

While hub and spoke systems served the US majors in an environment of low competition and high yields, the changed market has started to undermine their economic basis. Several legacy carriers are now adopting point-to-point or de-peaked operations, and are led by USAirways.

Will de-peaked & point-to-point services save US majors?

A quiet revolution is taking place in North America. In the past few months, American Airlines, Delta Airlines and US Airways, which were all guardians of the hub-and-spoke model, announced that they would restructure their schedules in 2005. These restructurings will more focus on the de-peaking of hub operations and point-to-point services. What is the key driver behind the scenes? What will the implication be for US legacy airlines' future fleet planning?

Evolution of the hub & spoke

Constrained by the regulatory environment in the 1970s, American major carriers could only operate point-to-point routes. No modern hubs were set up before deregulation.

Deregulation changed everything for the airlines. With the unprecedented freedom of flying anywhere at any time, US major airlines began to rebuild their networks. To cover as many markets as possible and achieve profitability, the incumbents had to break two bottlenecks:

First there were too many small markets to serve with point-to-point operations; and secondly, the incumbents lacked suitable aircraft to serve every city-pair.

The only solution to the problem was the hub-and-spoke model, with which the incumbents collected passengers from smaller markets with regional feeders and distributed them to other routes via the hubs. With several banks of flights in a day, hub-and-spoke systems provide better network connectivity, and so wider

market coverage, than linear networks. Any given number of points can be linked over a hub with fewer departures than non-stop or direct services would require.

"40 flights are the break-even point for an airline to establish a hub and achieve a significant number of passengers," says Adrian Hamilton-Manns, executive vice president of alliances, revenue management and network designing at South African Airways. Once a hub has been established, each additional spoke magnifies the linkage benefits. These incumbents therefore were strongly motivated to enlarge their network to achieve economies of scale. With this operation model, incumbents increased their load factors and aircraft utilisation, and adapted to the competitive environment after deregulation, enjoying the profits at the cost of passengers' time in waiting and changing flights in the hubs.

In the late 1980s, American legacy carriers had established many hubs across the US. In the past decade, however, major airlines have occasionally cut their hubs due to over-expansion. Examples are American Airlines at San Jose, Northwest at Milwaukee and US Airways at Dayton, but these exceptions aside, the tendency was to grow hubs.

Delta, Northwest, Continental and US Airways spent the mid-1990s reducing their non-hub flying, cutting weak spokes, and developing routes to lower-cost regional partners. The logic behind these efforts is that the larger the hub the more the economies of scale these carriers will gain. The hub-and-spoke model

seemed overwhelming in America.

Although out of favour in some quarters, it was generally accepted that hubs are a necessary response to the geography of air transport demand in the US. Is this still true?

Among recent efforts by several US legacy carriers to re-focus on point-to-point operations and de-peaking their hubs, the removal of Pittsburgh's status as a USAirways' hub is the most striking. Once its third hub, Pittsburgh will become a secondary hub, or 'focus city'. In a letter dated 5th May 2004 to the Pennsylvania Governor Edward Rendell, USAirways president and chief executive officer Bruce Lakefield notes that the airline is 'moving toward a business plan that involves lower operating costs and more point-to-point flying to take advantage of our strong market positions in the east. Although I cannot predict the outcome with specificity, it will likely mean fewer flights and non-stop destinations out of Pittsburgh, as we focus more on point-to-point service to larger business and leisure destinations'.

On 12th August 2004 USAirways announced that, as part of its transformation plan, it will discontinue non-stop service from Pittsburgh on 20 routes operated either by USAirways or its wholly owned and affiliate regional carriers, beginning in November 2004.

Nevertheless, the company will keep non-stop service to more than 50 markets, in particular 28 of its top 30 markets, and will remain Pittsburgh airport's largest carrier.

USAirways is not the only one to change its existing hub-and-spoke model.



Delta Airlines and American Airlines are also de-peaking their hubs.

Delta will restructure 51% of its network by 31st January 2005, thereby executing the largest single-day service transformation in its history. The carrier will try to strengthen its hubs and increase point-to-point flying by de-peaking its Atlanta hub to add more flights while reducing congestion. It will also grow its Cincinnati and Salt Lake City hubs by re-deploying aircraft currently used at Dallas Fort Worth, and add 31 new non-stop flights to 19 additional destinations from certain focus cities.

Why change?

The traditional hub-and-spoke model has at least five inherent flaws that prevent legacy airlines' development: a complex fleet structure; low utilisation of resources between banks; more facility requirements per passenger; greater aggregate mileage flown compared to direct routings; and longer aircraft down time. "De-peaking may result in less congestion and higher aircraft utilisation," says Adam Green, manager of route planning at jetBlue.

Some think there are indications that the majors will make a small move to point-to-point, largely driven by the arrival and development of the low-cost carriers. Low-cost airlines are achieving higher utilisation and asset optimisation by doing point-to-point compared to the majors, which have traditionally operated on the hub system. This is sometimes

slow, inefficient, costly and not always satisfactory for customers.

A striking benchmark is jetBlue. "Our daily aircraft utilisation is 14 hours and downtime is 35 to 55 minutes, while the average stage length is 1,383 miles," says Green. "The high aircraft utilisation rate comes from our point-to-point operation." In considering new markets, jetBlue focuses on point-to-point service to highly-travelled markets that are under-served or large metropolitan areas with high average fares. In determining which markets to select, this company analyses publicly available data from the Department of Transportation showing the historical number of passengers, capacity and average fares over time in all North American city-pair markets.

Using these data and benchmarking the same or comparable past behaviour of the markets when prices increased or decreased, jetBlue forecasts the level of demand in a particular market that will result from its entry and lower prices, as well as the anticipated reaction of existing airlines. "Our network is a hub-and-spoke structure. We do not intend to build departure and arrival banks, and connecting passengers only account for 5% of our total traffic. We do not waste time waiting for passengers, and minimise ground time. Even after the ERJ-190s join us, we will not consider connecting flights. These policies contribute to jetBlue's point-to-point operation and consequently constitute our low cost structure."

"One of our aims in restructuring our schedule is to increase asset and aircraft

USAirways' dominance of the eastern US has been damaged by Southwest's, Independence Air's and jetBlue's entry into the market, which have introduced point-to-point services and reduced yields in the region. This has forced USAirways to adopt a policy of introducing point-to-point services.

utilisation and employee productivity," says Brian Clark, managing director of planning at USAirways. "Hub and spoke is a costly operation model, where many aircraft are in high demand during the banks and lie idle at the others."

USAirways, filing for Chapter 11 bankruptcy protection for the second time in two years, blamed this on it having the second highest labour cost among US major airlines. It is negotiating labour contracts with the unions. Some jobs will be lost, but the carrier does not yet know to what extent. Obviously, with fewer staff USAirways cannot handle the same number of flights at peak time as it could previously. De-peaking is therefore the only solution. Another potential benefit gained from de-peaking is an increase in aircraft utilisation. "We intend to increase our daily block hours from the current 10.5 hours to 11.5 hours under the new schedule. With the new schedule, we will have additional capacity equivalent to 27 more aircraft without actually adding any to our fleet," says Clark.

Delta is following a similar strategy. "We are still committed to hub and spoke operations, but we are going to smooth out operations at our Atlanta hub by de-peaking the departure waves," says Doug Blissit, vice president of network analysis at Delta Airlines. "Non-stop services are good for passengers, and we will provide them when the market moves in that direction. Only 5% of city-pairs in the US can support point-to-point services, however, although these account for 35-40% of the traffic. Atlanta is the largest global hub, and we operate at 970 departures per day divided over 12 peaks. In this way we use each gate at the airport three times per day and the aircraft are on the ground for 50 to 90 minutes between flights. Each peak can be as high as 95 departures per hour. We are going to smooth or de-peak our Atlanta operation by bringing departures down to 65-70 per hour, and having a higher rate in the troughs. This will lower the ground time for the aircraft and the number of staff required for each departure bank. Aircraft utilisation will



also increase by 7-8%, and overall we will increase our number of daily departures by about 70 to about 1,050. Rather than reducing our fleet and keeping the same number of available seat-miles in the operation, we will use the higher productivity of our fleet to serve more frequencies and destinations with the same fleet.

"This will produce a steady flow of traffic and relieves peak demands on airport staff. It will compromise connections to a degree, but there will still be several 100,000 connections per day in the system," continues Blissit. "The de-peaking means we will require more revenue passenger-miles to fill the ASMs we are adding to the operation. Today we have an average load factor of 75%, and it is as high as 85-90% during the peaks. This means we are spilling passengers at peak times, and so have plenty of demand to fill the additional capacity. The objective is that unit cost will improve on aircraft utilisation alone, although we are hoping to make other cost reductions."

American Airlines also points out the benefits of restructuring its operating schedule. Flight and cabin crews, for the most part, stay with the same aircraft throughout their duty day, resulting in less shuffling and reassigning of crews. This provides pilots and flight attendants with more predictable workdays and can increase their productivity as well. Flight and cabin crews staying with the same aircraft are able to spend more time on board servicing the aircraft and passengers, and less downtime shuttling to other gates at the airport or waiting for

another flight connection. Move-ups (the reassigning of a new aircraft to a flight if the original aircraft is delayed due to a mechanical issue or late arrival) tend to create a ripple of delays through the system. Limiting move-ups minimises the number of delayed flights and helps keep many other flights on schedule for departure.

Another solution is de-hubbing. USAirways is the only US major so far to follow a de-hubbing policy, because it has too many hubs. On the eastern seaboard, USAirways has established Pittsburgh, Philadelphia, Washington Dulles and Charlotte as its hubs, thereby developing a network covering the whole area. One decade ago, when low-cost airlines had no strong presence in this area, the strategy was undoubtedly correct and viable. Collecting passengers from thin routes to hubs and distributing them to the mainlines via hubs worked. Ideally, with the co-ordination of the hubs, USAirways may have achieved economies of scale and controlled this area. However, the emergence of jetBlue and other low-fare carriers, which operate point-to-point routes, has broken USAirways' dream.

Southwest started serving six cities non-stop from Philadelphia in May 2003 and began non-stop service from Philadelphia to seven additional cities two months later. Independence Air began operations from Washington Dulles to five cities in June and served more than 30 cities later. In the Boston-Tampa market, USAirways lost 6.4% of market share after jetBlue entered.

A more serious and imminent threat is

American Airlines has de-peaked its Dallas-Fort Worth hub and simplified its fleet from 14 to six types. It has also deferred orders for 47 737-800s and 777-200ERs, indicating the reorganisation of its operation has increased the capacity generated by the current fleet.

that jetBlue will allocate 100 ERJ-190s from August 2005. This aircraft, which has a range of 2,200 nm, will cover the whole east coast region. The sudden increase of point-to-point services offered by low-cost airlines, plus the onslaught of low fares, has jeopardised USAirways' hub-and-spoke operation.

Where to go?

Obviously, USAirways knows where it should go. "Our new operational model is called a hybrid operation, combining hub-and-spoke and point-to-point services," says Clark. "We will lay the groundwork for a complete overhaul of the USAirways business model with our February 2005 schedule. This is with a design that uniquely combines the best business practices of both legacy and low-cost carriers," says Ben Baldanza, senior vice president of marketing and planning at USAirways. Clark adds: "With the new operation we expect aircraft utilisation to increase up to 9% from the current 10.5 hours to 11.5 hours in the future, while load factor will increase by 2-3%."

Key elements of the new schedule, which assumes a fleet of 281 mainline aircraft and 169 RJs, are:

1 Significant changes at Philadelphia, where traditional flight-connecting banks will be replaced by a 'rolling' structure.

1 The addition of two new flight-connecting banks in Charlotte, N.C., combined with significant capacity growth.



jetBlue has a daily aircraft utilisation of 14 hours, aided by an average downtime of 35 to 55 minutes. It focuses on point-to-point services to highly travelled markets that are underserved or have high average fares. jetBlue then forecasts demand on new routes that will result from its entry and introduction of lower fares and reaction of existing airlines.

- 1 The beginning of expanded operations to the Caribbean and Latin America from Fort Lauderdale/Hollywood International Airport, including four new destinations in the region added to the US Airways network.
- 1 The redefinition of Ronald Reagan Washington National Airport, with new non-stop service to primary business destinations, complemented by the replacement of many turboprop flights with RJ service.
- 1 Increased productivity of aircraft and other assets closer to low-cost carrier standards, brought about by better balancing the hub-and-spoke and point-to-point business models.

When asked whether there will be a conflict between the point-to-point and hub-and-spoke operations, USAirways says the two will be supplemental, because the point-to-point operation would serve large markets while the hub-and-spoke system will serve smaller ones.

“Hybrid operations are a risky operation model,” says Hamilton-Manns. “Swissair wanted to perform hybrid operations, but it failed. So far Aer Lingus, British Midland, Air New Zealand and Qatar Airways have succeeded. South African Airways is considering the possibility. The hybrid operation requires lower cost structure.

USAirways will fail if it cannot achieve lower unit cost, even if it can achieve higher unit revenue.”

Hurdles of transformation

USAirways does not comment on the requirements of successfully restructuring its schedule, since it is renegotiating with interested parties under bankruptcy protection. The most obvious hurdle, however, apart from the unions’ resistance, is the existing agreements with regional airlines. Regional feed is provided as USAirways Express by three wholly-owned subsidiaries: Allegheny Airlines, Piedmont Airlines and PSA Airlines. There are also four independent operators: Chautauqua, Mesa Airlines, Shuttle America and Trans States Airlines.

Due to the relatively small local traffic base at its hubs, USAirways relies heavily on feed traffic from its USAirways Express affiliates which carry passengers from low-density markets to USAirways’ hubs. As of December 2003, the USAirways Express network served 143 airports in the continental U.S., Canada and Bahamas, including 44 airports also served by USAirways. In 2003, US Airways Express airlines carried about 13.2 million passengers. This was split almost 50:50 between its wholly-owned regional airlines and third-party carriers operating under capacity purchase agreements.

In USAirways’ new schedule, capacity from Boston and New York will increase by 36% and 12% respectively. Capacity growth occurs as larger regional jets (RJs)

and mainline aircraft replace smaller, less efficient RJs. Mainline jets will replace 50-seat RJs and 37-seat turboprop services on selected flights from Washington to 10 destinations. When USAirways operates point-to-point routes and enters large markets previously served by regional airlines, the marriages between this carrier and its regional partners will break. Thanks to Chapter 11, which grants USAirways rights to negotiate the contracts with its service suppliers, USAirways may persuade these regional airlines to compromise.

Besides increasing aircraft utilisation, Delta is also renegotiating the agreement with its pilots. “The objective is to reduce the annual pilot cost by \$1 billion,” says Blissit. “Our overall aim is to cut costs by \$2.5 billion, and the other \$1.15 billion will come from a variety of sources. We will shed 6,000-7,000 ground staff over the next nine months out of today’s total of 65,000. We have already pulled 14,000 staff in recent years and cut costs by \$2.5 billion. The \$2.5 billion saving we are aiming for will partially claw back the \$800 million per year higher fuel bill, so making a net gain of \$1.7 billion and return us to profitability.”

Delta’s annual operating expense for 2003 was \$14.3 billion (against revenues of \$13.5 billion), and is estimated to be \$16.0 billion for the whole of 2004 (against a revenue of \$15.2 billion). Estimates by Merrill Lynch for 2005 are for revenues of \$16.4 billion and costs of \$16.3 billion; although this is based on the old operating model. A net saving of \$1.7 billion would clearly be welcome.

Delta will de-peak its Atlanta hub operation from February 2005, and reduce departures per hour from 95 to 70. The result will be an 8% increase in aircraft utilisation and improved labour productivity, allowing it to shed 7,000 staff.

Fleet planning implications

As a logical extension of the fleet simplification that began as early as 2000, American Airlines has reduced the number of aircraft types it flies to six from 14. The systemwide simplification initiatives call for minimising the number of fleet types at each hub and spoke. For example, American will base MD-80s at Chicago O'Hare (ORD) while the majority of 737-800s will be moved to Miami International (MIA). This concentration of fleet types significantly affects the operation, since flight schedules and aircraft maintenance become more predictable and dependable. In addition, maintenance efficiency is improved by consolidating night maintenance checks so crews at major airports will typically handle only one type of plane. American earlier announced that it would withdraw the equivalent of 15 aircraft: fourteen MD-80s and one 757-200. This, together with the retirement of its entire Fokker 100 fleet will result in a 5% reduction in domestic capacity by the March 2005.

Simplifying fleets seems an industry trend, whether an airline is de-peaking or not. "All 737-200 aircraft will be retired by January 2005. That will leave America West with three fleet types: 737-300s, A319/320 and the large gauge 757-200," says Flannery.

Delta's de-peaking strategy will go into effect on the 31st January 2005, and will follow it with a campaign to simplify its fleet. "We will sell our older 737s, the -200s and -300s, to simplify our fleet," says Blissit. "We will take our another two types from the remaining list of MD-80s, MD-90s, 737-800s, 757-200s, 767-200s, 767-300s and 777s."

"Improved aircraft utilisation and changes to hub operations will allow us to operate about 230 more daily flights, the equivalent of adding 27 mainline airplanes and 15 regional jets (RJs) to our fleet at today's utilisation," says Baldanza. The revised flight schedule will reduce aircraft turn times by 15%, thereby allowing mainline aircraft utilisation to increase by 10% and USAirways Express utilisation to increase by 5%, compared to February 2004. Mainline capacity for USAirways will increase by 7% in February 2005.

The effect of de-peaking American's



schedule at ORD and DFW saved it the equivalent of 16 aircraft, and also improved employee productivity and reduced airport congestion.

However, the significance of changing operation is not limited in this. US legacy airlines may shrink the market for aircraft due to changes in their operations. American Airlines has approached Boeing to defer delivery of its remaining 47 737-800 and 777-200ER firm orders, for example. Embraer reduced its delivery forecast for 2004, and 2005 as new orders failed to mitigate the continued loss of business from the US. The revision drops 15 aircraft from the 160 deliveries previously predicted for 2004, and 25 from the 170 deliveries forecast for 2005. This announcement came just one week after Embraer's main rival, Bombardier, reduced its own jet delivery schedule. The principal reasons for the revision are the cancellation of 18 ERJ-145s by American Eagle Airlines (aircraft that were scheduled to be delivered between July 2005 and February 2006); and the previously announced suspension of the manufacturer's 170 aircraft deliveries to USAirways while this airline remains under bankruptcy protection. USAirways took delivery of 22 of the 85 mid-sized aircraft before the suspension.

Although Clark said there would be no change in USAirways' current fleet, it will have to make some changes to accommodate the hybrid operation. The first is that, due to the change of operation the carrier may defer the delivery or delete the orders for 10 A330-200s, which are suitable for long-haul operations, even if it can emerge from Chapter 11 bankruptcy protection. Secondly, USAirways needs to simplify its fleet, irrespective of whether it is to

reduce costs or make the hybrid operation model work. Finally, Chautauqua, Mesa Airlines, Shuttle America and Trans States Airlines will all have to rethink their future and adjust their fleet planning to adapt to change.

Legacy airlines, however, may transfer some of their capacity to overseas markets to aid their dilemma. By the end of 2005, United plans to devote 41% of its capacity to overseas flying, up from the current 35%, and hopes to derive more of its revenue from flying between the US and Asia, Europe and Latin America than from domestic flights. The airline plans to double capacity to China, add more services to Japan and begin flights to Vietnam. United will expand its services to Mexico and the Caribbean, mostly with its low-cost unit Ted.

Continental's new routes include Belfast, Berlin and Hamburg, all of which served from its Newark Liberty hub with 757s, starting spring 2005. Expansion of Newark routes to the UK in summer 2004 included a service to Edinburgh and a second daily flight to Birmingham. A service to Bristol is planned for summer 2005. Continental has also sought Newark-Moscow rights. American, meanwhile, is planning to add 90 daily flights (20 more than were announced a month ago) to its summer schedule at Dallas.

"The U.S. domestic market currently has 15-20% too much capacity at present," says Flannery. "There are too many marginal hubs and too many aircraft. Expanding low-cost carriers continue to reduce the value of connecting traffic and the aforementioned surplus of hubs and aircraft in the legacy carriers is accelerating the downward yield pressure." **AC**