

A Quick Forecast Tool (QuickCAST)

Objective

- Build a tool that can quickly measure the economic impact of retiming flights
- Tool must have ability to retime flights, measure profit change, and meet operational and fleet size limits quickly

Description

- Whenever a flight is re-timed, the O & D services (ODS) it can serve may change due to losing existing connections or gaining new connections. Moreover, since its departure and/or arrival time is changed, the QSI of existing O &D services will also be altered. All these imply economic impact on the re-timed flight decision when selecting candidate. Calculating the exact economic impact of each re-timed candidate is theoretically possible, but very time consuming if not done intelligently.
- QuickCAST is a computationally efficient method to provide a good approximation of such economic impact.

QuickCAST Methodology

- A “Full” forecast is completed and stays in memory:
 - Network Constructor, QSI Market Share, and Revenue data
- After all re-time candidates are generated, a new algorithm is invoked. Algorithm processes all re-time candidates, and figures out any lost connections (ODS), any new connections, and the (new) QSI values of all ODS it served. At the end, an updated set of ODS is generated for the re-time candidate with the new demand estimation of each ODS. Then, a heuristic is used to estimate the observed passenger, observed revenue, and revenue with up/down for the candidate. Finally, the profit number of the candidate is calculated and used for optimization of the schedule.

QuickCAST Heuristic Applied

- QuickCAST demand is converted to observed economic values by heuristic and approximation
- QUICK leg Traffic = QUICK leg Demand via Gamma Spill
- QUICK onboard Revenue = QUICK demand Revenue (Original full forecast onboard Revenue)
- QUICK up/down Revenue = Average of two methods for estimating up/down Rev : Original full forecast observed/demand ratio and QUICK observed/demand ratio
- QUICK up/down Capacity Cost = Average two methods for estimating UDCC: Original full forecast up/down Capacity Cost and QUICK observed/demand ratio

QuickCAST Usage

- A better estimation of profit for Re-time candidates
 - Significantly improves schedule profit by retiming according to economic criteria
 - Intelligently restores aircraft count even when future period block times are applied to a current “in-count” schedule
- Flight Pattern Generation:
 - Identify poorly-directed flights
 - Works in tandem with Displacement to optimize connect revenue while preserving flight separation and pattern of service

QuickCAST Inputs

- A Completed original Full Forecast
- Operational Constraints
 - Gate counts, Aircraft counts, Curfew, Block Times, MCT, etc
- List of Stations
- Retime Parameters

QuickCAST Inputs

Stations

- When QuickCAST is turned on, the user must supply a list of stations for consideration of building new connections whenever there are such opportunities. This list of stations can consist of all hubs, or other important stations with lots of passenger connections.

Flight Re-time Parameters

- Flight re-time parameters such as number of candidates, maximum and minimum re-time penalty, maximum re-time minutes, shape of re-time penalty curve, re-time exemptions, and station specific re-time parameters are all inputs that need to be part of the tool

QuickCAST – Parameter Inputs

- Flight Re-time Parameter (Example)

Name	QuickCAST TEST iNPUTS
Freq	MTWTFSS
Max Pos-time Window	240 Minutes
Max Neg-time Window	240 Minutes
Pos. Penalty Rule	0
Neg. Penalty Rule	0
Max # Pos Candidate	48
Max # Neg Candidate	48
Max Pos. Penalty	0
Max Neg. Penalty	0
Min Pos. Penalty	0
Min Neg. Penalty	0
Station File	HUB
Retime Exception	XXX
Revenue Threshold	10