

## Datalink Focus Group Issues

### ATC Delay

1. The ATC delay of 40 minutes per/flight seems too high.

Several people have commented that 40 minutes seems too high, but as of yet we do not have any data to substantiate a lower number. The 40 minutes came from Margaret Kim of ATA. Joe Sinnott (MITRE) said that he would talk to Margaret to understand how the delay numbers were derived, and to see if he can reconcile that with his intuition that delay is actually lower. The data provided by Margaret are delays from optimum (not scheduled) and are all considered "ATC" delay. ATA delay numbers are reported to them by their members (77% reporting).

#### Average delay in minutes (based on 1996 data):

Gate 19.54

Taxi out 8.30

Airborne 7.71

Taxi in 3.54

Airborne delay is computed based on actual flight time compared either to computer-projected flight time or estimated time enroute filed in the flight plan for the conditions at time of flight. Taxi-in and taxi-out delay is computed based on actual vs. standard time for that carrier, that equipment, and that airport. Gate delays are actual delays experienced after ready to depart.

### Equipage Assumptions

Recommendation: Accept the premise that all flights receive equal delay reduction (no preferential treatment for equipped flights), but delay reduction vs. equipage level takes the form of an S-curve, as discussed below.

2. Equipage vs. Benefits

From Rob Mead:

- > All that said, I believe your general conclusion is correct. Benefits and equipage will not have a linear relationship. Below a certain equipage level (e.g. 20% ??), controllers will not be able to maintain proficiency and datalink will show a workload increase, not a decrease.
- > Once at that certain level I \*believe\* that you will see a rapid increase in the benefits until another equipage level (e.g. 70% ??), after which the benefits increase will tail off (i.e. a curve more like your figure 4).
- > What is needed is a series of real-time simulations similar to the Atlanta Study, covering two or three more airspace types and different equipage levels in each (certainly less than 90%).
- > We will be doing something similar for fast-time sim's, but equipage levels especially are very difficult to get an accurate feel for unless you put them behind the glass for controllers to see and feel.
- > An iterative program would resolve it (fast-time > real-time > fast-time), but I don't believe there are any plans for that (is there time for it??).

This seems like a reasonable way to model the relationship, where we'd have the following uncertainties (I'm just guessing at the ranges):

Minimum equipage level for controller proficiency: 20-50%

Benefits equipage relationship: we could vary this, something like the 3 curves that we have now

Cutoff equipage level for maximum benefit: 70-90%  
Benefits Equipage relationship: another set of curves.

3. Do non-equipped flights receive the same delay reduction as equipped flights?

Joe Sinnott thinks that the controller will be able to handle both airplanes better (equipped vs. non-equipped), thus all will benefit. Jim Simpkins thinks that all airplanes benefit equally if the assumption is that a reduction in voice congestion is the reason for benefits.

This begs the question of preferential treatment for equipped airplanes. What assumptions do we want to make?

4. Will airlines equip only part of their fleet (e.g. forward fit only)

If we accept the premise that both equipped and non-equipped flights see delay reduction benefits, Brad Loomis wonders if an airline would equip only part of its fleet. My feeling is that this would not be the case (Rob Mead seems to back me up), but we need airline input on this one.

From Rob Mead:

- > It is very much like equipping 20% of an airline's fleet type, then
- > expecting aircrew to be fully proficient each time they step on an
- > equipped aircraft having flown non-equipped aircraft for the last month.
- > Basically, you will get thrown off the floor before you get started; an
- > airline wouldn't even consider it.

5. Should we run the model for a hub airline?

The business case might make the most sense for a single dominant airline at a hub. Should we consider running the model under this scenario? This might convince the "big" airlines to equip and would eventually drive equipage for the others.

6. Airline equipage for AOC

Source: Jim Simpkins, MITRE. Are you treating AOC equipage and ATC equipage as the same? It seems possible that some planes will be equipped with VDL-2 for AOC only and some will be equipped with VDL-2 for both AOC and ATC. For example, it might make sense to equip some older aircraft with VDL-2 for AOC but not ATC due to human factors requirements and the age/design of the cockpit. Do you want to consider this as well?

#### Retrofit and Payback Period

7. How do we handle NEXCOM and VDL-3

Source: Norm Fujisaki and Brad Loomis, FAA. Norm and Brad are wondering if we need to factor in retrofit/forward fit of VDL-3 based on the FAA's plans. They think that VDL-2 retrofit would not go out to 2015, but would stop when VDL-3 is available.

Would VDL-2 fleet continue to accrue benefits after VDL-2 infrastructure implementation? My position is that there are too many uncertainties in VDL-3 schedule/requirements, and we don't know how VDL-2 implementation may affect requirements for VDL-3.

8. Benefits cut off at 2015

Source: Steve Glickman, Boeing. Big benefits are achieved towards the end of the analysis timeframe (2015). Airplanes that equip will see benefits longer than that. Do we want to extend the time frame of the analysis to show better ROI?

9. Payback Period, high cost of retrofit

Source: Jean-Luc Bersat, Airbus. Because of the large retrofit costs, the business case is not at all attractive, with payback in 10 to 14 yrs. Could we not show also what it is for new aircraft? This might help start the process (although I can see the difficulty of mixed fleets).

#### Questionable Modeling Assumptions

10. Estimation of en-route delay savings

Source: Jean-Luc Bersat, Airbus. Use of Atlanta study. I fully support it. However, if we want to extrapolate the numbers to the whole domestic US, we must be able to justify that the ATL sectors are average in the US.

We took the extrapolated minutes of delay savings and divided it by the number of departures in the NAS to obtain an average minute of delay savings per flight. The FAA extrapolation is questionable, but we have put a range on the variable that should account for uncertainties in the extrapolation.

11. Growth in Delay

Model is currently using 7%/year. This number was derived from Russ' white paper. It should be noted that typical delay growth numbers tend to mask block time creep. This seems high to some. FAA suggested including a statement to the effect that this is a high delay growth rate, but takes into account unmet traffic growth, i.e. flights not scheduled due to insufficient system capacity.

12. ATM Costs are not modeled

Source: Philippe Enaud, Eurocontrol. My response is that this analysis is from a US airline point of view, so ATM costs are not needed. If the analysis were to be done for European airspace we would want to include ATM costs because of user charges. Also, if the analysis were to be done from the FAA point of view we would include those costs.

13. Inflation and discount rate

Source: Jim Simpkins, MITRE, EJ Spear, MITRE. I've heard that the actual inflation rates today are much lower. Do you perform a sensitivity analysis (or provide a range) for the inflation rate? I guess 3.5% is conservative, but is it too conservative?

#### Modeling and Reporting Process

14. Cost inputs cannot be released (also AOC savings)

Source: Henk Hof, Eurocontrol, Jim Simpkins, MITRE. What are the assumed type of a/c, avionics? Can a cost breakdown be included? Since this are the most significant costs, a more detailed foundation should be given .

15. Model outputs come in many forms

Source: Boeing. Do the airlines want to see cash flow summaries, NPV, ROI, or something else? We'd like to provide the charts that have the most meaning. If we provide too many different kinds of summary charts the message gets lost and it becomes more difficult to re-run the model. Jean-Luc asked for cashflow curves for the three equippage vs. delay reduction curves