Rapporteur: Midori Tanino~~, FAA~~
Session Chair: Nicolas Durand
~~, DSNA~~

Papers and Analysis
For the ATM2011 seminar, we received seven papers in the Network and Strategic Traffic Flow Optimization category and have accepted three papers for this session. Note that this category received fourteen papers in the ATM2009 seminar, with eight acceptances. We believe that Network and Strategic Traffic Flow Optimization is a very important category and we hope to receive more papers for the ATM2013 seminar. Among three papers accepted, one is an extension from the ATM2009 seminar. Continuation of work is part of the goal of the ATM seminar and this is a positive sign. Three papers addressed different models; 4D-trajectory optimization model, Game-theoretic model, and an Airspace Flow Program (AFP) collaboration model. 4D-trajectory and collaboration with users are both key elements of NextGen and SESAR.

Paper 157: Combining Flight Level Allocation with Ground Holding to Optimize 4D-Deconfliction was presented by Cyril Allignol of DSNA

This paper is a nice extension of the previous work, "4D-Trajectory Deconfliction Through Departure Time Adjustment" from ATM2009. The model, rather than trying to respect sector capacity constraints, looked at each possible conflicting situation between any two aircraft and imposed adjustments of flight level and departure times to keep them separated. This model handled very large scale combinational problem using constraint programming and produced optimal solutions under certain assumptions, such as, aircraft can precisely follow their planned 4D-trajactories. It was pointed out that the airport capacity constraint was not considered, and that airport capacity constraints are often the problem than the enroute congestion constraints. Additional comments are provided to enhance the model by considering factors such as capability differences among aircraft types and wind factors. The stability of the model was questioned since this model uses the finest grain (conflict) approach with sliding time window to address uncertainty. It was voiced that the aggregate model using capacity sector might be better suited to address uncertainty. In the conclusion part of the briefing/paper as well as the question and answer session, the presenter acknowledged that adding robustness to the model towards uncertainty on the take off times is an important next step.

Paper 45: A Multi-stakeholder Evaluation of Strategic Slot Allocation Schemes under Airline Frequency Competition was presented by Vikrant Vaze, MIT

This was a very interesting and important paper that attempted to tie slot allocation policy to the profitability using a game-theoretic model. The conclusion of the paper states that a small reduction in the total number of allocated slots translates into a substantial reduction in flight and passenger delays. This claim reveals considerable improvement in the airlines' profits and may be a surprise to airlines and ATM community especially since regulation can improve the bottom line. The result could have a big implication for NextGen/SESAR policymaking. The airport studied for this paper was New York LaGuradia (LGA) using number of passengers, number of flights and total arrival delays to flights. The model is based on the S-shaped relationship between market share and frequency share of an airline and is solved for a Nash equilibrium. The number of flights in 2010 is about 16% less than that of 2007. This reduction on slots (number of flights) and associated reduction on delay in 2010 data supported this game-theoretic model. It was pointed out that all slots do not have equal

value; some slots are more favorable than others. The presenter replied that the arrival slot demand at LGA is relatively flat throughout the day and acknowledged that many other airports have peak arrival times. It was mentioned that the airlines with smaller aircraft get different impact than the airlines with larger aircraft. It was also pointed out that airlines are quick learners and they may come back with some unknown creative strategy to take advantage of the new slot allocation policy.

Quote by Amedeo Odoni: "Users do not always know what is good for them."

Paper 123: Collaborative Approaches to the Application of Enroute Traffic Management Optimization Models was presented by Charles Glover, University of Maryland

This paper described two approaches to embed the "collaborative" activities into the stochastic traffic flow optimization model in response to predicted congestion in the enroute airspace. The model relaxes the implicit assumption that the optimization is performed globally by the ANSP, and instead models the decisions that might be made by each independent carrier, in a CDM–enabled environment. It was voiced that the airlines have its own business models, makes business decisions, and that the Ganji-Glover model used in this paper may not be appropriate representation of "collaboration". It was also pointed that the handling of weather as a static event with some predetermined weather event may not be realistic. It was suggested that a ration-by-distance algorithm might be better suited than the ration-by-schedule algorithm to model enroute weather events.