MAY 2012

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Issues of importance to Airports

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Airline Network Analysis in a Changing U.S. Industry

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The U.S. airline industry continues to undergo a significant transformation, creating uncertainty and challenges for airports. This article discusses how this transformation may affect airports, and offers advice regarding ways to project the infrastructure needs of their airports and maintain a level of airline service that provides sufficient access to the destinations most important to the local economies.

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Significant events during the past decade, including the 2001 terrorist attacks, the financial turmoil and global recession of 2008-2009, and increased volatility and the general upward trend in energy prices since 2008 have accelerated a transformation of the U.S. airline industry – itself troubled by high costs, market fragmentation, and overcapacity. Reorganization under bankruptcy by many of the so-called legacy airlines helped strengthen balance sheets and streamline operations, while the U.S. government's acceptance of industry consolidation enabled the mergers of Southwest Airlines and AirTran Airways, United Airlines and Continental Airlines, and Northwest Airlines and Delta Air Lines, reducing market fragmentation.

Airlines, which have become committed to profitability and investor returns rather than the pursuit of market share at all costs, continue to "right-size" their route networks. Legacy airlines have sized their domestic operations to primarily feed their more lucrative international networks, which have flourished in recent years as the result of regulatory liberalization and the continued evolution of global alliances. American Airlines, Delta, and United each entered into highly integrated risk/reward-sharing relationships with international partners that have taken the shape of de facto mergers, enabling joint route decision making and capacity planning among those partners.

While resulting in significant improvements in the financial operations of the airlines, downward trends in domestic capacity, reduced competition, and shared decision making among airlines have added uncertainty and concern for airports regarding their ability to properly plan infrastructure projects and ensure sufficient service to accommodate the needs of their passengers and local economies.

In the remainder of this article, we discuss the fundamentals of how airline capacity decisions are made, and how this process has evolved in light of recent industry changes. We stress, however, that the fundamentals are still intact and airports, armed with an understanding of these fundamentals and a few simple analyses outlined herein, can more confidently and effectively evaluate the network strengths and weaknesses of their airports, communicate with airline planners, and plan infrastructure projects into the future.

THE FUNDAMENTALS OF HOW AIRLINES MEASURE THE SUCCESS OF A FLIGHT

As the airlines are emphasizing profitability rather than market share when making network decisions, airport managers need to understand how the airlines measure the profitability of a flight and how this process may affect service decisions at their airports. In simple terms, the success and sustainability of a flight is determined by the revenue it generates minus the costs to operate that flight. Revenue is generally determined by the number of passengers onboard and the amount those passengers paid for their tickets and ancillary services. A flight is likely to generate more passengers if it offers opportunities for connections to other flights in an airline's route network, rather than simply serving passengers traveling between the flight's origin and destination (O&D) points. Airlines calculate the amount of revenue attributed to a particular flight based on the mix of O&D and connecting passengers onboard. Generally, the fare of an O&D passenger is allocated in full to that flight, whereas the fare of a connecting passenger may be fully allocated to that flight or it may be prorated across all of the flights in the passenger's journey, usually on a distance basis, depending on the profit measure being analyzed.

The profitability of a flight is measured in two ways: on a standalone basis (referred to as "segment profitability") and by its value in supplying passengers across that airline's network in the form of connections (referred to

Table 1

Illustration of Per-Flight Segment and Beyond Measures

While this flight is unprofitable on a segment (or standalone) basis, it is profitable on a connecting (or beyond) basis

PASSENGER ROUTING	PASSENGER COUNT	FARE + OTHER AMOUNT PAID	TOTAL REVENUE	PORTION ALLOCATED TO CHICAGO-MILWAUKEE	PORTION ALLOCATED TO CONNECTING FLIGHT	SEGMENT REVENUE	BEYOND REVENUE
Milwaukee - Chicago	3	$150	$450	100%	0%	$450	$0
Milwaukee - Chicago - Beijing	6	$800	$4,800	3%	97%	$144	$4,656
Milwaukee - Chicago - San Francisco	10	$200	$2,000	7%	93%	$140	$1,860
Milwaukee - Chicago - Other	16	$170	$2,720	9%	91%	$245	$2,475
Total	**35**	**$285**	**$9,970**	**10%**	**90%**	**$979**	**$8,991**

Cost to Operate Chicago - Milwaukee	$1250	
Segment Profit/(Loss)	($271)	
Beyond Profit (Segment Profit + Beyond Revenue)		$8720

Note: All figures are for illustration only and are not real. Some elements of cost have been omitted for this illustration.
Prepared By: Ricondo & Associates, Inc., May 2012.

as "beyond profitability"). On a standalone basis, a flight's profitability is measured by aggregating the prorated portion of the fares of all passengers onboard plus any ancillary revenues and cargo, and subtracting the costs of operating that flight. To assess a flight's beyond profitability, the total non-prorated revenue of the passengers onboard is aggregated along with ancillary and cargo revenues, and then the cost of operating that flight is subtracted. The cost of operating a flight consists of several factors, including fuel and labor costs, and generally increases with aircraft size and distance flown. An airline develops targets for segment and beyond profitability based on a desired financial return, and evaluates its flights on one or both measures depending on how they serve the airline's network.

For example, consider a flight from Milwaukee's General Mitchell International Airport to Chicago's O'Hare International Airport as presented in Table 1. Given the short distance between the cities, passengers onboard the flight are likely connecting at O'Hare to other destinations, such as San Francisco or Beijing. O&D passengers—those traveling between Chicago and Milwaukee—would likely choose to drive instead of fly because of cost and convenience. Evaluated on a stand-alone basis, the Chicago-Milwaukee flight would appear to be highly unprofitable and unsustainable, as nearly all passenger revenue would be allocated to the connecting flights beyond Chicago, with revenue attributed to the Milwaukee flight insufficient to cover the flight's costs. However, it is very possible, assuming a reasonable number of passengers paying reasonable fares on an aircraft appropriately sized for the market, that the Milwaukee flight would be a successful element in the airline's network on a "beyond" basis, as it feeds a significant number of connecting passengers into the airline's global route network centered at O'Hare.

Airline route planners use these data to allocate an airline's finite aircraft resources to maximize profitability, selecting the combination of destinations, routings, timings, and frequencies by route in a way that is intended to appeal to the optimal mix of O&D and connecting passengers across all markets served by the airline. Route planners operate in the context of the competitive route system offered by the airline industry as a whole, which continually changes, threatening the viability of some flights while improving the prospects for others. Changes in service at one airline's hub can significantly affect the performance of existing or potential service from another airline's hub. Thus, an airline offering connecting service at O'Hare to passengers traveling between Milwaukee and San Francisco must consider the operations of airlines at competing hub airports, such as Minneapolis-St. Paul, Phoenix Sky Harbor, and Salt Lake City International Airports, in developing an optimal network schedule.

A FEW KEY CHANGES IN THE INDUSTRY BUSINESS MODEL AFFECT NETWORK DECISION-MAKING

A Greater Focus on Profitability and a Niche for Low Cost Carriers

While the fundamentals of airline route planning have not changed, U.S. airlines have, in recent years, been more diligent in allocating their aircraft resources to generate sustained profitability. This more rational approach to airline business means that marginally profitable flights are subject to elimination, or less likely to be initiated, if the measures of segment or beyond profitability are not sufficiently compelling.

The days of battling for the last market share point at the expense of profitability seem (for now) to be over and, in many situations, the legacy airlines are acknowledging that low-cost carriers may have an appropriate niche in markets that, in the past, would not have been tolerated. So, while the legacy airlines may be limiting or decreasing capacity to ensure that profitability targets are achieved, the passenger demand that the legacy airlines do not satisfy is increasingly being met by low-cost carriers, which can use their cost advantage to sustain service that the legacy airlines cannot.

High-risk flight segments that are longer distances (higher costs), less populated (for example, catering to a small O&D market with few prospects for connections to help ensure adequate revenue), and that overfly numerous competing hubs along the way (high competitive threat) are less likely to be considered by the legacy airlines. Such flights may be considered by the low-cost carriers if the routes fall within their niche. However, lower-risk options of creating or improving connecting service via an airline's hub may be more realistic, with the potential of developing sufficient passenger flows to eventually support nonstop service.

The Influence of International Airline Alliances on Route Planning

Internationally, the U.S. legacy airlines have found ways to increase efficiency through highly integrated alliances with their foreign-flag partners. By virtue of antitrust immunity grants with several key international partners, American, Delta, and United have all formed a variety of risk/reward-sharing joint ventures that enable coordinated route selection, pricing, and sales, centralizing the decision-making among these airlines and their partners. In some instances, these relationships have become so integrated that key management staff are now co-located, and aircraft resources are freely interchanged between partners for flights in the regions served by the joint venture.

It is important to note that not all airlines under the large alliance umbrellas (i.e., Star Alliance, oneworld, and SkyTeam) participate in these highly integrated joint ventures. This stems from reasons ranging from an inability to achieve antitrust immunity, to a business decision by the existing joint venture partners to exclude certain airlines, to an individual airline's decision to remain autonomous (risk/reward-sharing joint venture airlines must let their partners share in the business decision-making process). These more-highly integrated joint ventures mimic cross-border mergers, and their structures provide incentives for the participants to act on behalf of their joint-venture partners before all others.

The implication of the evolution of international airline alliances for U.S. airports is twofold. First, particularly when discussing international service opportunities with an airline, it is important to understand the dynamics of the airline's industry relationships, and whether or not its planners can make service decisions entirely on their own. With regard to international service, communication with route planners across an integrated partnership may be best (if possible) to gain insight on how a particular airport fits into the partnership's planning process. Second, not all partners in the broader umbrella alliances are equal. Connections expected between the networks of two airlines in the same broad alliance may not come to fruition if one of those airlines is involved in a joint venture with another alliance partner in the same region. The two airlines, while part of a large umbrella alliance, may view each other only as competitors because of the joint venture.

DEVELOPING PRAGMATIC AIR SERVICE STRATEGIES THAT ACCOUNT FOR INDUSTRY CHANGES

Despite several significant trends in the industry over the past decade that have led to reduced capacity and market consolidation, airports can be comforted by the fact that the fundamental goals of the industry players have remained the same. Airports still seek to provide the maximum utility of their resources relative to the needs of and opportunities in their individual markets, and airlines still seek service opportunities that offer a high probability of success in generating profitability and network growth.

Airports should develop a baseline view of the utility and sustainability of flights provided in today's world, and in light of any known competitive changes expected to occur in the industry. Several analyses can be conducted

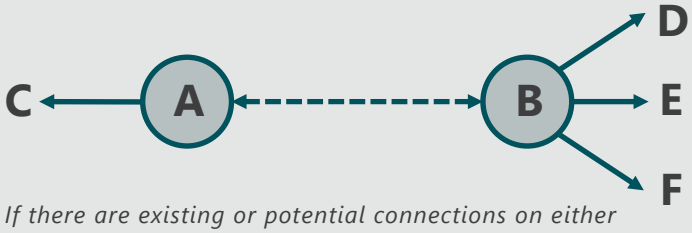
to identify areas of potential improvement for both airlines and airports, providing a good platform from which to develop an effective air service strategy and a context for forecasting demand at the airport, such as:

- *O&D market service gap analysis: Analysis of O&D market access compared to O&D market demand, incorporating pertinent information such as corporate and military presence and related travel patterns. This analysis should include input from the local travel community, as well as analysis of passenger and schedule data to understand popular destinations and the routings and timings of currently available flights. The purpose of the analysis is to determine where demand is not being served and to develop insights to present to the airlines regarding potential service alternatives or adjustments to improve service offerings for the local market.*
- *Airline share gap analysis: Analysis of gaps in an airline's market share of passenger traffic relative to that airline's expected market share. When combined with intelligence from the O&D market service gap analysis, this analysis can be used to illustrate service adjustments that are mutually-beneficial for the local market and the airline. One example could be a suggested flight time change to improve the schedule for business travelers in an O&D market seeking morning and evening departures where currently only morning and midday flights are provided. By providing evening service, an airline may regain O&D market share currently travelling over a competitor's hub in the evening time slot.*
- *Connecting market opportunities analysis: Analysis of connecting opportunities at either end of a new or existing flight that, when combined with local passenger demand, could help support that flight as depicted in Exhibit 1. This analysis should consider likely and unlikely alliance connections.*
- *At-risk services analysis: Analysis of industry data to identify an airline's weak or weakening flights from an airport. Insights gained from the three previously discussed analyses can be used to help provide solutions to improve performance.*

Once gaps, opportunities, and at-risk services are identified, realistic solutions and the airlines most likely to be involved in those solutions should also be identified. The solutions should be prioritized based on their expected value, accounting for complexity, the effect on passenger demand and airport utility, the effect on airline profitability, and the likelihood of continued success in light of competitive forces. This priority list should be refreshed as often as needed to address changes in the airline industry and the needs of the market.

Exhibit 1

*Here, one city pair is served by a flight connecting cities **A** and **B** (the local, or O&D, market). Gaps in service should be analyzed to ensure local demand is adequately met. Solutions can range from simple timing changes of existing services to the addition of new service.*



*If there are existing or potential connections on either end of the flight from **A** to **B**, passengers will use the flight from **A** to **B** to travel between several cities. Here, seven additional connecting city pairs are served by connecting cities **A** and **B**. Local market solutions described above should also account for potential improvements (or disruptions) to connecting passenger travel options.*

Prepared By: Ricondo & Associates, Inc., May 2012.

Finally, airports should develop and maintain an ongoing dialogue with airlines serving them, as well as any additional airlines likely to offer service solutions in the future. Where applicable and possible, alliance partners should also be included in these discussions. Airports are recognized by airline planners as having expert knowledge of the needs and opportunities. With fact-based analyses and a strategy that incorporates the needs of the airport market and the airlines, airports can develop relationships with airlines that are mutually beneficial and continual, rather than acquaintances that are rekindled when a need arises. Such ongoing relationships foster the necessary two-way information flow that enables airports to become a valuable resource to airline planners, develop successful strategies for the provision of airline service, and appropriately plan for the future of their facilities.

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