

Mid-Term TFM Weather Integration Activities

Presentation to: FPAW
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Date:

Graphics provided by: MIT Lincoln Laboratory and
MITRE CAASD



Federal Aviation
Administration



Overview

- Prototype evaluations – Weather Integrated DSTs
 - SFO GDP Parameters Selection Model (GPSM)
 - Integrated Departure Route Planning (IDRP)



Background: GPSM...

- Software prototype designed to provide guidance to decision makers in selecting GDP parameters at SFO during summer stratus events
- Calculates recommended GDP parameters for SFO based on existing marine stratus forecast tool & TFMS demand:
 - Start time
 - End time
 - Airport acceptance rate (AAR)
 - Scope
- Engineering evaluation conducted in 2010 severe weather season
 - GPSM was assessed for 59 stratus GDPs
 - **16%** ground delay reduction vs. actual GDPs from 2010



2011 GPSM Evaluation

- Joint effort between NASA & AJR-4
- Evaluation plan for 2011 stratus season
 - Phase 1: Shadow evaluation (current)
 - Phase 2: Operational evaluation
- Primary goals:
 - Determine validity of GPSM GDP parameter recommendations and potential benefits in real-time operational conditions
 - Identify new desired functionality and refine existing functionality in response to user feedback and model analysis



GPSM Recommendation Table

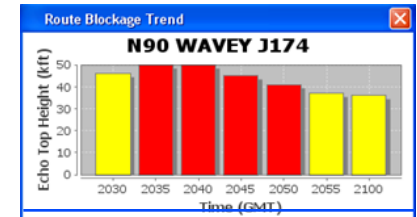
17Z GDP RECOMMENDATIONS					
17Z Consensus Forecast			-> Clear at 18:04 GMT		[GOOD]
Traffic Data		17:25 GMT			
		Current	Alt-1	Primary	Alt-2
Start Time		16:00	16:25	16:25	16:25
End Time		19:14	18:14	18:29	18:44
Scope		1200 m	1000 m	1000 m	600 m
AAR	45 @ 60 @	n/a n/a	n/a 18:15	n/a 18:30	n/a 18:45
Risk Assessment					
Probability GDP End before clearing		8.0%	15.3%	13.1%	10.1%
Probability GDP End before clearing -30 min		4.6%	10.1%	7.0%	6.1%
Probability GDP End before clearing -60 min		1.4%	4.1%	2.6%	1.7%
CEDES – Probability Exceed Max Hold/Diversion		1% / 0%	9% / 5%	6% / 1%	2% / 0%
PYE - Probability Exceed Max Hold/Diversion		1% / 0%	5% / 2%	3% / 0%	1% / 0%
PIRAT - Probability Exceed Max Hold/Diversion		0% / 0%	0% / 0%	0% / 0%	0% / 0%
SKUNK - Probability Exceed Max Hold/Diversion		0% / 0%	4% / 1%	2% / 0%	1% / 0%
Delay Impact					
Number of affected flights		48	29	33	31
Max Ground Delay		123	103	90	97
Total Ground Delay		2,129	1,254	1,399	1,887
Average Ground Delay		44.4	43.2	42.4	60.9
Expected Airborne Holding		138	643	351	206



Background: IDRP Phase 1 = RAPT + Aggregate Demand

- Route Availability Planning Tool (RAPT)

Route	Trend	PIG	2100	2105	2110	2115	2120	2125	2130
N90 HAPIE	—	110							
N90 MERIT	—		33 N90	32 N90	31 N90	31 N90	31 N90	31 N90	31 N90
N90 GREKI CAM	▲		31 N90	31 N90	31 N90	31 N90	31 N90	33 N90	31 N90
N90 GAYEL J95	▼		37 NEAR	37 NEAR	36 NEAR	42 NEAR	42 NEAR	42 NEAR	34 NEAR
N90 COATE J36	—		31 N90	31 N90	33 N90	27 NEAR	37 N90	34 N90	33 N90
N90 ELIOT J60	—		38 ENR	38 ENR	39 ENR	38 ENR	39 ENR	39 ENR	40 N90
N90 ELIOT J64	—					39 N90	40 N90	28 NEAR	40 N90
N90 ELIOT J80	—					39 N90	40 N90	36 N90	40 N90
N90 PARKE J6	—		33 N90	33 N90	43 NEAR	39 N90	44 N90	34 N90	44 N90
N90 LANNA J48	—		44 NEAR	44 NEAR	44 NEAR	44 NEAR	32 N90	29 N90	32 N90
N90 BIGGY J75	—		40 N90	45 N90	32 NEAR	38 N90	41 N90	39 N90	31 N90
N90 WHITE J209	—		40 NEAR	39 NEAR	40 NEAR	41 NEAR	47 NEAR	42 NEAR	43 NEAR
N90 WAVEY J174	▲		36 NEAR	36 NEAR	35 NEAR	36 NEAR	35 NEAR	36 NEAR	34 NEAR



- Aggregate Route and Fix Demand Forecasts

Route	Demand
N90 HAPIE	3
N90 MERIT	4 2
N90 GREKI CAM	
N90 GAYEL J95	4 1
N90 COATE J36	6
N90 ELIOT J60	2
N90 ELIOT J64	2
N90 ELIOT J80	3
N90 PARKE J6	6
N90 LANNA J48	4
N90 BIGGY J75	3 2
N90 WHITE J79	2
N90 WAVEY J174	

•Fix	1655	1710	1725	1740	TOTAL
ELIOT	3	6	7	4	20
PARKE	2	4	8	3	17
LANNA	8	4	2		14
BIGGY	2	5			7
RBV	2	1	2	6	11



IDRP Phase 2

- Primary New Functions:
 - Demand count flight lists

ELIOT, 1815-1914Z										x	
<input type="button" value="Configure"/>	<input type="checkbox"/> Dynamic			Current: 1823Z				Last updated: 1822Z			
ACID	DEP	ARR	ETD▲	TYPE	ALT	FIX	DEMAND	WX	ROUTE	▲	
N7094B	HPN	MDW	C 1828	F900	280	ELIOT	1/12		HPN ELIOT J60 GSH GSH4		
EJA413	TEB	MDW	C 1833	GLF4	300	ELIOT	5/12	32 ENR	TEB ELIOT J60 GSH GSH4	≡	
N1007C	MMU	TEX	P 1835	LJ35	360	ELIOT	5/12		MMU ELIOT ETX RAV J64		
CHQ5317	EWR	STL	P 1836	E135	380	ELIOT	5/12	32 ENR	EWR ELIOT J80 KIPPI J80		
DAL6297	LGA	IND	P 1839	B763	320	ELIOT	5/12	28 ENR	LGA ELIOT Q42 HIDON RC		

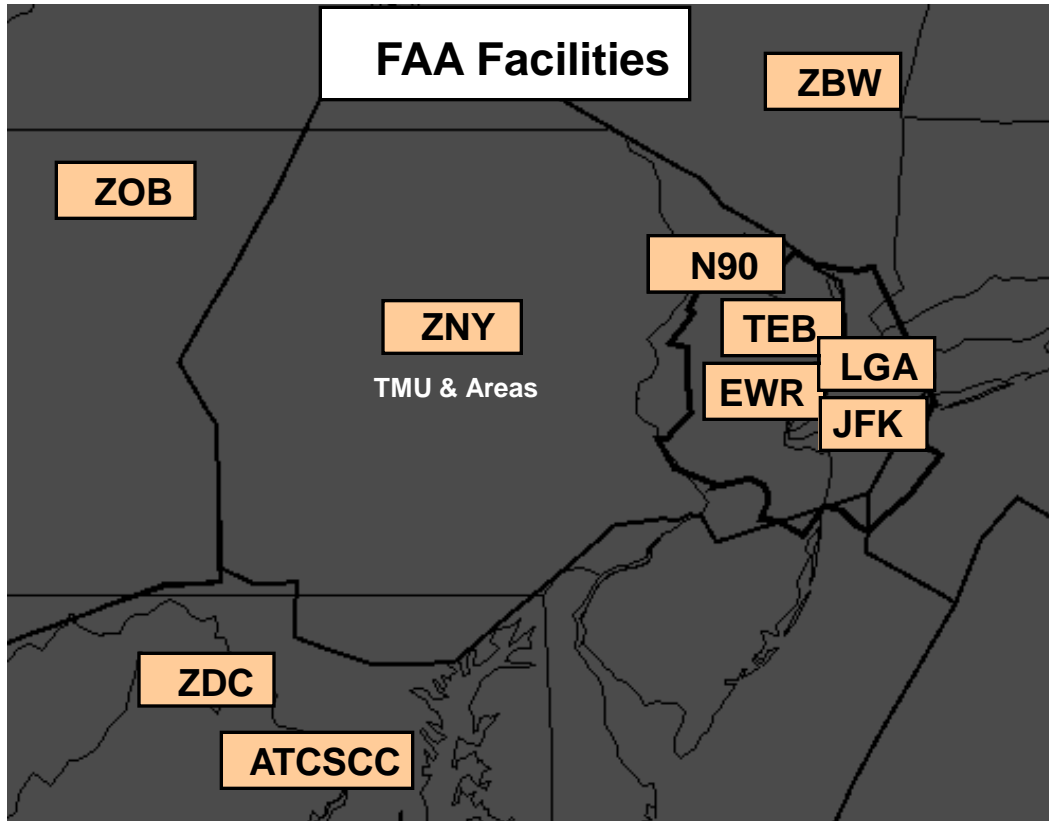
- Route options with metrics

CHQ5317, EWR-STL, P1836 - ELIOT, 1815-1914Z												x
OPTION NAME	ROUTE	Coord Req'd	Fix Demand	Extra Fly Time ▲	Departure Time							
					1810	1815	1820	1825	1830	1835	1840	
As filed	ELIOT J80		5/12	0:00								
EWRSTLJ6	PARKE J6		4/17	0:01								
EWTSTL64	ELIOT J64	Y	5/12	0:02								
EWRSTL60	ELIOT J60	Y	5/12	0:04								
EWRSTLFN	COATE J36	Y	3/15	0:06								
EWRSTLCA	GREKI CAM	Y	0/0	0:15								

- Enhancement of wheels-off predictions with ASDE-X



IDRP Users

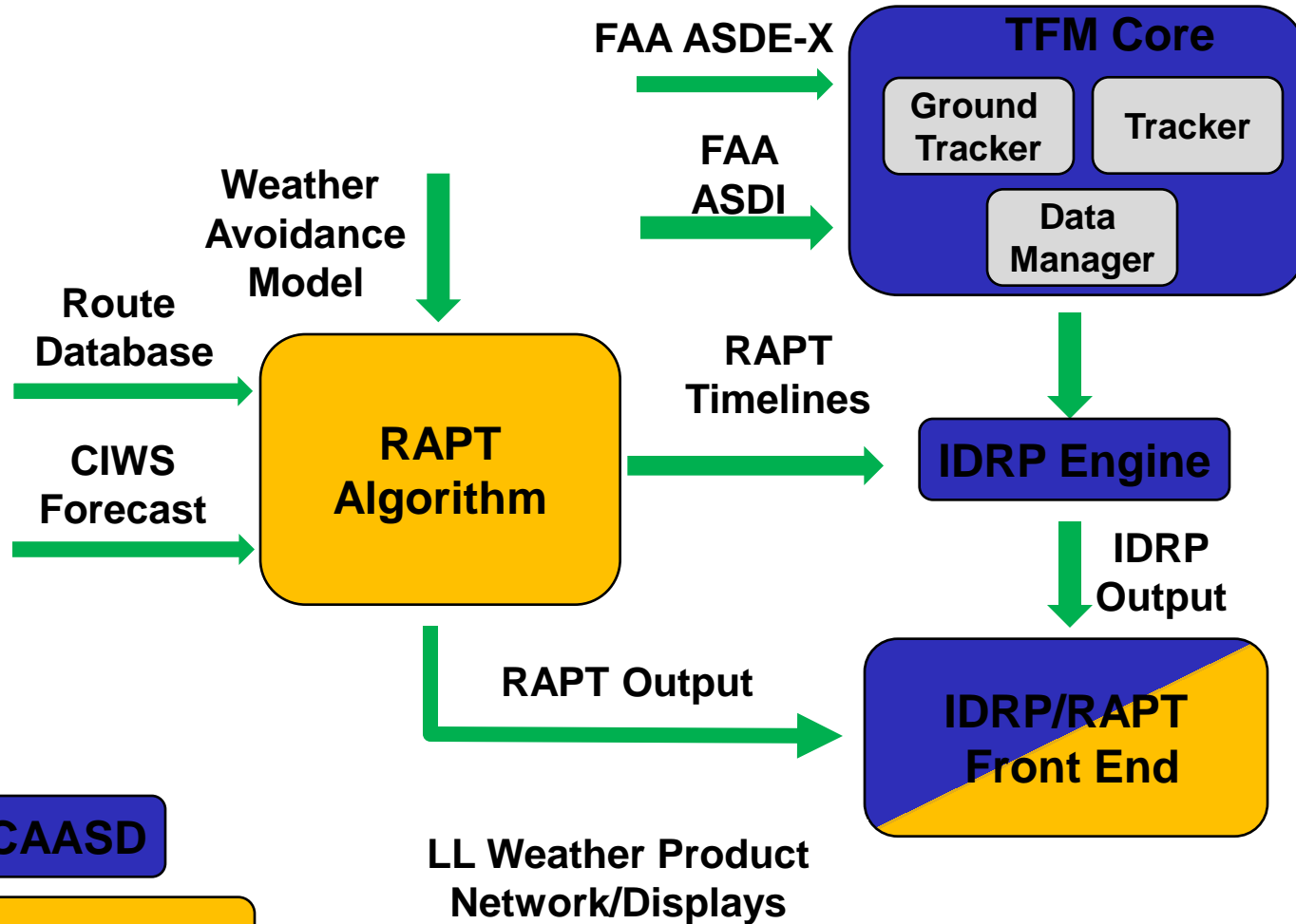


ZBW, ZDC, ZOB: IDRP in TMU and Areas adjacent to ZNY



Federal Aviation
Administration

MITRE / LL Collaboration



MITRE CAASD

Lincoln Laboratory

LL Weather Product
Network/Displays



Federal Aviation
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Summary of Expected Prototype Benefits

- GPSM
 - Reduce ground delay during SFO GDPs through:
 - Recommendation & presentation of GDP parameters
 - Quantification & presentation of uncertainty in terms of impact to the NAS
- IDRPs
 - Improve operational efficiency, predictability and coordination
 - Enable more effective utilization of departure capacity
 - Reduction of departure delay



Questions?...

