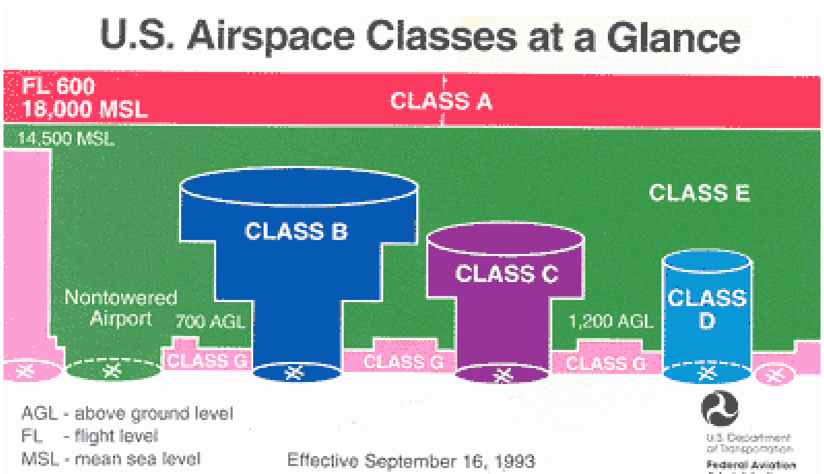
Changing the Paradigm of Air Travel

CTGi is positioned to be the SABRE reservation system for the nascent air tax industry, leveraging intellectual property to change the way air travel is booked and carrier logistics managed.

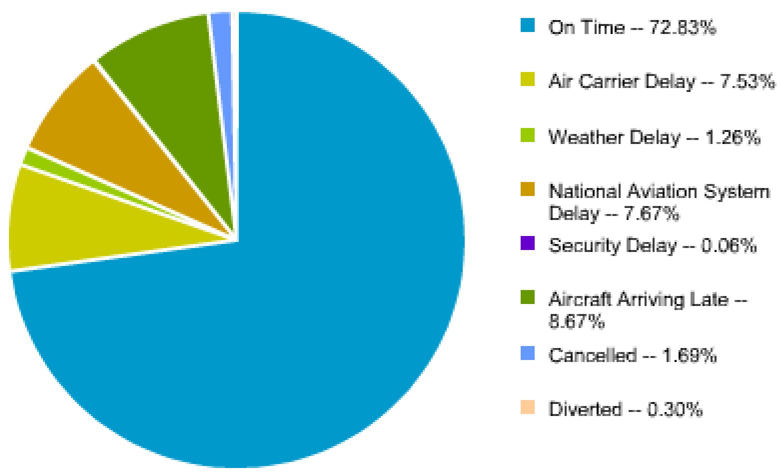
Passengers think of their local airport as the commercial terminal populated by large airliners, and about 600 of these airports serve the United States. The FAA designates these airports as class Bravo and class Charlie airspace. There are two additional types of airports, the small towered airport, class Delta, and the un-towered or un-controlled airports in class Echo or Golf airspace. Most travelers are not aware of the local facilities closest to their point of origination, and even pilots are hard pressed to identify the closest airport to their point of destination. There are more than 10,000 of these smaller facilities.

To enable the use of these thousands of facilities, CTGi has implemented a patent protected air taxi booking system that schedules transport ***by the street address of the origin and destination*** and dynamically assigns the airports based on proximity, air and ground delays, weather, additional bookings, and a multitude of operational factors for the air carrier. In addition, ground transportation is linked to this system, such that the passenger is met at both sides of the trip, most frequently on the ramp at the aircraft itself, and transfers become seamless events.



Private air taxi will provide substantial per trip time savings; minimized ground travel to the closer airport, streamlined security and check in procedures, flawless direct luggage transfer, and reduced aircraft taxi and clearance times will save hours over airline travel, and these savings will be calculated and displayed versus airliner schedules. This time savings will be most dramatic when commercial air service requires interconnection on regional flights, or when schedule flexibility allows a day trip vs. an overnight stay.

The U.S. Department of Transportation's (DOT) Bureau of Transportation Statistics (BTS) tracks the on-time performance of domestic flights operated by large air carriers. In June 2006, fully 16% of these flights are late due to air carrier delays, including delays created by late arrivals. [1] We anticipate that the security delay percentage will jump substantially with the higher security alert levels in place for August '06. In addition, domestic security screening procedures required a 3 hour pre-flight check-in, adding six hours of round trip airport wait time.



In order to fully realize the promise of Air Taxi and the use of local airports, a new class of real time software is required capable of complex optimizations.

The Air Taxi Optimization Problem

The successful air taxi operator will need a real time system able to minimize Non Revenue Flight Miles (NRFM), Non Revenue Flight Operations (NRFO), Landing Fees, Fuel Surcharges, and Flight Delays while optimizing the passenger experience.

The system must be able to dynamically assign aircraft and flight crews based on an ever changing landscape, including new customer bookings, unusual airport delays, maintenance events, fuel cost updates, ATC routing changes, aircraft weight and balance, and weather systems.

[1] Bureau of Transportation Statistics, http://www.transtats.bts.gov/OT_Delay/OT_DelayCause1.asp

No airline in existence today has faced a dynamic routing problem of this scale; potentially thousands of jets with crew assignments, manifests and routing assigned in response to passenger bookings and changing conditions. [2] We believe that the science of telecom traffic engineering represents the closest real world model to this problem; that the real time routing and optimization programming employed to mange the nation's largest telecom networks holds a key to capacity planning, route optimization, and dynamic re-routing/route-around for optimal traffic flow.

Providing least cost routing support for 12 billion transactions per month, the author has access to the proven scalability and fault tolerance required to manage large scale air carrier class operations based on fleets of VLJs. The telecom numbers dwarf the calculations required to optimize air taxi operations; however, as the number of passenger bookings, VLJs in service, and airline crews grow, the optimization problem does get more calculation intensive (grows logarithmically), while the responsiveness of real time dispatch must never be compromised; the best approach to managing this is the high speed parallel processing that we have already deployed in the telecom space.

Typical Routing for Air Taxi Operations

To better understand the problems faced by the emerging class of Very Light Jets, the author has flown a turbo prop aircraft for the last year that closely emulates the performance envelope of the emerging VLJs. In particular the TBM 700 has a maximum cruise of 300kts, a service ceiling of 31,000 feet, and a range of 1500NM. The TBM is slightly slower, flies 10,000 feet lower, and has greater range and payload than the VLJs.

Pictured below, courtesy of FlightAware ®, are the 5335 flights airborne at 6PM CDT on July 22nd, 2005. It is important to understand that the both NASA's more aggressive model and the FAA's more conservative model show simultaneous flight number at least tripling over the next decade. What makes this work is the use of the thousands of general aviation airports that will become part of the fabric of the Small Aircraft Transportation System, which models the current VLJs as a first generation of aircraft. Understanding the routing and flight levels that will be available to this new breed of aircraft, and responding dynamically to changes in this routing will be critical to the efficient operations of the Air Taxi operator; perhaps even to the survival of the carrier and its passengers.

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[2] NetJets is the closest analogue we have to this problem, and they operate 24x7 manned centers to work on routing issues. Given the cost of the fleet they operate, this manned staff represents a smaller operational cost on a percentage basis, and NetJets is facing more pressing issues around fuel costs and profitability. It is anticipated that NetJets will be among the largest consumers of VLJ services, used to position NetJets crews.

Both the TBM and the VLJs are slower than the passenger jets flying at the flight levels, and the difficulty of getting cleared to even to Flight Level 310 (31,000 feet) in a TBM foreshadows the careful planning that will be required to safety operate the VLJs at less then their projected cruising altitude. (range calculations for the VLJs are typically shown at the most efficient cruise altitude of 41,000 feet and will not reflect real world operations). The range and payload of the emerging VLJs will be limiting factors, and must be carefully managed; a problem well suited to automation and data mining.

Driving Safety for VLJs in the National Air Space System

The primary safety differences between Air Taxi Operations and Carrier Operations involve the experience of airline crews with a set of familiar route destinations, and the oversight of dedicated flight planning departments.

Safety in the Air Taxi paradigm will involve the prioritization of selection of airline crews that have familiarity with the airports being served *and the alternate airports* on a given flight. The importance of this safety initiative is compounded by the greater number of airports available to the Air Taxi system and the lack of standardization of approaches, precision approaches, lighting systems, and runway environments at these airports. It is highly likely that an aircrew will be approaching an unfamiliar airport with sub standard approach lighting, safety overruns and terrain clearance, if this experience is not factored in during the crew assignment process.

Weather issues further compound the need for sophisticated flight planning, and familiarity with the departure, destination and en-route environments. Low ceilings, turbulence and terrain combine with the lack of precision approaches to create a much higher risk profile.

A method for an automated review of flight plans with regards to risk factors will be crucial to the safe operation of VLJs, to aid in Critical Decision Making. Each flight will be scored based on flight crew (experience, familiarity, and crew rest), weather (en route, departure and destination) and destination (precision approach, circling approach) metrics, and high risk operations will be flagged for review by the Air Taxi Operator.

The review will include sufficient fuel and NBAA IFR reserves, proper weight and balance, creation of seating charts, and any required fuel loading changes based on customers with over gross weight profiles (luggage or passengers).

Finally an automated security check against homeland security watch lists will be conducted on each crew member and passenger prior to each flight. Optional criminal DB checks may also be incorporated. Currently this is not implemented in Air Taxi operations, which represent a growing risk factor for terrorism.

Driving Efficiency for VLJs in the National Air Space System

Route optimization depends on knowledge of the routes most likely to be assigned between airport city pairs. The use of direct flight miles is insufficient for route optimization purposes.

The table below shows the most common routes assigned between PBI and Newark indexed by altitude. Note the ability to fly more direct at 40,000 feet than at lower altitudes. Most passenger jets cannot climb directly to the 41,000 foot service ceiling of the VLJs; conversely a VLJ can make this climb without intermediate stops to burn fuel. Understanding and modeling these performance characteristics can drive savings in fuel and time. Conversely the typical VLJ will not be able to fly directly from PBI to EWR with sufficient fuel reserves, and the time required to climb to altitude must be set against the need for a fuel stop and the second climb/descent.

Route Analysis Summary				
Frequency	Origin	Destination	Altitude	Full Route
5	KPBI	KEWR	35000	BLUFI PERMT AR16 ILM J109 FAK DYLIN2
4	KPBI	KEWR	37000	BLUFI PERMT AR16 ILM J109 FAK DYLIN2
3	KPBI	KEWR	39000	BLUFI PERMT AR16 ILM J109 FAK DYLIN2
1	KPBI	KEWR	40000	TBIRD ORL CRG FAK

About the author:

Richard Kane has 20 years of experience in capacity planning, route optimization and least cost routing for telecommunications industry. Spurred on by the belief that the intellectual property developed over this timeframe has direct implications for the burgeoning air taxi industry, Richard directed efforts to sign up three operators for proof of concept work applying the framework to the air taxi problem.

Code designed by the author has processed over a half trillion messages in the pursuit of the perfect optimization of the telecom infrastructure for carriers as diverse as MCI/Worldcom, WCT/Frontier, Sprint and Qwest.

Mr. Kane holds patents and pending patents on high speed parallel processing, artificial intelligence, self learning code and air taxi dispatch models. Kane holds a pending patent on a critical attitude recovery system intended to prevent spatial disorientation accidents. Kane holds a BA in mathematics from the Faculty Scholars program at Florida Atlantic University, an IBM co-sponsored program which allowed him to bypass two years of a 4 year degree program.

Richard is a commercial, instrument rated, pilot, with seven world speed records and one transatlantic single-engine crossing. Richard is an Aviation Safety Counselor with the Ft. Lauderdale Flight Standards District Office (FSDO), and in that role represents the FAA on the PBC/Lantana Airport Safety Committee. Richard has held multiple safety related educations seminars for Florida pilots, as part of the WINGS safety program, and is himself on Wings level IV, an EAA Young Eagles Flight Leader and president of the Florida Aero Club Palm Beach chapter.

Richard is the Chairman and CEO of Coastal Technologies Group, an Inc 500 company for 2005, the 191st fastest growing privately held company in the nation, and one of the world's largest Application Service Providers (ASPs), processing more than 12B transactions monthly.