Attila Arrives

Technologies meter arrivals to save airlines money

Jerome Greer Chandler Dallas

Even as carriers await the full flowering of the FAA's Next Generation Air Transportation System and Eurocontrol's Single European Sky ATM Research (Sesar) effort, a purely intra- and inter-airline arrivals synchronization technology is racking up solid savings for one major carrier.

"While we're waiting for NextGen and Sesar, there are a lot of things an airline can do to manage its own house," asserts Keith Wichman, director of ATM and airline efficiency services for GE Aviation Systems. "They don't have to tolerate the lack of system predictability that we have today."

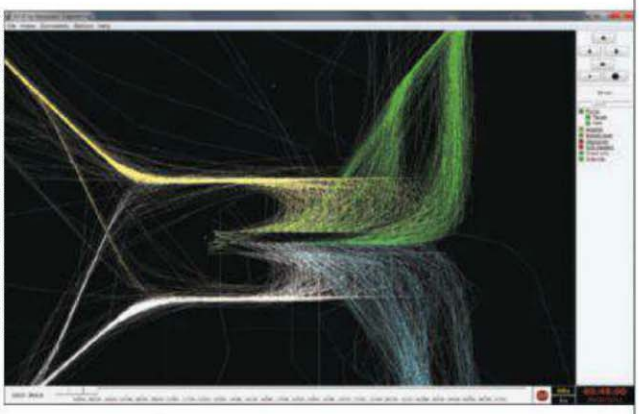
Expelling inefficiencies from the system, to remove arrivals' randomness, is the aim of Attila, a technology developed by Colorado-based ATH Group. It is predicated on the premise that "an airline is nothing more . . . than a relatively simple production process," says R. Michael Baiada, a Boeing 747-400 captain for a major international airline and president of ATH.

In Attila's scheme of things, the carrier collects passengers, bags and cargo at one end. It processes the "raw material" and puts it out the other end. The aim is to produce "a high-quality product . . . a smiling passenger with bag in hand," he says. That, of course, is not always the case. Baiada asserts airlines employ what amounts to a "fire and forget" philosophy, one in which a flight is "launched off the departure date and arrives at the destination sometime thereafter—sometimes close to schedule, sometimes not."

Variability is the villain, in this instance the variance with which aircraft achieve terminal area arrival fixes that are typically 30-40 mi. from touchdown. It is around those fixes that inbound flights congregate. Attila's aim is to meter the inbound flow so that air traffic control can better digest it.

Baiada likens the process to a funnel, one which inefficiently sorts arrivals and sequences them for landing. Meter the flow in the en route environment, the theory goes, and aircraft present themselves to controllers so they feed through a "soda straw." It is through that straw that ATC "can shoot them through the narrow end "just in time."

That's the theory. But does it work? Delta Air Lines contends it does. The carrier began validating the concept at its Atlanta Hartsfield-Jackson International Airport hub in 2007. It then followed up with tests at Minneapolis-St. Paul International Airport in the fall of 2011 and Detroit Metropolitan Wayne County Airport in early 2012. It tracked "dwell time" minutes saved per flight within the airports' arrival fixes. In each instance, "We [found] real value" in the process, says Kevin Mathison, Delta's managing director of performance and planning in ops control. Initially at Atlanta, Attila saved 1.7 min. per flight.



Attila arrival-flow data into Atlanta Hartsfield are displayed on a 4-D trajectory visual analysis tool supplied by a sister company to ATH Group.

The salient issue for the airline is getting pilots to comply with the Required Time of Arrival (RTA) messages that Attila sends out. Attila digests Aircraft Situational Display to Industry information, data noting position, speed, time and altitude. Then it calculates a flight's RTA at a particular fix. Attila transmits this request automatically via the Aircraft Communications Addressing and Reporting System. One Delta aircraft might receive an RTA calling for a 12:29 arrival at the fix, the other asking for 12:31. Pilots make adjustments during the en route phase of the trip, speeding up or slowing down. Baiada says they need not hit the fix precisely. If the aircraft hits the fix within a minute of RTA, "We consider that a win," says Mathison.

Based on that 1-min. window, Delta's Atlanta hub averages 40.4% compliance. That's good enough to shave an average of 0.99 min. per flight dwell time. At Minneapolis-St. Paul, compliance averages 35.2%, rendering a 0.95 per flight cut in dwell time within the arrivals fix, Mathison says. At the carrier's Detroit hub, the compliance is 34.5%, and the savings average 1.03 min. per flight.

Speaking to the compliance issue, "The problem with a technology like this is that a lot of the variables the aircraft has to deal with are beyond the control of the pilot," says John Vensveen, global head of Airline Advisory Services for Radixx International. Vensveen says pilots who have employed the system "for the most part, find it beneficial. But [they] see it more as a teaching aid than anything else."

Whether it is a teaching aid or significant slice of the solution, per-flight fuel savings go hand-in-hand with reducing dwell. For competitive reasons, Delta declines to release specific numbers. "The really big" savings come in the terminal area, because "that's where you burn the most fuel," says John-Paul Clarke, a professor at Georgia Institute of Technology's School of Aerospace Engineering and director of the Air Transportation Laboratory. He worked with both Delta and ATH Group defining test scenarios and analyzing the benefits bequeathed by the arriv-

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als synchronization system. The intent was "to make sure that the time spent in the terminal area was reduced."

ATH says Attila data from August 2006 through August 2012 indicate the system cut Delta's fuel burn by 26.1 million gal., or a savings of $60.9 million. It did this while reducing flight time by 1.4 million min. In an industry increasingly focused on CO_2 effluent, Attila data indicates a reduction of 551 million lb. of carbon dioxide emissions.

Overall, Mathison characterizes Delta's return on investment in the system as "superb," noting, however, that "what we invested in this is not typical," because Delta is Attila's launch customer.

Delta continues to implement Attila at Atlanta Hartsfield, Minneapolis-St. Paul and Detroit Metropolitan airports. In each instance, it is an intra-airline arrangement. Other carriers do not participate. At Charlotte (N.C.) Douglas International Airport, however, a variant was tested called Attila Exchange. Delta did not participate in this study. The second-generation of the system allows two carriers to share ATC and trajectory information. The airlines might be scheduled for a 16:30 arrival time at a given fix. Exchange might give Carrier A an RTA of 16:30; Carrier B a 16:31 time. But next time, Carrier B gets the preferential RTA. Essentially, Attila Exchange aims to optimize airline operations, without sharing business information.

That is not to say optimizing a given carrier's business *per se* is not one of Attila's aims. Baiada offers this instance of an aircraft going from Dallas-Fort Worth to Boise, Idaho. On the westbound leg, there may be few if any connections out of Boise for passengers on board. On the return route, however, "It's critical to get that aircraft back to Dallas on time, from a connection standpoint." The system takes such scenarios into consideration.

When two carriers must get to their respective gates on time is where the rub could result, and that is why the exchange system might favor one airline one time, and the other the next.

The ultimate challenge for a system such as this could come in the variegated airspace above the New York metro area, where no one carrier, except perhaps for United Airlines at Newark (N.J.) Liberty International Airport, exercises a dominant position at any airport. Mathison says Delta is exploring the possibility of implementing Attila Exchange in New York. The carrier is a major player at both Kennedy International and LaGuardia airports.

While ATH Group has been working with Delta for years on refining Attila, ATH also is embarking on a venture with GE Aviation Systems to better manage arrivals for Emirates at its Dubai hub. ATH provides the software while GE adapts it. "At Emirates, the availability of traffic data in the environment is very sketchy," says Wichman. It is employing company data and flight management system numbers to fill in those holes. "That's where GE's expertise comes into play," he says.

Emirates was clear that the ability to improve predictability is a money-saver. Bob Everest, the Dubai-based carrier's vice president of flight operations support, says initial expectations are that Attila will "enable less ATC vectoring, but not eliminate it; less holding, but again, not eliminate it." Emirates wants to banish as much unpredictability in the system as possible, and let the benefits flow from there.

Everest accedes that fuel savings are important, but there are other possible perks. One is to better sequence arrivals of Airbus A380s (Emirates is the largest operator of the type) "so that ATC can minimize the separation based on wake turbulence criteria and thus increase runway throughput."

Attila in the U.S. operates virtually independent of air traffic control, at least for now. However, "In my view," says Georgia Tech's Clarke, it's just one component of a larger vision." That is the way others envision it too—near-term gains independent of air traffic control (ATC), greater payoff down the line if and when it is melded with ATC.

To that end, the second phase of Emirates' Attila validation "will be to see how we can integrate with ATC systems," says Everest. There have been discussions with both the United Arab Emirates Area Control Center at Sheik Zayed Center and Dubai ATC on how Emirates can provide RTA estimates so as to "understand if these can be integrated into the arrival manager."

And it is the same in Atlanta. Mathison envisions the possibility of employing an arrivals sequencing tool such as Attila in concert with operational descent profiles (ODP). Such profiles are designed so pilots can descend in smooth curvilinear swoops, without having to adjust the throttles, without having to level off. That in itself saves fuel. Combine ODP with arrivals sequencing and you get a continuum.

Mathison says the FAA is testing the concept, but the agency did not comment on Attila-related issues. He says FAA and Delta conducted a brief test at Atlanta in which Attila collaborated with ODP. The test window was very short, and therefore not conclusive. But the combination "seems to work."

Another combination that could work to reduce flight time is the wedding of Lockheed Martin's Time-Based Flow Management (TBFM) with the ATH Group system. The Lockheed Martin set-up is operational in all 20 FAA ATC centers, the ATC System Command Center and the top 25 U.S. airports, according to Diane De Sua, the company's manager of NextGen programs.

TBFM assigns each inbound aircraft a unique slot, relative to other flights. The system can be fully integrated in to ATC automation.

At this juncture at least, TBFM and Attila differ. The former is intimately wedded to FAA; the latter is an intra- and inter-airline affair. "TBFM takes into account FAA's density issues," says Kevin Hightower, Lockheed Martin's TBFM system architect. But it does not consider an airline's business goals.

This begs the question: Can TBFM and Attila work together to even better meter inbound flow? Hightower "thinks they [will be] working together in the future to do just that." The systems are more complementary than competitive. "We have different information," says De Sua. "They have airline information. We have FAA information, and both are needed to make the right decisions."

EMIRATES