimore-Washington International Airport (BWI) combines the price-sensitive tourist trade, the District's business traffic that is not time sensitive, and business traffic reaching destinations in Maryland. BWI has become the discount fare reliever to the Baltimore and Washington markets.¹⁶ Part of this specialization is due to flight restrictions that Congress and the Federal Aviation Administration have imposed on National. Flights into and out of National must be less than 1,500 miles, forcing longer distance travel to either stop within that perimeter or land at one of the other airports, and flight operations must end at 11:00 PM. Additionally, National is one of four airports that has a limit on the number of take-offs and landings, known as slot controls, that are used to control congestion.¹⁷

The two-second tier international gateways are Boston and Seattle. Both serve as hubs for their regions and have about the same level of passenger traffic as does Toronto—all are near 25 million passengers a year. In 1994, Boston serviced nearly 3.2 million international passengers and Seattle recorded 1.3 million. However, Leigh Fisher Associates, the City

¹⁵ The international passenger data do not differentiate between long- and short-haul international traffic. Airports near the Caribbean, Mexico and Canada report high international passenger loads, however significant portions of their business may be short-haul. Data for Miami, Dallas, Houston, Detroit, Seattle, and Minneapolis may be distorted by short flights.

¹⁶ BWI also handles 30 international flights a day in addition to its 55 domestic flights ("DAP in the Can? Caulking Firm Eyes Move," *Baltimore Business Journal*, September 15, 1997, electronic edition).

¹⁷ There are four slot-controlled airports: Chicago O'Hare, New York's LaGuardia and Kennedy, and National (see Morrison and Winston, *op cit.*, p.45). Instead of slot controls they recommend that congestion pricing be used to both control congestion and increase efficiency.

of Cleveland's consultants on airport economics, noted that international passenger traffic has dropped at both of these airports since 1994. Northwest closed its international gateway in Boston in 1994, and Seattle lost market share to San Francisco and Los Angeles since the 1994 data were collected.¹⁸

Toronto is differentiated from the other second-tier international gateways by its volume of freight shipments. Toronto shipped nearly three quarters of a million metric tons of freight, while Seattle and Boston handle about 400,000 metric tons each.¹⁹ The third-tier international gateways are Philadelphia, Vancouver, Portland, Oregon, and Anchorage. Anchorage is included in this group despite its relatively small passenger volumes, because the data show that it was the third highest volume international freight airport in the United States.²⁰

Regional Hubs: 3 Tiers Containing 11 Markets

Regional hubs have two distinguishing characteristics: international flights are secondary to their primary function as central transfer points in an airline's domestic route system and one airline has a dominant market share of the passenger market. There are three tiers of regional hubs, parallel to the three tiers of international gateways, each distinguished by passenger volume. Houston and Denver share the top tier. (The Denver market was formed by adding together the data for Denver and Colorado Springs because it is clear that the recent increase in Colorado Springs' traffic was caused by the increase in fares associated with the new Denver airport.²¹) These two air markets have passenger volumes

¹⁸ Leigh Fisher Associates, *op cit*.

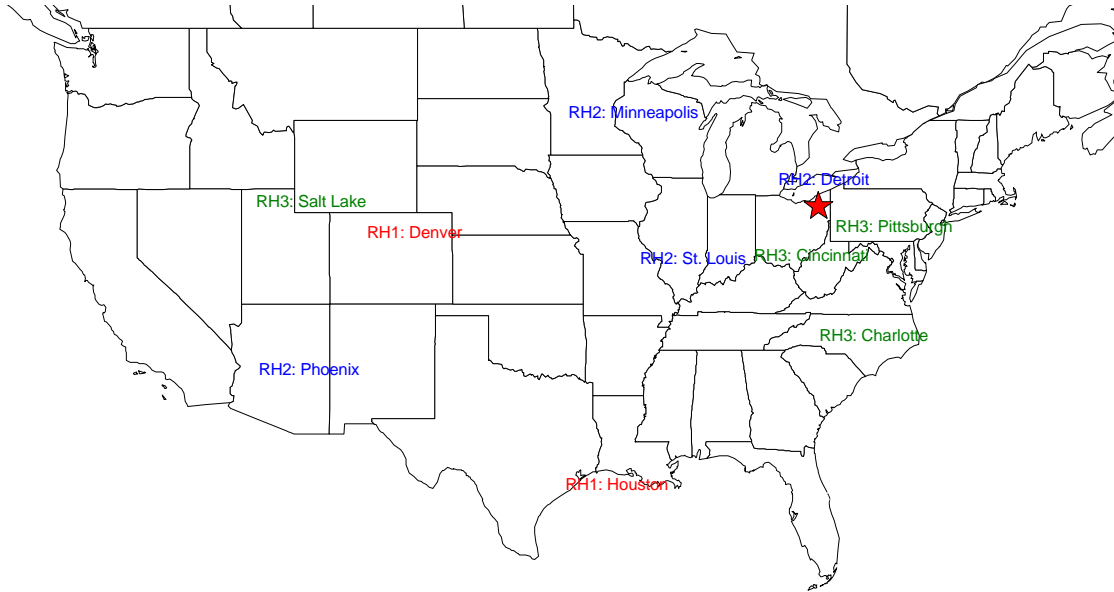
¹⁹ The air freight statistics from Canada are a bit odd because freight data are only available for Toronto and Vancouver.

²⁰ U.S. Department of Transportation, Bureau of Transportation Statistics, Table 100, Segment Data. Anchorage and Fairbanks are uniquely located on circum-polar air routes between Asia, Russia, North America, and Europe. In November 1996, the Department of Transportation granted permission to foreign carriers, with the exception of those from Japan and the U.K., to transfer cargo at these airports.

²¹ Denver Airport serviced 32.3 million passengers in 1996 while Colorado Springs served 4.8 million. Leigh Fisher Associates asserts that these two airports do not form a system. The increase at Colorado Springs was due to a low fare start-up airline, Western Pacific Airline (WestPac), that moved its hub to Denver in June of 1997. The move increased WestPac's cost per passenger from \$3 to \$15; WestPac increased its fares to cover the cost increase. This suggests that operations may be less sensitive to airport costs than I asserted and that airlines will pay more to access higher passenger volumes. Leigh Fisher Associates state that airport fees and charges account for about 5 percent of airline costs. WestPac entered bankruptcy during the first week of October 1997, and is terminating its Colorado Springs traffic and concentrating its operations on Denver.

Figure 3:

Regional Hubs



The star marks Cleveland.

Type of Market	Metropolitan Region	Passenger		Cargo		
		Rank	Volume	Rank	Metric Tons	
Regional Hubs	First Tier	Houston	8	42,179,263	21	339,100
		Denver	10	37,079,485	16	411,394
	Second Tier	Detroit	12	30,610,993	22	326,288
		Phoenix	13	30,411,852	24	283,665
		Minneapolis	14	28,771,750	19	361,448
		St. Louis	15	27,274,846	35	131,436
	Third Tier	Charlotte	21	21,849,879	30	184,070
		Salt Lake City	22	21,088,478	26	227,913
		Pittsburgh	23	20,533,660	32	156,619
		Cincinnati	25	18,864,206	23	288,823
		Cleveland	30	11,582,164	34	131,600

source: North American Air Traffic Report, May 1997

that are about ten million people greater than the markets in the tier below them. Houston transported 2.7 million international passengers in 1994, a bit more than two-thirds on U.S. flag airlines, which indicates the importance of Continental to the Houston market.²²

The second tier contains the two hubs of Northwest Airlines, Detroit and Minneapolis; the central hub of troubled TWA, St. Louis; and Phoenix, a region that combines indigenous traffic with visitor traffic and the hub operations of a regional carrier. Detroit had the third largest percentage increase in international traffic from 1993 to 1994, reaching 2.2 million passengers. International traffic accounts for about 2 percent of its passenger volume. Minneapolis carried 1.0 million international passengers, which is about 1 percent of its volume, nearly all on U.S. flag carriers. Again, these data show the importance of being a hub city if the region is inland and competing for international traffic. All of these regional markets handle about 30 million passengers a year and approximately 300,000 metric tons of freight, with the exception of St. Louis, which has about one-third of the volume of freight.

Cleveland's comparable airports are the third-tier regional hubs in Charlotte and Pittsburgh, maintained by US Airways; and Salt Lake City and Cincinnati, Delta's regional hubs. Cleveland is by far the smallest regional hub market, handling 11.6 million passengers per year, compared to Cincinnati's nearly 19 million and Pittsburgh's 20 million. International traffic is not reported for these markets, indicating that it is a relatively small part of their business and that the traffic that exists is concentrated on fewer than three carriers.

The strength of each of these regional hubs depends in large part on the strength of the airline that dominates the market and the position of the hub in the airline's route system. The Delta system is centered in Atlanta. New York's Kennedy Airport is the focus of Delta's international operations, with Salt Lake City and Cincinnati serving secondary roles. US Airways' system is a patchwork of strong regional hubs in Charlotte, Pittsburgh, and Washington, DC, with Philadelphia serving as a limited international gateway. Continental has its national hub in Houston, which is also its gateway to Mexico and Central and South America. Continental's European gateway is Newark. Cleveland is Continental's secondary regional hub. Northwest is a major regional competitor based in Minneapolis

²² U.S. Department of Transportation, Bureau of Transportation Statistics, Table 400, Segment Data.

and Detroit. Detroit is the only regional hub in the East North Central states with a strong international presence. United and American serve Asia out of Chicago, Northwest serves Asia out of both Detroit and Minneapolis, and Air Canada serves all of its destinations outside of North America from Toronto.

Destination Air Markets: 10 Markets

The next tier in the air services hierarchy is composed of destination air markets. There are two types of destination air markets. Many of these metropolitan areas are either major tourist or convention destinations that when coupled with locally generated demand, result in larger passenger volumes than would be expected based solely on their population size. Examples of destination air services markets are Las Vegas, Orlando, and New Orleans.²³ Kansas City and Montreal are not major tourist or convention destinations but are included due to the number of passengers that use their airports.

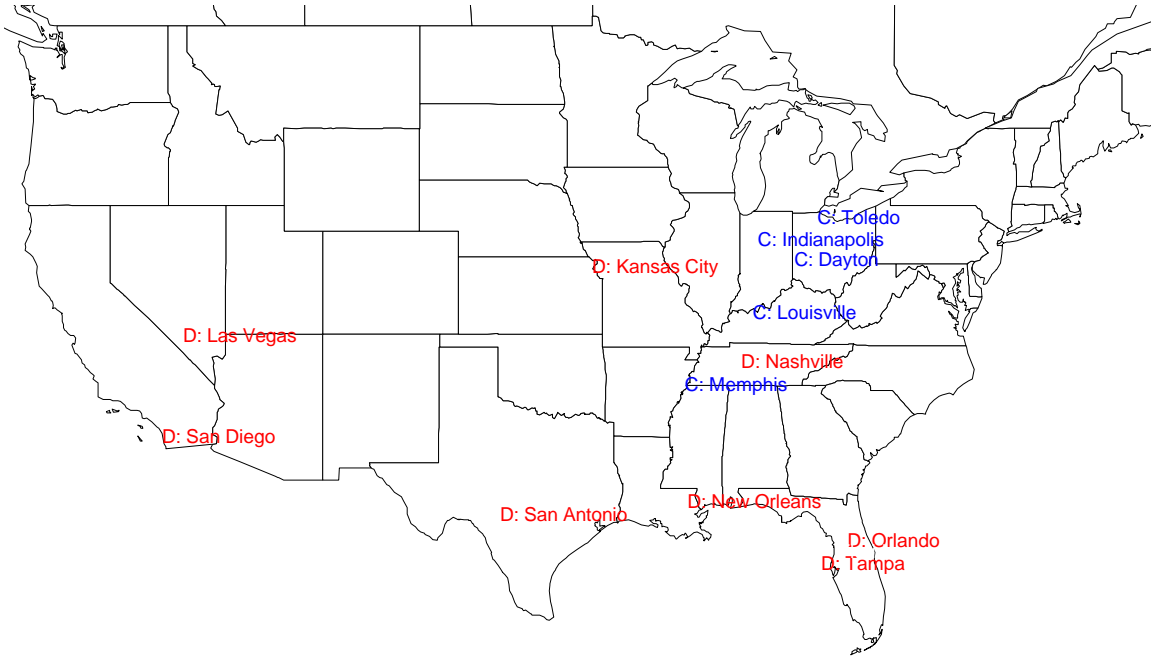
Destination air markets must: (1) not contain either a national or regional hub of a major carrier, (2) not have unusually large volumes of direct international traffic on regularly scheduled airlines, and (3) have international travelers that terminate their trips in the region. It is unlikely that any of these markets are dominated by a single carrier because so many carriers find serving the destination from their own hubs to be profitable.

Two of the destination air markets, Nashville and Kansas City, could be expanded into hubs due to their location and the volume of passengers they currently handle. *The Wall Street Journal* has reported that Nashville, the smallest of the destination markets, appears to be under development by Southwest Airlines as a hub for transcontinental operations. Arguing in favor of this development are the facts that Nashville is: (1) a prominent tourist city, (2) in the midsection of the nation, and (3) a center of an industry that generates a fair amount of travel—music. However, arguing against the establishment of Nashville as a

²³ Orlando is a unique air market due to the drawing power of its visitor attractions. It is the 33rd largest population center in North America, yet its air market was ranked 20th in total passenger traffic and it was the 12th busiest international airport in the nation. However, only 19 percent of Orlando's international passengers arrived on U.S. flag airlines, indicating that a good deal of its traffic is on international charter aircraft.

Figure 4:

Destination Markets & Cargo Specialists



Type of Market	Metropolitan Region	Passenger		Cargo	
		Rank	Volume	Rank	Metric Tons
Destination Markets	Las Vegas	11	31,374,749	53	56,747
	Honolulu	17	24,326,737	15	436,165
	Orlando	20	23,587,773	28	206,755
	San Diego	27	13,788,725	45	92,980
	Tampa	28	13,001,091	36	123,439
	Kansas City	31	10,454,857	31	163,217
	Montreal	33	8,941,883		NA
	New Orleans	34	8,483,453	49	78,570
	San Antonio	35	7,135,291	46	87,335
	Nashville	36	7,099,103	55	53,608
	Cargo Specialists	Memphis	32	9,922,211	2
Louisville		53	3,559,340	6	1,368,520
Indianapolis		38	7,069,039	12	609,450
Dayton		71	1,977,243	10	767,255
Toledo		91	600,276	20	344,976

source: North American Air Traffic Report, May 1997

major hub operation is that: (1) it is a relatively small metropolitan area, (2) Southwest has done well with a point-to-point route system, and (3) similar claims were made when Southwest expanded into both Chicago's Midway Airport and St. Louis.

Kansas City has had a history of being a hub for a number of smaller airlines, but all eventually entered bankruptcy and disappeared. Nearly 8.5 million passengers used Kansas City's airport without a hub operation, giving it adequate size. The airport's physical plant is reported to be underutilized and it is situated in the middle of the country. The combination of all these factors makes Kansas City a disciplining device for other second- and third-tier hub airports in much the same way that empty baseball and football stadiums are used to extract concessions from cities that have existing professional sports franchises—it is a credible threat. While airlines are capital-intensive—airplanes cost a great deal of money—they are easy to move and air crews often travel great distances to get to their base airports. This means that the only forces holding an airline to its current hub are the length and strength of the airport's lease agreement with the airline and the cost of lost goodwill if the airline abandons an existing hub. While these considerations are important, airlines have shifted their operations in the past. Cleveland lost air services when United centralized its operations in Chicago and a second time when US Air decreased its Cleveland operations and strengthened Pittsburgh's. Cleveland also benefited when Continental decreased its presence in Denver and increased it in Cleveland.

Cargo Specialists: 5 Markets

There is growing national interest in expanding air services by using air freight as an anchor. There are two components to the argument. The first examines the growth in international commerce in manufacturing and distribution. The argument begins by noting that international commerce is expanding and firms are increasingly dealing with large numbers of international and domestic suppliers. They then assume that with the growth in just-in-time supply strategies, suppliers are increasingly using air freight to ship their products and the assemblers will further benefit from locating at an airport so that work-process inventory will not have to be handled multiple times. The problem with this logic is that it does not factor in the cost of air freight. The second line of argument examines the growth rates in air freight, especially in the overnight package business, and assumes that

the growth will attract new firms into the market that will need a site for their operations. There is a third component that is implicit to these two lines of argument—that air freight pays its own way. All of the assumptions behind these three arguments are incorrect.

There are three types of air cargo: air express delivery services, air freight forwarders, and an activity that has become known as a “tradeport.” Air express delivery services operate their own hub and spoke freight networks. They also pick up and deliver individual packages and cargo in their own truck fleets. They have established their operations at airports that (1) do not have major passenger operations, so they will not suffer from congestion delays, and (2) are centrally located in a band of cities that stretches from Toledo to Memphis.²⁴ These companies—FedEx, UPS, Airborne, DHL, and the U.S. Postal Service—originally specialized in documents and small packages, but have moved into larger and heavier goods as fax and e-mail technologies have eaten into their courier business. (FedEx, for example, bought Flying Tiger, which operates out of Rickenbacker.) They now compete with Burlington Air Express and Emery, which operate hub and spoke systems with their own set of planes but have specialized in heavier freight. Air express delivery services also compete against freight forwarders who coordinate truck shipments to airports that can handle wide-bodied aircraft and purchase space for cargo on both all-freight aircraft and in the bellies of passenger aircraft. Most of this freight goes to or from international airports where the space in the bellies of passenger planes is very competitively priced. In fact, most of Northeast Ohio’s air freight is not shipped by air, but is instead trucked to Toronto, Chicago, Philadelphia, or New York. It is then air-freighted from these markets. The air express companies with sorting operations in Ohio also truck their cargo to their in-state air hubs. The small number of airports that specialize in air freight have unique market positions that are not duplicated by other types of airports.

The air markets with the largest volumes of air freight and those with the greatest specialization in air freight (specialization is defined as the highest ratios of metric tons of freight shipped per passenger) are listed in Table 4. Three of the largest in terms of absolute tonnage are the pinnacle markets—New York (1), Los Angeles (4), and Chicago

²⁴ Memphis is an exception. Not only is it a prominent freight airport, it is a secondary hub for Northwest Airlines and services nearly 10 million passengers a year.

Table 4:

The Largest and Most Specialized Air Freight Markets in North America

Largest Freight Markets			Most Specialized Freight Markets		
Rank	Metropolitan Region	Metric Tons Cargo	Rank	Metropolitan Region	Passengers per Ton of Cargo
1	New York*	2,681,529	1	Toledo^	1.7
2	Memphis^	1,933,846	2	Reading	2.0
3	Miami-Ft. Lauderdale*	1,866,437	3	Dayton^	2.6
4	Los Angeles*	1,806,785	4	Louisville^	2.6
5	San Francisco*	1,418,973	5	Memphis^	5.1
6	Louisville^	1,368,520	6	Stewart	7.1
7	Chicago*	1,286,962	7	Columbia^	10.4
8	Atlanta	800,181	8	Indianapolis^	11.6
9	Dallas*	774,947	9	Des Moines	16.2
10	Dayton^	767,255	10	Miami-Ft. Lauderdale*	23.9
11	Toronto	735,486	11	Sioux Falls	24.2
12	Indianapolis^	609,450	12	Fairbanks	25.1
13	Washington DC*	528,579	13	Anchorage	25.7
14	Philadelphia	493,532	14	Lansing	26.5
15	Honolulu	436,165	15	New York*	30.2
16	Denver*	411,394	16	Greensboro	31.3
17	Boston	405,582	17	Roanoke	32.3
18	Seattle	388,218	18	Richmond	32.6
19	Minneapolis	361,448	19	Huntsville	33.7
20	Toledo^	344,976	20	Omaha	34.4
21	Houston*	339,100	21	Hartford	35.5
22	Detroit	326,288	22	Wichita	36.4
23	Cincinnati^	288,823	23	Philadelphia	39.1
24	Phoenix	283,665	24	Los Angeles*	39.4
25	Portland	265,083	25	Toronto	41.5
26	Salt Lake City	227,913	26	Knoxville	41.5
27	Vancouver	216,889	27	San Francisco*	41.6
28	Orlando	206,755	28	Portland	47.5
29	Anchorage	185,119	29	Milwaukee	48.8
30	Charlotte	184,070	30	Buffalo	52.0
31	Kansas City	163,217	31	El Paso	52.2
32	Pittsburgh	156,619	32	Grand Rapids	52.2
33	Hartford	151,532	33	Columbus*	55.2
34	Cleveland*	131,600	34	Honolulu	55.8
35	St Louis	131,436	35	Austin	56.2
36	Tampa	123,439	36	Greenville	57.8
37	Stewart	117,184	37	Hilo, Hawaii	60.5
38	Columbus*	113,673	38	Birmingham	61.3
39	Milwaukee	111,844	39	Chicago*	61.5
40	Des Moines	111,795	40	Boston	62.1

* The metropolitan area has data reported for more than one airport.

^ The air market has a sorting center of an air express delivery company.

(7); two are the national hubs—Atlanta (8) and Dallas (9); three are first-tier international gateways—Miami-Fort Lauderdale (3), San Francisco (5), and Toronto (11); and four are the hubs of package express companies—Memphis (2), Louisville (6), Dayton (10), and Indianapolis (12).

The air freight business is dominated either by those airports that can land a large volume of wide-bodied jets (which is largely a byproduct of the international passenger business) or by the specialized express package companies.²⁵ Six of the ten airports that are most specialized in air freight are hubs of express package companies, and only one of the ten most specialized airports handles large numbers of passengers—Miami-Fort Lauderdale. FedEx developed the overnight express package business at its Memphis air hub, which is now the second largest air freight market in North America. They have since opened a second hub operation in Indianapolis (which is also the national hub of the express mail service of the U.S. Postal Service) and a number of regional sorting facilities. In October, FedEx announced the groundbreaking of a sorting facility in Miami to service its Latin American business. FedEx also offers point-to-point service on high-demand routes. UPS centered its overnight business in Louisville, with three regional hubs located in Rockford, Illinois; Columbia, South Carolina; and Ontario, California. Toledo is the home of Burlington Air Express. Dayton is the center of Emery's operations and Airborne Express operates its own airport in Wilmington, Ohio. DHL has a sorting facility in Cincinnati. These sorting operations generate a large number of part-time jobs late at night, and there has been limited spin-off business from these hub operations. The express package business is an industry that is maturing, and it is unlikely that there will be new entrants unless one of the current players stumbles badly.

The W.E. Upjohn Institute for Employment Research surveyed the air freight business as part of a feasibility study to develop a tradeport in Kalamazoo.²⁶ A tradeport is a combination industrial park, airport, and free-trade zone. Proponents of tradeports state

²⁵ Passenger airlines have been substituting narrow-bodied aircraft for wide-bodied planes, making it impossible for them to ship containerized freight. This has increased the amount of truck shipments to international gateway airports from domestic airports. A cargo study commissioned by Cleveland Hopkins Airport noted that Hopkins is served by one wide-bodied flight a day to Chicago and that has taken most of the air freight that is shipped by air, as opposed to the larger amount of air freight that is actually trucked to an international gateway. *Air Cargo Study for Cleveland and Ohio Markets* (Baltimore: Sypher:Muller, Inc., no date).

²⁶ *Economic and Fiscal Impact of a Proposed International Tradeport at the W.K. Kellogg Regional Airport* (Kalamazoo, MI: W.E. Upjohn Institute for Employment Research, October 6, 1995).

that the push of just-in-time production in high-valued, globally disbursed industries has created a market opportunity for these specialized facilities. The Upjohn Institute found several problems with this concept—the largest is that none of those they surveyed in 1995 were breaking even.²⁷ The second problem is that the two that were most successful—Columbus’ Rickenbacker Airport and Alliance Tradeport near Dallas—were succeeding largely as distribution facilities, not as production platforms. Rickenbacker’s “success” is due to Columbus’ historical strength in distribution, its position on the interstate highway system, the not-inconsequential influence of The Limited—which had its distribution located in Columbus, and the fact that the facility was heavily written down as an orphaned military air base. This is a difficult recipe to reproduce.²⁸

The Upjohn report also notes several other challenges to the tradeport concept:

- Tradeports and air freight, while growing at 5 percent annually, are the shipping method of last resort for businesses, especially manufacturing firms. To justify air freight, the goods need to be extremely time sensitive and worth more than \$15 per kilo (about 2.2 pounds), and the volumes need to be too large to be delivered by an overnight delivery service. The electronics industry is the largest customer of the air freight industry.
- Much of the growth in air freight is attributable to the overnight package business, which is maturing. Combining statistics from the overnight package business with more traditional air freight overstates the growth rate in more traditional air freight.
- To take advantage of an industrial park that is equipped with a major airport implies that the plant can use air-freighted materials from a single source in airplane-sized loads on a frequent basis. This is nearly inconceivable for anything other than distribution, even if the loads are consolidated from a number of vendors in the same region—such as the region around Hong Kong. It would make more sense to consolidate major

²⁷ Franklin County provides a \$3.5 to \$4 million subsidy each year to Rickenbacker, Toledo Express Airport runs a \$200,000 deficit that would be larger if not partially offset by passenger traffic, and H. Ross Perot Jr.’s Alliance Tradeport is an impressive monument to public subsidy.

²⁸ Leigh Fisher Associates noted three tradeports that they judge to be successful. All are on the Texas-Mexico border and service maquiladora factories.

subassemblies offshore or assemble the product completely offshore, and use the U.S. facility for distribution.

- Standard air freight services and overnight delivery companies can access any part of the United States within several hours' drive of a major airport in a fairly economical fashion, allowing firms to use conventional sites and more economical truck, rail, and inter-modal transport for the bulk of its needs.

The research team at Upjohn then looked at the possibility of financing a tradeport through revenues generated by air freight and discovered another set of challenges. Air freight is clearly an add-on business for airports—passengers produce much more revenue.

- Air freight does not generate ancillary revenues from parking, auto rental, and concessions.
- Freight forwarders are extremely price-sensitive. Airline and truck coverage is so complete that freight forwarders and consolidators will shift locations quickly if prices rise relative to alternative locations. All that users of air freight services need is to be within a four-to-five-hour truck drive of a major airport. Cleveland has three major airports within that range—Cleveland Hopkins, Detroit, and Pittsburgh. In addition, major air cargo facilities exist in Columbus and Toledo, and modest investments are being made to expand Youngstown's air freight capacity so that it can land wide-bodied all-freight aircraft. Also, Willow Run near Detroit has wide-bodied all-freight air service. A recent survey of the air cargo business at Cleveland-Hopkins Airport indicated that most international air freight in this market was trucked to New York, Chicago, Philadelphia, or Toronto.²⁹ This is a competitive business. (Freight would be less price-sensitive if the region produced extremely time-sensitive or fragile products such as fish or flowers, as is true of airport operations in Seattle and Amsterdam.)

In sum, air freight is not the way to build an airport. The cargo business will grow in Cleveland hand-in-hand with its international passenger operations because the cargo

²⁹ *Air Cargo Study for Cleveland and Ohio Markets* (Baltimore: Sypher:Muller, Inc., no date).

follows the capacity available in the bellies of passenger planes (providing that either containers are developed to fit the new generation of narrow-bodied planes or that wide-bodied planes begin to use Cleveland-Hopkins Airport, which is doubtful).

Regional Air Services Markets

Most regions in North America have airports that are at the bottom of the air services hierarchy. These are regional air services markets. Their level of services are dictated by the volume of local passenger and freight traffic. They do not have substantial volumes of traffic from tourism and are not major transfer points for either passengers or freight. They vary from air markets that justify jet service and have relatively high volumes of flights, such as Hartford-Springfield and Milwaukee, to smaller airports that rely primarily on commuter flights that shuttle passengers into regional hubs, such as Kalamazoo.

Summary

The Northeast Ohio air services market is barely a member of the third tier of air service, sharing the characteristics of a hub and of a regional air services market. Our immediate regional competitors are second- and third-tier regional hubs—Detroit, Pittsburgh, and Cincinnati—all linked to strong national airlines. All of these competitor air markets have international service, giving them an advantage in the location of foreign-owned operations and North American headquarters activities. Detroit has a natural advantage for foreign-headquartered firms in the automobile and automotive parts and supply businesses. But Northeast Ohio should be competitive in those industries where our economic base provides a competitive advantage—such as machinery, steel, and related machined products, chemicals, paints, and coatings. The lack of international flights waters down this advantage. However, US Airlines, TWA, and, to some extent, Delta have shown weaknesses of late that offer opportunities to Continental Airlines to expand its market share in the East Central United States air services catchment area.

The economic geography of air services is not solely determined by the size or composition of the regional market, presence or absence of tourist amenities, or the location of the market in the continent. Operating costs are important to a region's success in providing air services. For example, Continental pulled its secondary hub operation out of Denver and increased its presence in Cleveland in reaction to a combination of three factors.

Continental and United Airlines were engaged in a brutal fare war at Denver's old airport when commitments needed to be made for the new International Airport. At that time United was in a strong financial position and Continental's finances were fragile and could not sustain the losses in the struggle for market share. Continental also noted the void created in Cleveland when United centralized its flights to Chicago in 1979 and the higher operating costs at the new Denver Airport. The combination of lower revenues at Denver due to the fare war, the prospects of higher operating costs at the new airport, and the higher margins at Cleveland caused Continental to lower its presence in Denver and shift operations to Cleveland. Only Continental knows the weight the higher operating costs in Denver played in their decision, but it did play a role.

The point is that strategic business decisions on the part of individual airlines, their financial strength, and their ability to market determines the success of an individual airport and air services market—you win or lose with the company that brought you to the dance.

The figure that follows the hierarchy maps all of the important air markets in the East North Central portion of North America, running from Toronto in the northeast to Memphis in the southwest, and from Pittsburgh in the east to St. Louis in the west. Cleveland is marked by a star on the map. P represents a pinnacle market (Chicago). I1 represents a first-tier international gateway (Toronto). RH means regional hub—there are five on this map—and the number indicates its tier: Detroit and St. Louis are second-tier regional hubs; Cincinnati, Pittsburgh and Cleveland are third-tier regional hubs. Nashville is a destination market that may emerge as a regional hub. Finally, there are five cargo specialist hubs in the region. Memphis is a cargo specialist and a hub airport.

Figure 5:

Hierarchy of Air Markets

Figure 5
Hierarchy of Air Markets

Type of Market	Metropolitan Region	Type of Market	Metropolitan Region	Passenger Rank
Pinnacle Markets	New York*	First Tier	Houston*	8
	Chicago*		Denver*	10
	Los Angeles*	Second Tier	Detroit	12
National Hubs	Dallas*		Phoenix	13
	Atlanta		Minneapolis	14
International Gateways	San Francisco*	Third Tier	St Louis	15
	Miami/Ft.Laud*		Charlotte	21
	DC*		Salt Lake	22
Second Tier	Toronto		Pittsburgh	23
	Boston		Cincinnati	25
Third Tier	Seattle		Cleveland*	30
	Philadelphia		Las Vegas*	11
Cargo Specialists	Vancouver	Destination Markets	Honolulu	17
	Portland		Orlando	20
	Anchorage		San Diego	27
	Memphis		Tampa	28
	Louisville		Kansas City	31
	Indianapolis		Montreal*	33
	Dayton		New Orleans	34
	Toledo		San Antonio	35
			Nashville	36

* The metropolitan area has data reported for more than one airport.

Figure 6a:

The Midwest Region

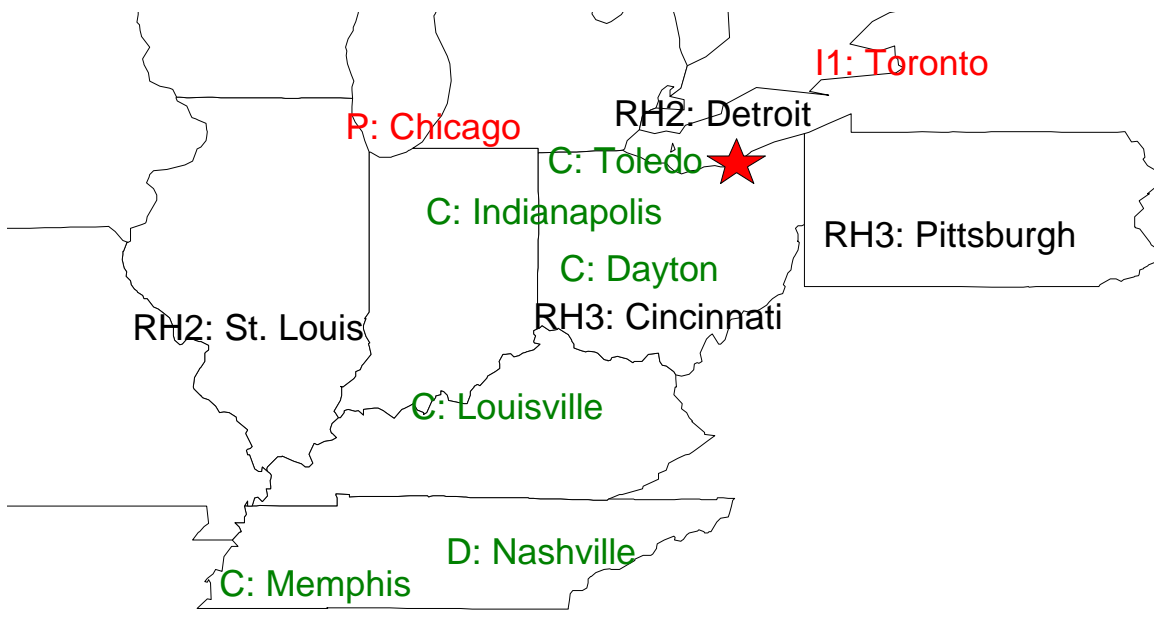
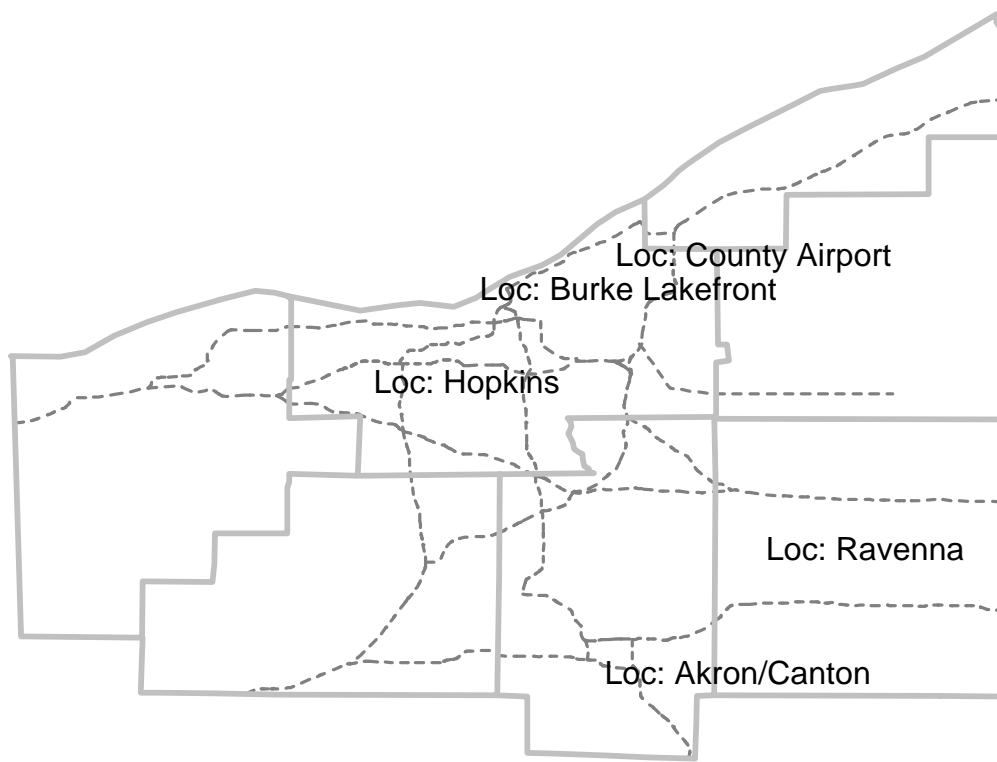


Figure 6b

Northeast Ohio Region



Data for most of the air markets in East Central North America are presented in Table 5. (Cargo specialists with very low volumes of passenger traffic were omitted.) The air markets in this region were then sorted by the population size of each market, which corresponds to the order of total income in each metropolitan area. However, the rank order of passenger volumes within the region do not correspond perfectly with the other two rank orders. To improve international air service in Northeast Ohio, and by so doing improve its competitive position within East North Central North America, requires increasing passenger volumes. Some improvement will come with growth in the continental air passenger market; the rest will have to come from gains in the market position of service providers in Northeast Ohio relative to competitor airlines who use other airports. In the next section a number of issues related to the future of air services in Northeast Ohio are discussed.

AIR SERVICES ISSUES FACING NORTHEAST OHIO

It appears that between 19 and 20 million passengers per year is a threshold for entering the next tier of air services and competing fully with the third-tier regional hubs and the second- and third-tier international gateways. This target needs to be kept in mind for future planning of the air services market in Northeast Ohio. It will take time to reach this number and it will have to come from traffic generated from hub operations.

Cost

Is a new Denver-style airport, possibly located in Ravenna, the solution to Northeast Ohio's air services challenge? There are five reasons why the answer is no.

1. The federal government indicated that Denver was the last new airport that will receive substantial funding; the region and state of Ohio would have to find a way to finance a new airport largely on its own. The direct cost of building an airport is huge. The approved five-year expansion to Hopkins will cost one-half billion dollars. Denver International Airport cost nearly \$4.2 billion in direct construction cost in 1991, bonding three-quarters of this amount. The FAA paid \$685 million.

Table 5: Northeast Ohio's Competitor Air Service Markets in East Central North America Sorted by Passenger Volume

Table 5

Northeast Ohio's Competitor Air Service Markets in East Central North America Sorted by Passenger Volume

Region	Passenger Volume		Metropolitan Population		Total Metropolitan Income		Population 1995	1995 Total Metro Income \$ million	Passenger Volume 1996	Air Market Type
	Rank Order	Regional	Rank Order		Rank Order					
			North American	Regional	National	Regional				
Chicago	2	1	3	1	3	1	8,589,913	234,889	79,127,250	Pinnacle
Detroit	12	2	8	2	8	2	5,279,500	140,163	30,610,998	Regional Hub 2
St. Louis	15	3	21	5	17	4	2,547,686	63,929	27,274,846	Regional Hub 2
Toronto	19	4	10	3	*	*	4,344,000	*	24,259,268	International Gateway 1
Pittsburgh	23	5	22	6	20	5	2,394,702	57,518	20,533,660	Regional Hub 3
Cincinnati	25	6	25	7	23	6	1,907,438	45,310	18,864,206	Regional Hub 3
Cleveland	30	7	16	4	15	3	2,903,808	72,102	11,582,164	Regional Hub 3
Memphis	32	8	44	11	40	10	1,068,891	25,222	9,922,211	Cargo
Nashville	36	9	42	10	35	9	1,093,836	27,453	7,099,103	Destination
Indianapolis	38	10	31	8	27	7	1,476,865	36,402	7,069,039	Cargo
Columbus	43	11	33	9	28	8	1,437,512	34,614	6,275,587	Local Air Service

2. The connecting infrastructure, roads, water, and sewers would eat up the region's typical share of the state capital budget for a significant period of time, leaving other projects unfunded. The fiscal opportunity cost would be tremendous. The economic feasibility of the project should be judged by balancing the direct construction costs and the indirect infrastructure costs against the incremental growth in the regional economy that would not have occurred if a new airport is not built. The direct costs of the airport are likely to be between \$4 and \$5 billion and the indirect infrastructure expenditure would be equivalent. To be conservative, assume that the total present value bill for a new airport would be \$8 billion in a metropolitan economy that has a total income of \$72 billion. Is it likely that a new airport would generate additional income that is equal to 10 and 12 percent of total income? This is extremely doubtful.
3. The experience in Denver indicates that financing a new airport with user fees is not feasible. If the airlines had to directly pay the lion's share of the bill, their operating costs would increase to the point where they would take all of their operations, except those required to serve just the local market, elsewhere.
4. The map of airports in the seven counties surrounding Cleveland and Akron indicates that placing a major growth pole in the southeastern corner of the region at the Ravenna Arsenal would significantly distort current growth paths. Putting the airport at the edge of the Akron and Cleveland metropolitan areas would have a devastating impact on land values in other parts of the metropolitan area and feed sprawl.
5. A new airport would generate new economic activity—hotels, housing, and industry—but it is likely that most of it would have either occurred anyway or it would have moved from other locations in the regional economy. If county and municipal politicians are rational, they should oppose a major new infrastructure project that would hurt their tax bases and generate demands on state and county revenues that would compete with investments in their jurisdictions. Building a new airport would hurt the tax bases of Cuyahoga, Summit, and Stark Counties and would not be politically viable.

The solution to expanding the capacity of the air services market in Northeast Ohio lies in finding a regional answer to capacity constraints by developing coordinated specialized niches for several of the region's airports. The existing capacity of all of the airports in the region needs to be maximized and then incremental investments should be made that best improve the competitive position of the regional air system.

The way the air services issue is discussed in Northeast Ohio needs to be changed. The question should not be: Cleveland-Hopkins versus a new regional airport. This is the wrong question because the region cannot afford a new regional airport financially, economically, or politically. This dichotomy presents a false pair of alternatives that leaves the region worse off no matter which one is selected. Questions about the adequacy of air services needs to be reframed. The two fundamental issues are: How can the region best use all of its capacity to compete with other metropolitan regions? How can the region's air services be used to deepen our economic development capacity? In this context the facilities at Akron-Canton should not be viewed as a competitor to those at Hopkins; they should be viewed as a complement.

Capacity

Planning for the future of air services in the region must begin with a pragmatic targeted capacity for the region, a realistic assessment of the peak capacity of each airport under a number of scenarios, and possible specializations for each airport. Therefore, a comprehensive look at the current and possible functions of Cleveland-Hopkins, Akron-Canton, Burke Lakefront, and Cuyahoga County airports is necessary. This examination should cover (1) development strategy, (2) a segment-based marketing plan that reflects that strategy, (3) physical land uses at each airport and surrounding property, (4) planned and proposed infrastructure investments that will influence land uses near the airports, and (5) alternative regional management, finance, governance, and ownership structures that range from joint marketing agreements to a comprehensive regional airport authority. However, all of this activity is predicated on a very public examination of the capacity and possible uses of each facility.

The model for a solution to the capacity constraints that Cleveland-Hopkins will face in the near future lies in specialization among the airports as has occurred in the Washington,

Denver, and San Francisco markets. Airports in these markets have developed niches that have strengthened the overall region. (The specialization of Denver's airports was not planned; it was a market-generated response to Denver's fee structure and United Airlines' strong market presence in the new Denver airport.) Each of these air markets has at least one secondary airport that is distant from the core city of the metropolitan area that specializes in low-fare airlines. Washington also has a secondary airport that specializes in international flights that is linked to a domestic hub—this is mostly due to legislative restrictions on National Airport. Oakland's airport in the San Francisco Bay area appears to combine a specialization in low-fare airlines with cargo.

Developing a regional strategy for increasing the air services capacity in Northeast Ohio leads to the following specific questions:

- Can the airlines and airports in Northeast Ohio attract the number of passengers required to reach the next tier of the air services hierarchy? This requires the ability to attract an additional 7.3 to 10.3 million passengers per year. This is an increase of 72 percent. Most of these passengers will have to come from airlines that compete with Continental and use other hub airports in this catchment area.
- Can the airport capacity in the region be configured to accommodate that demand?
- Can the airports in this region be linked through ground transportation to service the demand? Alternative considerations for ground transportation should range from passenger van links to rail links.
- Can Hopkins Airport serve as the primary business airport that services full-fare carriers and possible international and transcontinental flights? This would recognize that Continental would, in all likelihood, be the dominant carrier in that airport. When open-skies agreements are fully executed with Europe and Asia, can Northeast Ohio be a viable base for some of their operations?

- Can Akron-Canton Regional Airport develop enough business to house one or more discount carriers, charter airlines, and major carriers who want a base of operations outside of Continental's shadow?
- Over the long term, should Burke Lakefront Airport stay in operation? Will increased traffic at Hopkins interfere with Burke's flight operations? Is Burke's current business better suited for either Akron-Canton or a smaller airport, such as the County Airport? Is the land at Burke better suited for housing and recreation?

Free Times reporter Mark Naymik wrote that the approved runway expansion will allow 50 take-offs and 50 landings per hour in good weather, up from the current 40.³⁰ However, capacity will only expand to 33 take-offs and 33 landings per hour from the current 30 in bad weather. Does this number of take-off and landing slots match the targeted passenger volume given peak-hour capacity constraints? In late spring 1997, Hopkins had 600 departures and arrivals daily; this does not account for the additional traffic that will be generated by Continental's regional jet expansion.³¹ Additionally, this activity is not spread evenly throughout the day, but is concentrated in several traffic peaks. A definitive answer cannot be given without a capacity study. The proposed expansion is necessary, but it is doubtful that it can meet demands that will be placed on the airport by its current growth path, and it will not be able to accommodate a major expansion in traffic.

There are a few specific questions that need to be investigated concerning land uses around Hopkins airport:

- Does Cleveland-Hopkins Airport require runways that can accommodate two airplanes landing or taking off independently and simultaneously to reach competitive scale on its own? If so, how can this be accommodated within the airport's footprint?

³⁰ Naymik, Mark, "Tarmac Turbulence," *The Cleveland Free Times*, August 13-19, 1997, p.16.

³¹ Wasserstrom, "Come Fly with Me, *Cleveland Magazine*, p.6.

- Should the current airport envelop be expanded, possibly by bridging Route 237 and Snow Road, and place its maintenance and cargo operations to the east of the current airport boundary?
- How do current highway, RTA, and railroad plans affect the airport and possible ancillary developments?

There is nothing in this set of questions that is critical of the current expansion plans at Hopkins. These investments are required to maintain the competitive position of the airport and of the region over the near term. They are intended to frame the discussion for the next phase of air services competition in the region.

The Role of Continental Airlines

Continental Airlines is Northeast Ohio's *de facto* partner in expanding air services. The region's ability to capture an increased share of growth in North American air travel depends on Continental's increasing its national market share. Therefore, a series of questions revolve around Continental Airlines, its strategy, and Cleveland's place in that strategy.

- Can Continental increase its national market share in the face of the weakness of US Airways, TWA, and Delta, and funnel a portion of that traffic through Cleveland?
- How many additional passengers is the regional jet expansion expected to produce and how many take-off and landing slots will they consume during peak hours? How will they feed into Continental's route structure?
- If Newark is Continental's dominant European gateway and Houston is its gateway to Central and South America, what is Cleveland's international potential within Continental's corporate strategy?
- Does Canada offer market extensions for Continental from Cleveland—especially with the introduction of regional jets?

- Can Continental move Cleveland-Hopkins further along in the international air market by introducing same-plane one-stop service to Mexico, Central America, and South America through Houston? Can Continental support same-plane one-stop service from Houston to Canadian destinations through Cleveland? Does Continental's code-sharing arrangement with Virgin Atlantic Airlines offer the prospect of same-plane one-stop service through either Newark or Kennedy, or direct service to the United Kingdom?
- How many transoceanic international flights does Continental require to staff an international base in Cleveland? How will that affect Continental's Newark operations?
- Finally, can Continental service Asian markets from Cleveland, or should an airline with a significant presence in a secondary Pacific gateway, such as Seattle, be courted?
- It should be pointed out that it may be in Continental Airlines' best interest, but not the region's, to have Hopkins reach capacity after the airport is expanded. If the airport reaches capacity, Continental could purchase the slots of other carriers, increase its market share, and once it controls 70 to 75 percent of the market, push up prices.

Other Airlines

The key to the growth in air services in Northeast Ohio is held by Continental. Yet, the desirable effects of the expansion in one airline's market share can be offset by high fares due to a lack of competition. When Hopkins starts to reach its capacity, fares will rise and price-sensitive passengers will begin driving to Columbus, Detroit, and Pittsburgh. Therefore, Northeast Ohio needs to maintain the interest of other airlines in its facilities. As Hopkins reaches its capacity, it is essential that Akron-Canton be developed as an alternative or else the region will lose not only the price-sensitive leisure traveler but business travel as well.

The Challenge

Northeast Ohio cannot afford a new regional airport, yet it also cannot afford to allow Hopkins to reach its capacity after the new investments are completed. If that capacity is reached, fares will increase, the number of destinations will plateau, and the competitive position of the region will erode compared to Cincinnati, Detroit, Pittsburgh, and possibly Columbus and Nashville. Vision and regional leadership are required to intentionally craft a regional system of air services capacity.

Improving the competitive position of Northeast Ohio in the market for air services demands leadership because the solution to capacity constraints lies in maximizing existing capacity and in making incremental investments that improve the competitive position of Northeast Ohio's airports. Airports in several regions have evolved into systems of airports. New York did so intentionally using the powers of the New York Port Authority from the early days of commercial aviation. Market forces have evolved a system of complementary airports in the Denver-Colorado Springs, San Francisco, and Washington-Baltimore areas. No region has attempted to intentionally knit together a coordinated system of airports as a strategy for dealing with capacity constraints at the region's dominant airport. The most difficult parts of this process will be tackling the issues of the governance and ownership of the facilities. This is best addressed by determining the structure that best implements the region's strategic vision and builds its competitive advantage. Community leaders in Akron, Canton, and Cleveland need to form a regional alliance to ensure the competitive position of this vital portion of our economic infrastructure.

APPENDIX

Appendix Table 1: North American Airports Included in Each Metropolitan Region

Albany		Greenville		Oklahoma City
Albuquerque		Halifax		Omaha
Anchorage		Hartford		Orlando
Atlanta		Hilo		Palm Beach
Austin		Honolulu		Philadelphia
Baton Rouge		Houston*	Intercontinental	Phoenix
Birmingham			Hobby	Pittsburgh
Boise		Huntsville		Portland
Boston		Indianapolis		Raleigh-Durham
Buffalo		Jacksonville		Reading
Calgary		Kahului		Reno
Charleston		Kansas City		Richmond
Charlotte		Keahole		Roanoke
Chicago*	O'Hare	Knoxville		Sacramento*
	Midway	Lansing		International
	Megis	Las Vegas*	McCarran	Mather
			North Las Vegas	Salt Lake City
Cincinnati			Henderson Executive	San Antonio
Cleveland*	Hopkins	Lihue		San Diego
	Burke	Los Angeles*	International	San Francisco*
			Long Beach	International
Columbia			Santa Ana	Oakland
Columbus*	Port Columbus		Santa Barbara	San Jose
	Rickenbacker		Burbank	
Dallas*	Dallas-Fort Worth			Sarasota
	Love Field			Seattle
Dayton		Louisville		Sioux Falls
Daytona		Memphis		Spokane
DC*	National	Miami*	International	St. Louis
	Dulles		Ft. Lauderdale	St. Petersburg
	BWI	Milwaukee		Stewart
Denver*	Denver	Minneapolis		Syracuse
	Colorado Springs	Montreal*	Dorval	Tampa
			Mirabel	Toledo
Des Moines		Nashville		Toronto
Detroit		New Orleans		Tucson
Edmonton		New York*	Kennedy	Tulsa
El Paso			La Guardia	Vancouver
Fairbanks			Newark	Victoria
Ft. Myers				Wichita
Grand Rapids		Norfolk		
Greensboro				

* There are data on more than one airport in this air market.

80 Largest North American Air Service Markets in 1996 by Passenger Volume

Rank	Metro Region	Passengers	Rank	Metro Region	Passengers
1	New York*	80,962,006	41	Albuquerque	6,618,751
2	Chicago*	79,127,250	42	Raleigh-Durham	6,478,776
3	Los Angeles*	71,229,828	43	Columbus*	6,275,587
4	Dallas*	65,099,018	44	Kahului	5,906,135
5	Atlanta	63,303,171	45	Austin	5,691,233
6	San Francisco*	58,995,828	46	Palm Beach	5,680,913
7	Miami-Ft. Lauderdale*	44,674,431	47	Milwaukee	5,452,645
8	Houston*	42,179,263	48	Hartford	5,377,759
9	DC*	41,302,560	49	Anchorage	4,763,283
10	Denver*	37,079,485	50	Ft. Myers	4,206,936
11	Las Vegas*	31,374,749	51	Jacksonville	3,714,010
12	Detroit	30,610,993	52	El Paso	3,561,072
13	Phoenix	30,411,852	53	Louisville	3,559,340
14	Minneapolis	28,771,750	54	Omaha	3,547,895
15	St. Louis	27,274,846	55	Tucson	3,513,443
16	Boston	25,167,741	56	Oklahoma City	3,495,805
17	Honolulu	24,326,737	57	Tulsa	3,387,803
18	Seattle	24,324,596	58	Spokane	3,258,762
19	Toronto	24,259,268	59	Edmonton	3,121,444
20	Orlando	23,587,773	60	Buffalo	2,940,627
21	Charlotte	21,849,879	61	Norfolk	2,784,108
22	Salt Lake City	21,088,478	62	Birmingham	2,749,403
23	Pittsburgh	20,533,660	63	Halifax	2,744,720
24	Philadelphia	19,317,220	64	Lihue	2,561,807
25	Cincinnati	18,864,206	65	Keahole	2,524,402
26	Vancouver	14,201,343	66	Greensboro	2,381,495
27	San Diego	13,788,725	67	Boise	2,375,289
28	Tampa	13,001,091	68	Richmond	2,154,603
29	Portland	12,593,013	69	Albany	2,029,393
30	Cleveland*	11,582,164	70	Syracuse	2,015,749
31	Kansas City	10,454,857	71	Dayton	1,977,243
32	Memphis	9,922,211	72	Des Moines	1,807,990
33	Montreal*	8,941,883	73	Grand Rapids	1,672,565
34	New Orleans	8,483,453	74	Hilo	1,622,743
35	San Antonio	7,135,291	75	Sarasota	1,589,352
36	Nashville	7,099,103	76	Charleston	1,472,843
37	Sacramento*	7,090,735	77	Greenville	1,428,223
38	Indianapolis	7,069,039	78	Wichita	1,427,542
39	Calgary	6,913,867	79	Knoxville	1,409,100
40	Reno	6,742,532	80	Columbia	1,159,214

* Data are available on more than one airport in this air market.

Source: North American Air Traffic Report, May 1997.

Appendix Table 3:

Top 114 Largest Airports in North America, Ranked by 1996 Passenger Volumes

Rank	Airport	Passengers	Rank	Airport	Passengers	Rank	Airport	Passengers
1	Chicago-Ohare	69,153,528	41	Montreal	8,941,883	81	Keahole	2,524,402
2	Atlanta	63,303,171	42	New Orleans	8,483,453	82	Greensboro	2,381,495
3	Dallas-Ft. Worth	58,034,503	43	Houston-Downtown (Hobey)	8,387,434	83	Boise	2,375,289
4	Los Angeles International	57,974,559	44	LA-Orange County	7,307,750	84	Richmond	2,154,603
5	San Francisco International	39,251,942	45	San Antonio	7,135,291	85	Albany	2,029,393
6	Miami International	33,504,579	46	Nashville	7,099,103	86	Syracuse	2,015,749
7	Denver	32,296,174	47	Sacramento	7,090,735	87	Dayton	1,977,243
8	New York-JFK	31,155,411	48	Indianapolis	7,069,039	88	Des Moines	1,807,990
9	Detroit	30,610,993	49	Dallas-Love	7,064,515	89	Grand Rapids	1,672,565
10	Las Vegas	30,459,965	50	Calgary	6,913,867	90	Hilo, HI	1,622,743
11	Phoenix	30,411,852	51	Reno	6,742,532	91	Sarasota	1,589,352
12	New York-Newark	29,107,459	52	Albuquerque	6,618,751	92	Charleston	1,472,843
13	Minneapolis	28,771,750	53	Raleigh-Durham	6,478,776	93	Greenville	1,428,223
14	St. Louis	27,274,846	54	Montreal	6,376,806	94	Wichita	1,427,542
15	Houston Int	26,484,079	55	Columbus	6,275,587	95	Knoxville	1,409,100
16	Boston	25,167,741	56	Ontario	6,252,838	96	Columbia	1,159,214
17	Honolulu	24,326,737	57	Kahului	5,906,135	97	St. Petersburg	1,045,928
18	Seattle	24,324,596	58	Austin	5,691,233	98	Victoria	978,625
19	Toronto	24,259,268	59	Palm Beach	5,680,913	99	Huntsville	923,827
20	Orlando	23,587,773	60	Milwaukee	5,452,645	100	Baton Rouge	884,737
21	Charlotte	21,849,879	61	Hartford	5,377,759	101	Stewart	835,329
22	Salt Lake City	21,088,478	62	LA-Burbank	4,838,483	102	Fairbanks	831,048
23	New York-LaGuardia	20,699,136	63	Denver-Colorado Springs	4,783,311	103	Daytona	807,449
24	Pittsburgh	20,533,660	64	Anchorage	4,763,283	104	Las Vegas-VGT	700,473
25	Philadelphia	19,317,220	65	Ft. Myers	4,206,936	105	Roanoke	686,952
26	Cincinnati	18,864,206	66	Jacksonville	3,714,010	106	Lansing	681,803
27	DC-National	15,095,923	67	El Paso	3,561,072	107	LA-Santa Barbara	673,818
28	Vancouver	14,201,343	68	Louisville	3,559,340	108	Sioux Falls	673,582
29	San Diego	13,788,725	69	Omaha	3,547,895	109	Toledo	600,276
30	DC-BWI	13,431,922	70	Tucson	3,513,443	110	LA-Long Beach	435,218
31	Tampa	13,001,091	71	Oklahoma City	3,495,805	111	Las Vegas-HSH	214,311
32	DC-Dulles	12,774,715	72	Tulsa	3,387,803	112	Chicago-CGX	134,439
33	Portland	12,593,013	73	Spokane	3,258,762	113	Houston-EFD	94,299
34	Cleveland	11,582,164	74	Edmonton	3,121,444	114	Reading	89,950
35	Ft Lauderdale	11,169,852	75	Buffalo	2,940,627			
36	Kansas City	10,454,857	76	Norfolk	2,784,108			
37	SF-San Jose	10,009,027	77	Birmingham	2,749,403			
38	Memphis	9,922,211	78	Halifax	2,744,720			
39	Chicago-Midway	9,839,283	79	Montreal-YMX	2,565,077			
40	SF-Oakland	9,734,859	80	Lihue	2,561,807			

Source: North American Air Traffic Report, May 1997.

Appendix Table 4:

Top 80 North American Air Service Markets in 1996

Rank	Metro Region	Tons	Rank	Metro Region	Tons
1	New York*	2,681,529	41	Columbia	111,263
2	Memphis	1,933,846	42	Omaha	103,170
3	Miami-Ft. Lauderdale*	1,866,437	43	Austin	101,334
4	Los Angeles*	1,806,785	44	Raleigh-Durham	98,666
5	San Francisco*	1,418,973	45	San Diego	92,980
6	Louisville	1,368,520	46	San Antonio	87,335
7	Chicago*	1,286,962	47	Sacramento*	86,990
8	Atlanta	800,181	48	Albuquerque	84,316
9	Dallas*	774,947	49	New Orleans	78,570
10	Dayton	767,255	50	Greensboro	76,053
11	Toronto	735,486	51	El Paso	68,275
12	Indianapolis	609,450	52	Richmond	66,164
13	DC*	528,579	53	Las Vegas*	56,747
14	Philadelphia	493,532	54	Buffalo	56,499
15	Honolulu	436,165	55	Nashville	53,608
16	Denver*	411,394	56	Tulsa	53,189
17	Boston	405,582	57	Jacksonville	52,476
18	Seattle	388,218	58	Oklahoma City	52,440
19	Minneapolis	361,448	59	Reading	45,608
20	Toledo	344,976	60	Birmingham	44,877
21	Houston*	339,100	61	Spokane	44,005
22	Detroit	326,288	62	Kahului	41,894
23	Cincinnati	288,823	63	Wichita	39,175
24	Phoenix	283,665	64	Knoxville	33,949
25	Portland	265,083	65	Reno	33,565
26	Salt Lake City	227,913	66	Fairbanks	33,081
27	Vancouver	216,889	67	Boise	33,044
28	Orlando	206,755	68	Grand Rapids	32,021
29	Anchorage	185,119	69	Tucson	29,712
30	Charlotte	184,070	70	Palm Beach	27,846
31	Kansas City	163,217	71	Sioux Falls	27,823
32	Pittsburgh	156,619	72	Huntsville	27,418
33	Hartford	151,532	73	Norfolk	26,829
34	Cleveland*	131,600	74	Hilo	26,806
35	St. Louis	131,436	75	Lansing	25,725
36	Tampa	123,439	76	Greenville	24,698
37	Stewart	117,184	77	Syracuse	24,599
38	Columbus*	113,673	78	Keahole	22,607
39	Milwaukee	111,844	79	Albany	22,521
40	Des Moines	111,795	80	Roanoke	21,258

* Data are available on more than one airport in this air market.

** Toronto and Vancouver are the only Canadian markets with reported cargo tonnage.

Source: North American Air Traffic Report, May 1997

Appendix Table 5:

Top 80 North American Air Service Markets in 1996 by Take-offs and Landings (Operations)

Rank	Metro Region	Tons	Rank	Metro Region	Tons
1	Los Angeles*	2,060,491	41	Columbus*	224,904
2	Chicago*	1,206,791	42	Nashville	211,821
3	San Francisco*	1,203,599	43	Tulsa	204,824
4	New York*	1,151,786	44	Albuquerque	204,247
5	Houston*	1,102,644	45	Milwaukee	200,963
6	Dallas*	1,070,754	46	Kansas City	197,184
7	DC*	889,709	47	Palm Beach	196,445
8	Miami-Ft. Lauderdale*	772,387	48	Kahului	178,590
9	Atlanta	761,011	49	Boise	178,214
10	Las Vegas*	754,932	50	Wichita	177,055
11	Denver*	672,298	51	Louisville	175,286
12	Detroit	538,424	52	St. Petersburg	175,079
13	Phoenix	526,648	53	Sacramento*	172,203
14	St Louis	513,849	54	Lansing	165,344
15	Minneapolis	485,480	55	Omaha	162,418
16	Boston	456,226	56	Victoria	159,781
17	Pittsburgh	451,995	57	Hartford	158,190
18	Charlotte	446,629	58	Sarasota	158,153
19	Philadelphia	416,248	59	Birmingham	156,277
20	Cincinnati	401,367	60	Stewart	156,004
21	Seattle	395,216	61	Oklahoma City	154,205
22	Cleveland*	383,717	62	Reno	150,526
23	Toronto	375,250	63	Dayton	148,679
24	Salt Lake City	374,209	64	Buffalo	146,695
25	Honolulu	372,268	65	Baton Rouge	146,451
26	Memphis	359,416	66	Charleston	146,187
27	Orlando	341,205	67	New Orleans	145,799
28	Vancouver	330,364	68	Richmond	140,203
29	Portland	297,941	69	Norfolk	139,980
30	Austin	292,642	70	Grand Rapids	139,533
31	Daytona	272,572	71	Halifax	139,193
32	Tampa	268,013	72	Reading	138,451
33	San Antonio	262,468	73	Jacksonville	138,111
34	Montreal*	256,160	74	Syracuse	136,858
35	Tucson	241,118	75	Des Moines	134,841
36	Anchorage	240,661	76	El Paso	134,601
37	Calgary	235,170	77	Albany	133,115
38	Raleigh-Durham	233,820	78	Knoxville	132,041
39	Indianapolis	227,109	79	Greensboro	131,227
40	San Diego	226,063	80	Spokane	113,131

* Data are available on more than one airport in this air market.

Source: North American Air Traffic Report, May 1997.

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