

Approaching Gridlock

Air Traffic Control Delays

**Produced by the
Air Transport Association
Departments of Air Traffic Management and Economics
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Executive Summary

The summer of 1999 was one of mounting discontent for airlines and their passengers, with record air traffic control delays throughout the nation. **According to FAA data, summer air traffic control delays were so bad that the summer of 1999 was the most delay-plagued season in history. Monthly, year-over-year delays were up dramatically: 51% in April; 35% in May; 12% in June; 76% in July and 22% in August.** And, without immediate and extensive overhaul of the air traffic control system, more delays – and inevitable system-wide gridlock -- are on the way.

The number of aircraft delayed daily also rose dramatically to 1,291 in 1999, from 948 in 1998 and 737 in 1997. This report concludes that the dramatic rise in delays is caused by an inefficient and outdated air traffic control system, coupled with inadequate management of that system by the federal government.

The report identifies the eight most delayed airports to date in 1999. **At certain airports, air traffic control delays are reaching critical levels:** at Dallas/Ft. Worth ATC delays are up 93%; 86% at Chicago O'Hare and 160% at Detroit. For all airports, over 100,000 people were delayed each day because of the air traffic control system.

Weather management is a particularly troublesome problem that causes numerous delays. Frequently the FAA will impose flight restrictions that cause delays, based upon early weather forecasts; but, if the bad weather doesn't materialize later in the day, the restrictions are still not removed. The report includes a specific example of inefficient weather management on July 31, 1999.

The costs of air traffic control delays to both the airlines and the public is enormous. In 1998, **the cost of air traffic control delays was \$2.9 billion and the cost to passengers was \$1.6 billion for a total of \$4.5 billion.** In 1999, delays are up dramatically, so these costs are on the rise as well and are expected to be up by nearly 10%.

The conclusion of the report forecasts that the number of passengers will rise by 43% through 2008 and that an additional 2,500 aircraft will be needed to transport these people. **If the air traffic control system is not fixed, this additional traffic would result in a 250% rise in delays.**

The FAA's system is broken. **If it is not fixed, the resulting delays will virtually eliminate the dependability of airline schedules and the system will descend into gridlock.** The hub-and-spoke system will falter and small communities now served by that system will, more and more, be excluded from access to a vital network of air transportation. Gridlock-induced costs will drive up the cost of air service, making air travel expensive and out of reach for all but the well-to-do.

The Summer of Discontent Air Traffic Control Delays April – August, 1999

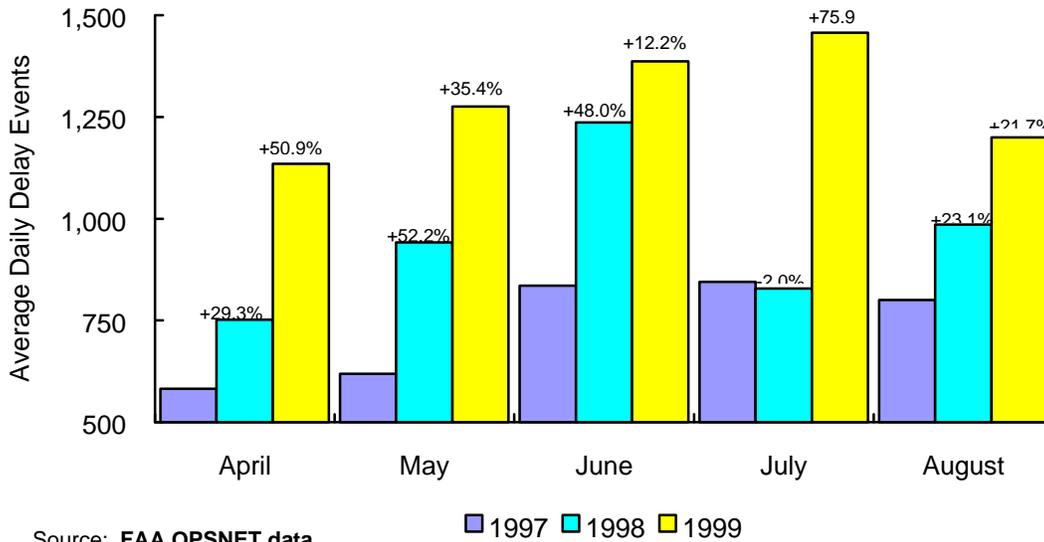
The air traffic delays experienced this summer by airlines and passengers were the worst in history. According to the Federal Aviation Administration (FAA), from April through August of 1999, year-over-year air traffic control (ATC) delays were up by 36.2% and delays in July alone were up a teeth-gritting 75.9%. Total delay increases averaged over 19.6% for the year (See Table 1).

Table 1
FAA Reported Air Traffic Control Delays
(15 Minutes or More)

	1997	1998	1999	Percent Change	
				99/98	99/97
Jan	21,588	27,623	24,664	-10.7	14.2
Feb	15,856	24,855	19,851	-20.1	25.2
Mar	15,055	24,159	23,180	-4.1	54.0
Apr	17,453	22,563	34,046	50.9	95.1
May	19,177	29,187	39,533	35.4	106.1
Jun	25,068	37,093	41,602	12.2	66.0
Jul	26,193	25,672	45,161	75.9	72.4
Aug	24,816	30,549	37,189	21.7	49.9
Sep	19,388	20,194			
Oct	17,812	23,988			
Nov	22,337	20,439			
Dec	20,516	19,912			
Total	245,259	306,234			
Apr-Aug	112,707	145,064	197,531	36.2	75.3
Jan-Aug	165,206	221,701	265,226	19.6	60.5

Source: **FAA OPSNET data**

Chart 1
Approaching Gridlock
Air Traffic Control Delays
(15 Minutes or More)



This dramatic rise in delays, seen in Chart 1, is caused by an inefficient and outdated air traffic control system, coupled with inadequate management of that system by the federal government. The system is broken and the purpose of this report is to outline, for ATA member carriers, several issues surrounding the ATC system and this summer's delays.

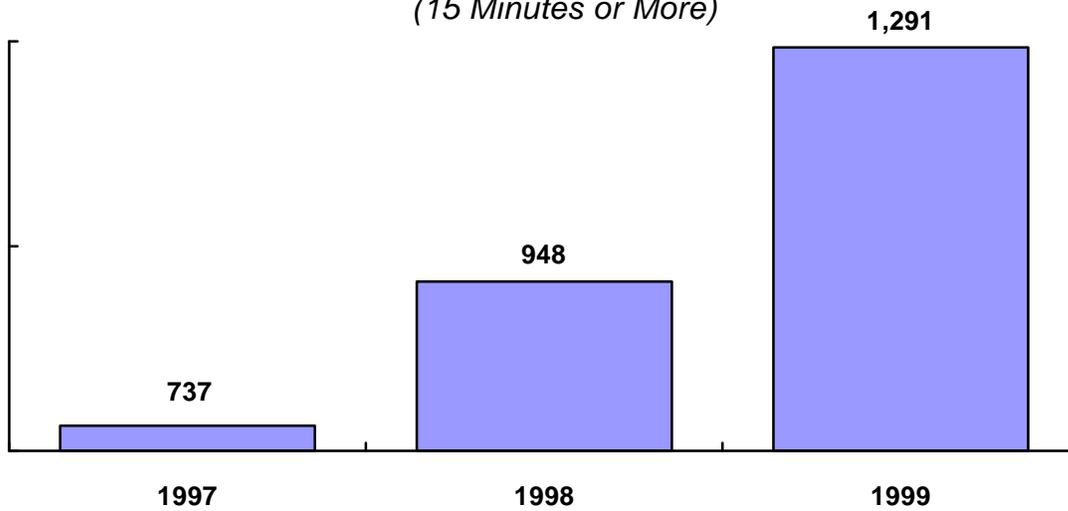
The government has operated the air traffic control system since the airlines turned it over to them in 1936. The FAA has been recording delays since the late 1960s, when ATC delays became an issue. Air traffic control delays are primarily caused by the government's management of the ATC system and if something isn't done soon, airlines and passengers can expect more of the same next year and the years that follow. Although some indicate that airline scheduling contributes to increased delays, an examination of the FAA's own data shows that schedule-related delays represent an insignificant number of total delays.

The Summer of 1999

The first indicator of trouble this summer was the dramatic increase in April delays when the FAA began their transition of the Cleveland Center to the new long-awaited Display System Replacement (DSR). The FAA needed a reduction in demand on this center's airspace, to allow controllers to become proficient on the new equipment, and put intentional delays in place by increasing miles-in-trail (MIT) up to 60-miles between aircraft. Miles-in-trail are imposed by individual air traffic control centers and terminal control areas to intentionally slow down traffic, something the FAA refers to as *controller comfort*. This spacing between aircraft should not be

confused with the safety separation standards required by the FAA of five nautical miles laterally or 2,000 feet in altitude, in sectors controlling high-altitude traffic. Even with the new equipment, a 60-mile separation between aircraft was excessive and was not done for safety reasons.

Chart 2
Average Number of Daily Delays
April - August 1999
(15 Minutes or More)



Source: **FAA OPSNET data**

It was only after airlines complained to FAA headquarters that any attention was given to the DSR transition procedures and the restrictions that might be legitimately required. The FAA's OPSNET data (their main air traffic control delay database) shows that April's delays were 51% higher than 1998 --- the highest delay month in five years. The DSR transitions for Chicago and New York soon followed and created further massive delays. Additional excessive MIT restrictions were put into place in both of these ATC centers and these FAA management decisions caused further delays throughout the nation.

The situation was complicated by weather events that start every year in the spring. By June, the intentional delays installed because of the DSR transition should have been removed, but they were not; excessive MIT separations were in place, so that the system delays for April, May and June reached a total of over 115,000 for the three months -- an increase of 30% over the previous year. July was a horrible month, with system delays the highest in over a decade -- 45,161 delays or an average of almost 1,500 delayed aircraft per day.

Most Delayed Airports

Through August of 1999, delays are up almost 20% over 1998. At certain airports, air traffic control delays have reached critical levels: the delays at DFW are up 93%, at Chicago O'Hare -- 86% and at Detroit -- 160%. The airlines have lost millions of dollars and passengers have lost millions of hours of productivity because of these ATC-system delays. In July, on average, over 100,000 passengers were delayed *every day* by the government's air traffic control system.

Table 2
Airport Delay Increases
 January – August 1999
 Airports having more than 5,000 delays

Airport	ID	1999 Delays	1998 Delays	Percent Increase
Minneapolis-St. Paul	MSP	6,772	2,984	126.9
Detroit Metro	DTW	8,694	3,339	160.4
Dallas/Ft. Worth Int'l	DFW	12,533	6,498	92.9
Chicago O'Hare Int'l	ORD	38,471	20,684	86.0
Washington Dulles Int'l	IAD	6,233	3,453	80.5
Cincinnati Tower	CVG	6,433	4,030	59.6
New York LaGuardia	LGA	19,018	15,642	21.6
Philadelphia Int'l	PHL	10,619	9,274	14.5

Source: FAA OPSNET Data

Weather is Just an Excuse

The FAA frequently blames ATC delays on “weather” and they do not focus on the real issue: management of how weather affects the system. The FAA has stated that in 1999, almost 72% of delays to aircraft that were 15 minutes or longer, were caused by weather and that, consequently, most of them were out of the FAA’s control. However, through the proper use of weather forecasts and appropriate FAA decisions, the number of weather-related delays could be reduced dramatically.

For example, on July 31 the FAA Command Center began planning in the morning for how the system would cope with a line of thunderstorms forecasted for mid-afternoon from Buffalo to Kansas. The collaborative forecast (meaning a number of airlines had participated along with the FAA in its development) estimated that between 25% and 50% of this area would be covered by thunderstorms and that the probability of occurrence as forecasted was about 50-50. This would indicate that the development of the storm required close scrutiny, because there was a 50-50 chance that the storms would not impact the total area between Buffalo and Kansas and that airlines could safely use some of the airspace.

In response to this forecast, the FAA imposed a series of ground stops that caused hundreds of delays. However, real-time tracking of the thunderstorm's development apparently did not happen. In fact, weather radar showed that the system did not develop as predicted and, throughout the day, large holes appeared in the system through which aircraft could safely fly.

In this case, and it is not unusual, the government's system presumed the worst and 700 flights were delayed -- many over four hours and many needlessly, because the FAA ignored the real-time development of this line of thunderstorms. Statistically, all of those 700 delayed aircraft were caused by weather, according to the FAA. The genesis of these delays was weather, but the majority were caused by the FAA's mismanagement of the severe weather avoidance process. The Air Traffic Control Command Center did not exercise the necessary command-and-control authority over regional ATC centers and allowed unnecessary ground holds to continue.

FAA Audit

In 1995, the airlines complained to the FAA that the number of MIT restrictions in place were excessive in both number and duration. After a year of complaints, the FAA finally conducted an audit of the use of MIT restrictions. They visited enroute centers¹ and radar approach control facilities² and did an on-site validation of their necessity. The FAA quickly learned that airline complaints were valid and that many of the restrictions that were causing delays were unnecessary. The FAA discovered that the average number of *daily* restrictions in enroute centers was 286 and that there was no method of accountability, at any level, for ineffective traffic management restrictions. A cursory check of the number of miles in trail that are in place today is

¹ Air Route Traffic Control Center-A facility established to provide air traffic control service to aircraft operating on instrument flight rules within controlled airspace and principally during the enroute phase of flight.

² Radar Approach Control Facility-A terminal ATC facility that uses radar and nonradar capabilities to provide approach control services to aircraft arriving, departing, or transiting airspace controlled by the facility.

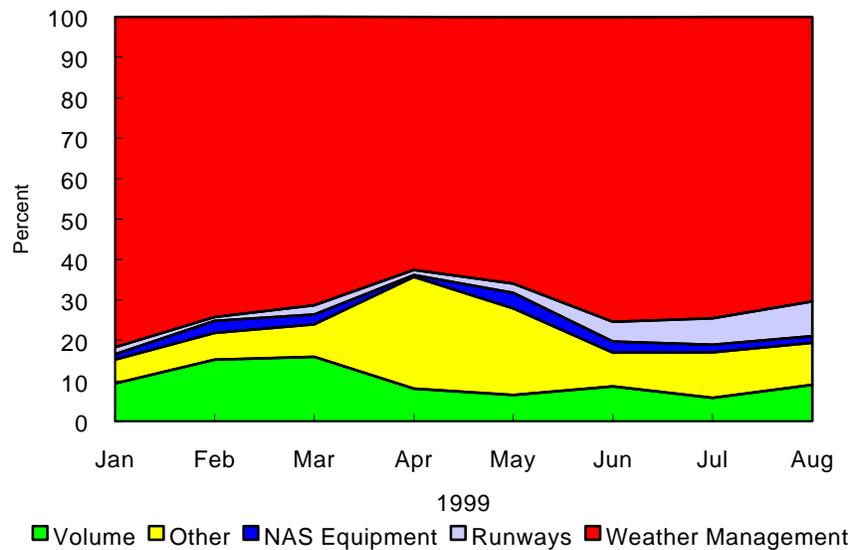
222, and that doesn't include data from the busy centers at New York, Boston, Atlanta and Indianapolis. Clearly, the air traffic control system is again using excessive MIT restrictions.

Airline Scheduling

Throughout the summer, the public outcry over delays grew, along with wait times. The FAA has been harshly criticized in the press including damaging stories on the *Today Show*, *Good Morning America* as well as numerous articles in newspapers and reports by other television shows. In an effort to redirect blame, the National Air Traffic Controllers Association (NATCA) has publicly said that airline schedules are the reason for the delay increase. Such a notion is ridiculous and one only has to look at the FAA delay data to see why.

Chart 3 depicts unedited FAA data that shows how the FAA allocated the causes for delays this year. Even if all delays in the volume category (the category in which schedule delays would be placed) were attributable to airline schedules, delays caused by volume in the system account for only 7.5% of total delays. This constituted, on average, 97 flights per day system-wide out of the 22,000 daily scheduled airline departures. These 97 delays, spread across the top-ten delay airports, produce less than ten delays per day, per airport. The bottom line is, of the 1,291 average daily delays this summer, almost 1,200 have nothing to do with airline scheduling. The vast majority are caused by the air traffic control system.

Chart 3
Total System Delays
% Breakdown by Causes



Airlines are willing to accept responsibility for some delays, due to their efforts to accommodate passenger desires to fly at peak times. It is the cost of doing business. When passengers experience a relatively small delay of 10 to 20 minutes, because demand for airline services is high, they can understand that the alternative is not to schedule those flights at all and leave a thousand passengers behind. But, these delays are insignificant in comparison with those instances this summer where aircraft have been delayed over six hours by FAA command.

FAA Findings

In early July, ATA airlines met with the FAA's associate administrator for Air Traffic Services, to voice concerns with mounting delays. They asked the FAA to perform an evaluation of its major centers and facilities in order to determine what had caused the increase in delays. The FAA agreed to that request and a joint FAA/industry evaluation was conducted at 33 air traffic control field facilities and the Air Traffic Control System Command Center (ATCSCC).

When the evaluation was complete, FAA Administrator Jane Garvey and Acting Deputy Administrator Monte Belger met with the airlines and ATA to identify short-term action items that could be implemented to ease delays. As a result, the FAA developed 21 specific action items to address delays. Those action items are being implemented by the FAA and airlines are working with the FAA to review their impact. On September 2, the FAA announced the results of their evaluation, saying there were 11 general areas that have adversely impacted the national traffic management system. These observations by the FAA government team of their system clearly indicate why the users of the ATC system experienced horrendous delay problems this summer. A partial list of the more telling observations are as follows:

- **“There is less than the maximum efficient use of the National Airspace System.”**

This is the understatement of the summer.

- **“Severe Weather Avoidance Procedures (SWAP) are *slow* to be implemented and are *poorly* coordinated among field facilities. SWAP routes are lengthy and often confusing to flight crews and the second- and third-tier traffic management units (TMU).”**

This observation recognizes one of the main reasons why aircraft sit on the ground needlessly as happened in our July 31 example and many other times this summer.

- **“Throughout the system, traffic management (TM) initiatives are independently managed; these require national standardization. Areas that need to be standardized are implementation, validation, real-time management, and post review and analysis of TM events.”**

This lack of leadership on the part of the FAA to provide command and control over what appears to be a number of field facilities acting autonomously is obviously contrary to the necessary systems approach needed.

- **“The ATCSCC was delegated the authority only to direct traffic management. They should also be delegated the authority to implement air traffic restrictions and Severe Weather Avoidance Plan (SWAP) reroutes.”**

This is a key recommendation. Without the proper authority to execute command and control over system operation, chaos reigns.

- **“Reduced use of land and hold short operations (LAHSO) (fewer locations and more refusal of LAHSO clearances) and the increased (sic) of regional jet operations, has adversely impacted system capacity.”**

This is true. The revised procedures for LAHSO have impacted capacity at some locations. ATA and the FAA are working with ALPA to resolve some of the capacity issues that remain from the FAA’s April 15 implementation order.

The introduction of regional jets, now operating out of approximately 160 airports, has increased the total number of aircraft flying in high-altitude airspace where MIT are prevalent. Because the regional jets fly at a slower speed than conventional jet aircraft, they are being closed on from behind by faster aircraft, necessitating the controller to intervene more often and impacting workload. BUT, the FAA’s new miles-in-trail strategy is what exacerbates this problem. If the FAA system almost always requires aircraft to be in-trail (regardless of altitude separation) and very seldom uses ALTITUDE separation, aircraft will often close on others, although they are safely separated. The FAA must review MIT as a way of doing business and develop a strategy to handle regional jets in cooperation with the Air Transport Association and the Regional Airline Association.

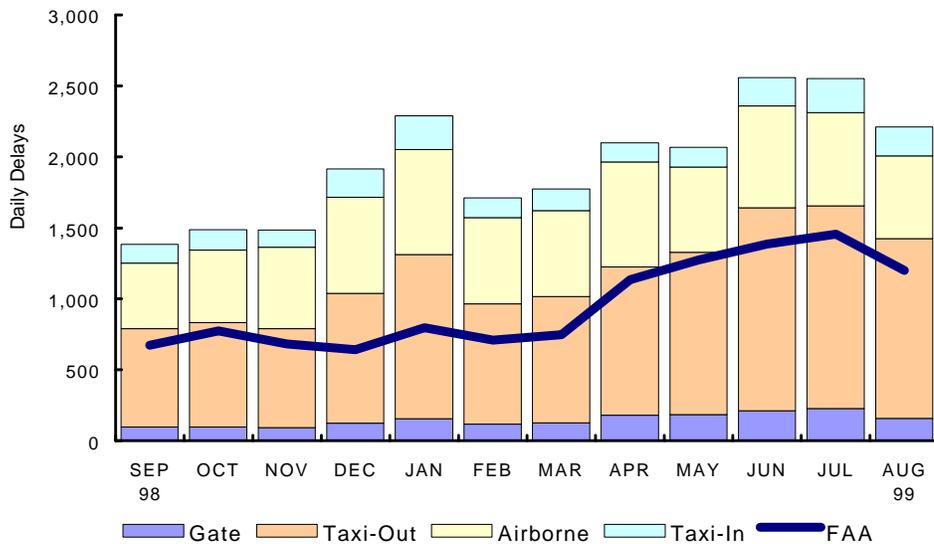
The Cost of Air Traffic Control Delays

The FAA collects data on daily air traffic control delays and keeps this information in a database called OPSNET. This data is based on controllers counting the number of aircraft that are delayed and is used to measure the magnitude of the delay problem. This system is subjective in nature and only counts aircraft that have been delayed fifteen minutes or longer; it also does not report the total amount of time lost to delays.

In order to collect information on the time lost to delays, major airlines report more detailed data to ATA, that includes information on the total amount of delay time. Carriers report this information for all ATC delays, including those that are less than 15 minutes. By gathering information on the total amount of time lost, it is possible to calculate the cost of delays to the airlines and their passengers.

Both the FAA data and ATA data are measuring the same problem. Chart 4 is a comparison between the FAA numbers and those generated by the airlines. Although the airline numbers are higher, because they look at a greater range of delays, clearly the trends are the same. Because this section of this report covers the cost of delays, and costs can only be generated from the total amount of delay time, we are using ATA rather than FAA data.

Chart 4
AVERAGE DAILY DELAYS
Comparison of FAA & Airline Reported Delays
(15 Minutes or More)



Source: FAA OPSNET and ATA data

ATA members report delay data in the four major phases of flight — gate, taxi-out, airborne, and taxi-in. As seen in the following table, the summer of 1999 had an average of 2,297 daily delays of fifteen minutes or more, with an average duration of nearly 32 minutes.

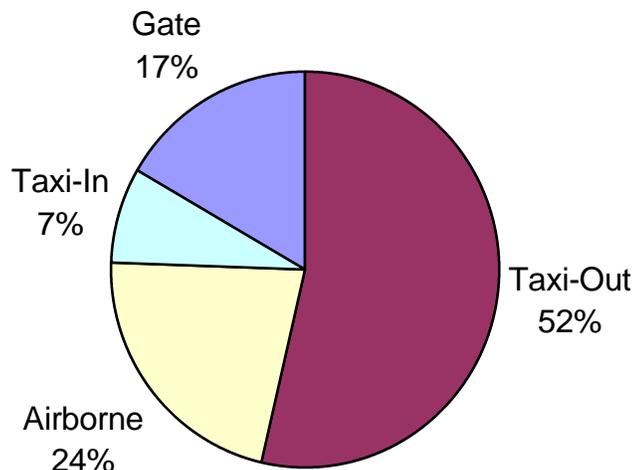
Table 3
Average Daily Air Traffic Control Delays
(15 Minutes or More)
 U.S. Major and National Carriers
 April – August 1999

Delay Type -----	Average Daily Events -----	Percent -----	Average Delay ----- (Minutes)
Gate	192	8.4	64.2
Taxi-Out	1,263	55.0	30.4
Airborne	658	28.6	26.3
Taxi-In	184	8.0	28.9
Total	2,297	100.0	31.9

About 30 to 35% of delays are caused by factors other than ATC problems and are not included in Table 3. Each airline, of course, is responsible for solutions to those company-caused delays which include aircraft delays caused by aircraft mechanical problems, the late arrival of aircraft (although this may have been caused by an earlier ATC problem), or crew time limitations.

As seen in Table 3, most of the delays during this past summer were concentrated in the taxi-out phase of flight; 55.0% of ATC delays occurred while moving from the gate to the runway. It is often necessary to clear the gate and incur a delay in the taxi-out phase of flight, so as not to jam up inbound traffic. Delays at the gate and during the taxi-in phase of flight are the smallest portion of total delays. Gate delays accounted for only 8.4% of the total. However, the average gate delay over 15 minutes, when incurred, was 64.2 minutes. These gate delays are the direct result of the FAA's "ground stop" program – a program that holds aircraft on the ground at their origin, if the FAA believes that weather or other ATC problems at the destination warrant that action. The high number of taxi-out delays, coupled with a 30.4 minute

Chart 5
Distribution of Delay Time
(15 Minutes or More)
ATA Member Delay Reporting Program
April - August 1999



average for all delays in that category, resulted in more than half of the total delay time being accumulated in that category (See Chart 5).

Using 1998 data for the operations of the U.S. air carriers, the average flight was 188 minutes, including 50 minutes at the gate. During this time at the gate, arriving passengers get off, baggage is unloaded, the interior of the aircraft is cleaned, fuel is put on board as well as food and other cabin supplies, routine maintenance is performed, and departing passengers and baggage are boarded. Table 4 shows the average flight profile and the total amount of ATC delay in each of the four phases of flight. The delay numbers are not limited to delays over 15 minutes, but include all ATC delay time.

Table 4
Typical Flight Profile
1998

Delay Type	Average Time (Minutes)	Delay Minutes Included	Delay Percentage
Gate	50	0.6	1.2
Taxi-Out	15	4.2	28.0
Airborne	116	2.3	2.0
Taxi-In	7	1.2	17.1
Total	188	8.3	4.4

Air traffic control delays are encountered in varying degrees at each stage of flight. For all departures in the U.S., on average, 8.3 minutes of the 188-minute flight and ground time total were for ATC delays. Because of the inefficiencies in the air transport system and the desire to improve customer service, the airlines have made a significant number of schedule adjustments, which have generally increased the typical flight profile, resulting in better on-time performance. However, better on-time performance and the appearance of reduced delays mask the inefficiencies of the airport and ATC system.

From Table 4, it can be seen that the taxi-out phase of flight is proportionately the most severely impacted by delays. Gate and airborne delays are a relatively small part of those phases of flight. However, airborne costs are considerably higher than those in any other phase of flight. Table 5, based on 1998 aircraft operating costs, shows the cost of ATC delays by stage of flight.

Table 5
1998 Cost of Delays
Aircraft Operating Costs Only
(Including Passenger Cabin Costs)

Delay Type	Cost per Hour	Daily Delay Hours	Daily Cost	Annual Cost
-----	-----	-----	-----	-----
Gate	1,399	182	254,000	92,710,000
Taxi-Out	1,787	1,384	2,474,200	903,083,000
Airborne	2,806	747	2,095,600	764,894,000
Taxi-In	1,746	397	693,900	253,273,500
 Total	 \$2,312	 2,710	 \$5,517,700	 \$2,013,960,500

The total added aircraft operating costs, due to ATC delays in 1998, was \$2 billion. Taxi-out delays, with high frequency of occurrence, generated \$903 million of that total airborne delays, with high per-minute costs, generated another \$765 million of the total. These numbers do not include any of the costs incurred on the ground. Added gates are required to accommodate delayed aircraft. Additional personnel are required to handle passengers on the ground and the delayed aircraft. A rough estimate for these additional costs has been set at \$850 million.

In the summer of 1999, delays soared to unprecedented levels. Table 6 shows the cost for ATC delays from April through August.

Table 6
Summer 1999 Cost of Delays
Aircraft Operating Costs Only
(Including Passenger Cabin Costs)

Delay Type	Cost per Hour	Daily Delay Hours	Daily Cost	1999 Summer Cost
-----	-----	-----	-----	-----
Gate	1,399	285	398,800	61,016,000
Taxi-Out	1,787	1,816	3,245,900	496,623,000
Airborne	2,806	765	2,146,300	328,384,000
Taxi-In	1,746	457	797,900	122,079,000
Total	\$2,312	3,323	\$6,588,900	\$1,008,102,000

During the summer of 1999, the airlines experienced significant increases in gate, taxi-out and taxi-in delays. The taxi-in delay increase was, no doubt, triggered by the increase in gate delays. With aircraft sitting at the gate, because of unnecessary ground stops and excessive MIT restrictions, there was no place to put arriving aircraft. Aircraft operating costs for delays during the summer amounted to \$1 billion. On an annualized basis, the figure would stand at \$2.4 billion, or an increase of about \$400 million over the 1998 annual level.

Using a conservative \$20 per hour as the value of a passenger's time, delays in 1998 costs air travelers about \$1.6 billion in lost time and productivity. Together, the cost of delays for aircraft operating costs, airline ground costs, and the value of passengers' time, in the U.S. soared to \$4.5 billion.

The Future

Both airlines and airline passengers were frustrated and angered by the massive increase in air traffic control delays during the summer of 1999. It cost both groups enormous sums of money and has inconvenienced millions of people. However, if the federal government does not move quickly to fix its broken air traffic control system, future delays will be even worse. The FAA must begin managing its air traffic control system more effectively, so that the delays they initiate are necessary and not simply the result of a system unable to respond to events such as bad weather that fails to materialize. The government must also step up the pace of ATC modernization; as we enter the new millennium, a 1970 air traffic control system is no longer acceptable to anyone. We need an ATC system that operates at 100% efficiency, 100% of the time.

The demand for air travel continues to grow at a pace that is greater than the growth of the total U.S. economy. The FAA, in its 1999-2010 forecast, projects that the number of passengers will increase by 43% by 2008. With more Americans flying, the number of aircraft needed to accommodate this demand, is projected to increase by 2,500 jets. In 2008, the U.S. commercial fleet will have grown from 5,236 in 1998 to 7,737.

In a recent study conducted by a major airline, it was calculated that ATC delays would increase dramatically, without an immediate and major effort to modernize the FAA's ATC system. It was calculated that the average length of an en-route delay by 2008 would increase by 75% and that terminal delays would increase by 114%. This level of delays would cost the airlines \$6.9 billion annually in aircraft operating costs that could be passed along to the consumer. This represents more than a tripling of operating costs associated with ATC delays, from the \$2 billion from 1998. Daily delay hours would increase by 250%, from 2,710 in 1998, to 9,605 hours in 2008.

The FAA's system is broken. If it is not fixed, the resulting delays will virtually eliminate the dependability of airline schedules and the system will descend into gridlock. The hub-and-spoke system will falter and small communities now served by that system will, more and more, be excluded from access to a vital network of air transportation. Gridlock-induced costs will drive up the cost of air service, making air travel expensive and out of reach for all but the well-to-do.

ATA airlines consider the enactment of the spending and management reforms of *Air 21* to be a critical component of any realistic delay-reduction program – including provisions for establishing a businesslike structure to oversee daily operations of the ATC system. The short-term action steps to ease delays that were initiated following the joint FAA/industry evaluation are only a beginning. We continue to meet with the FAA to track progress on the initiatives developed in our August meeting with Administrator Garvey. Concerns remain regarding efficient use of the National Airspace System, poorly coordinated weather procedures, lack of standardization, delegation of authority and inappropriate capacity management procedures.

The stakes are high for air traffic control reform and the FAA must move quickly to avoid a repeat of the summer of 1999. Immediate action is required – to modernize an air traffic control system that will enable airlines to continue to provide passengers with the safest and most efficient mode of transportation in the world.