

Collaborative Departure Queue Management for Reduction of Fuel Usage and Emissions

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Collaborative Departure Queue Management

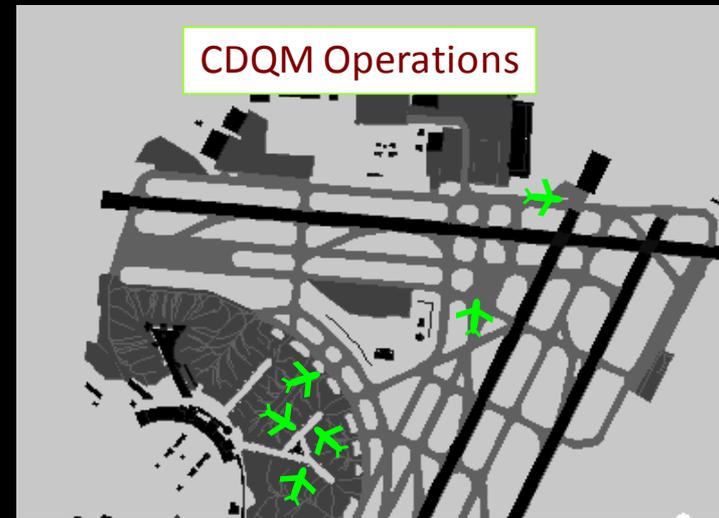
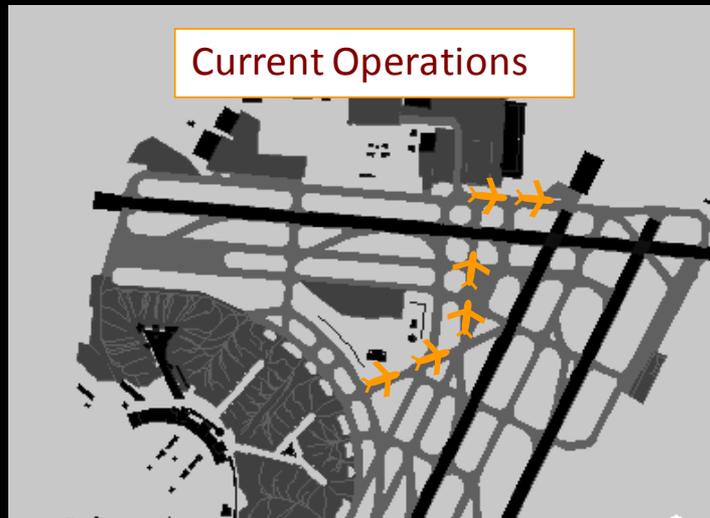
- Plan Departure Operations to Take Required Delay at the Parking Gate
- Take Delay Here Not Here



- Reduce
 - Fuel Burn
 - Operating Costs
 - Emissions
 - Congestion

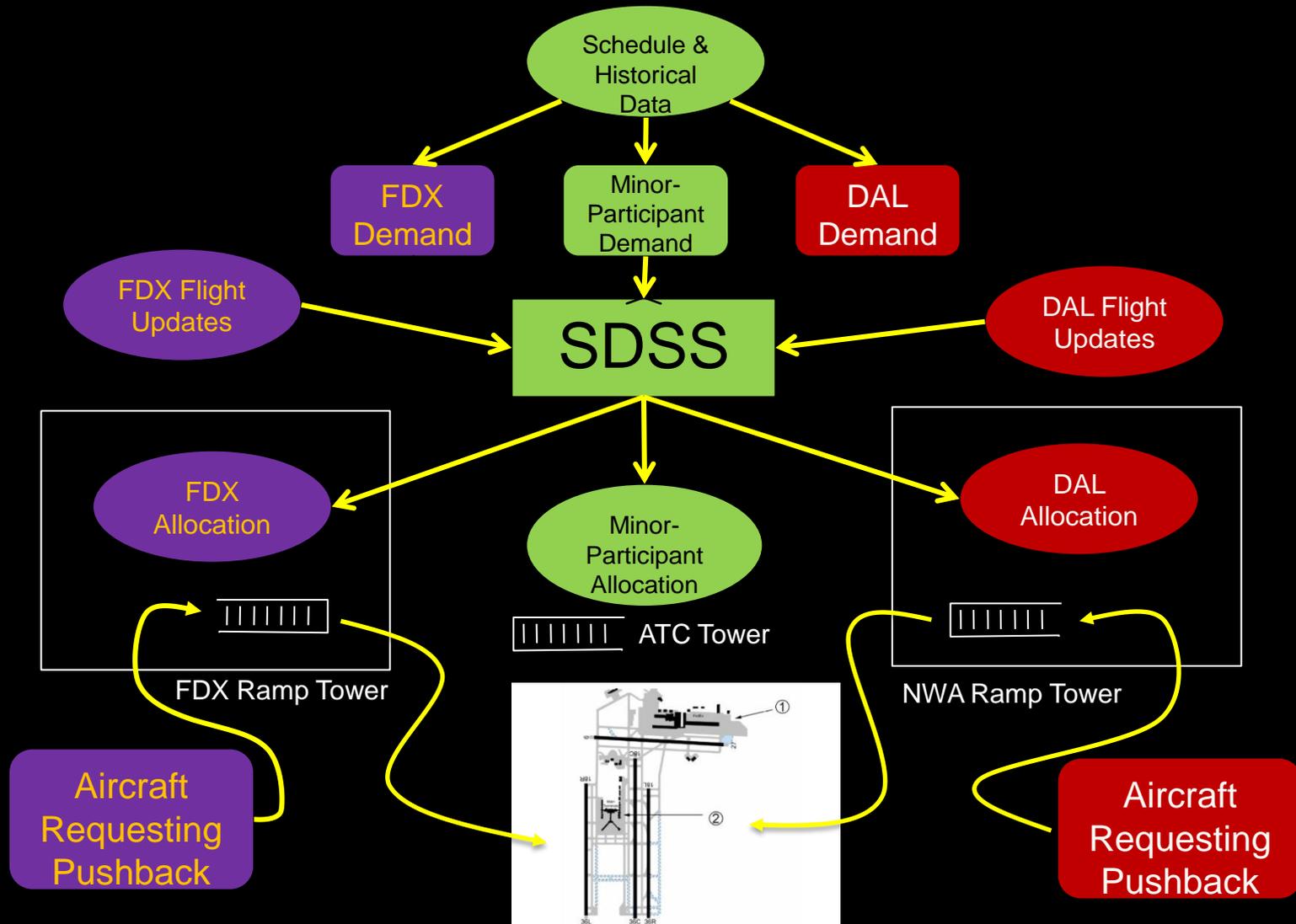
CDQM Conceptual Approach

- Just-in-Time Delivery of Departure Flights to Runway
 - Initial Steps Toward 4-D Trajectory Operations on the Airport Surface
- Departure Capacity is Allocated to Each Flight Operator
 - Flight Operators Push-Back Flights and Start Taxi to Meet the Allocation



CDQM Conceptual Approach

- Aggregate Departure Allocations are Computed with the Objectives:
 - Ensure Constant Pressure on the Runway when Demand Exists
 - Minimize the Amount of Queue Waiting Time
 - Subject to Minimum Engine Run Time Before Take-Off Power Can be Applied
 - Maintain Robustness to Uncertainties



CDQM Tower Display

CDQM Display - 18:12 GMT

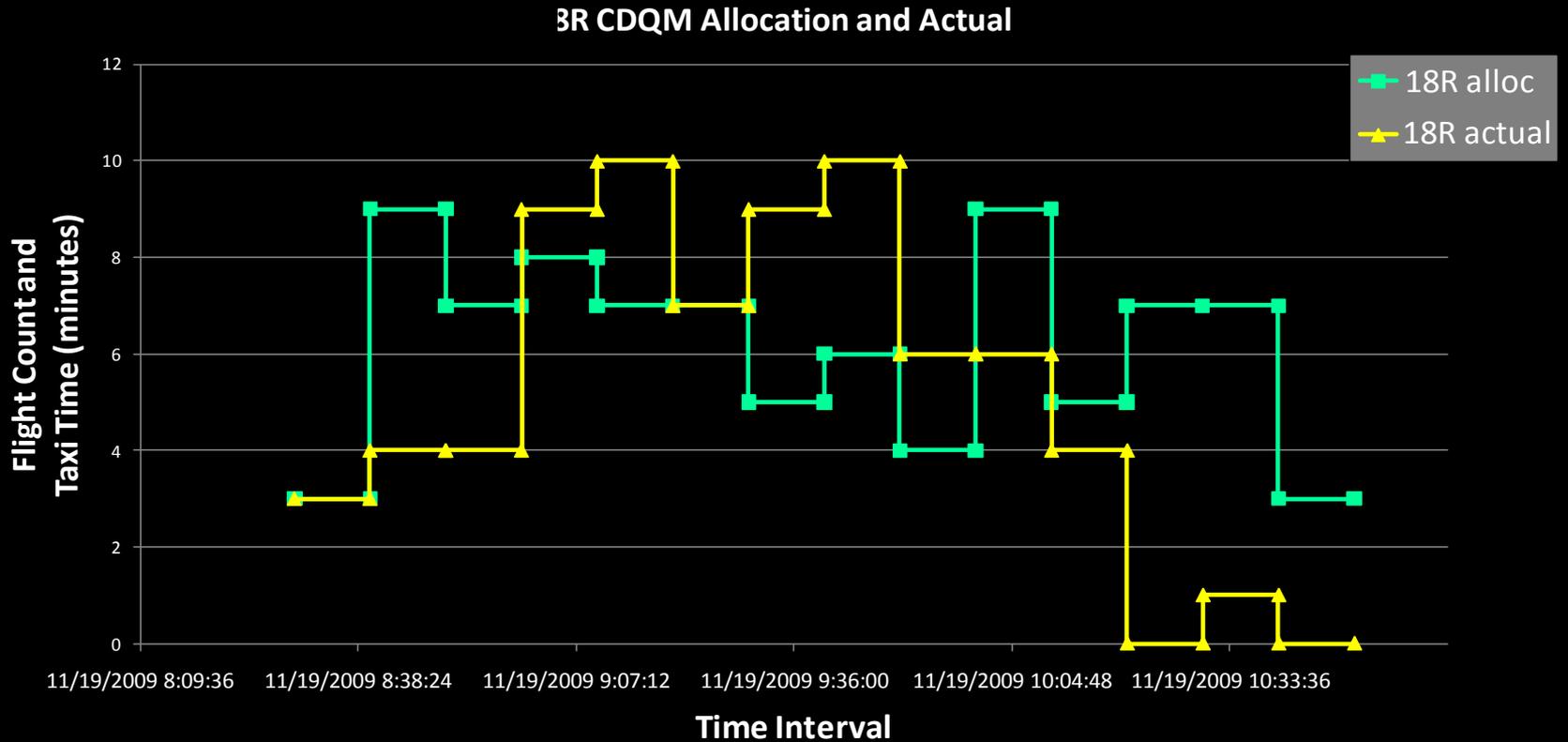
Pending					Ramp Holding					
PgUp					PgDn					
Up					Dn					
N4FE	0000	0			ASH2660 0000 0					Taxi
LJ45	WIL_...	N29/W	PIT	36R	CRJ9 C10 FV2/C CLT 36R					
ELVIS18	1062	0			WAK2112 0000 0					Taxi
C5	WIL_...	ER1/W	AEX	36R	PC12 WIL_... MR1/W JBR 36R					
N80CJ	1601	0			AMA Holding					
C501	WIL_...	FV1/W	JVY	36L	PgUp PgDn Up Dn					

ACID	N4FE	TAXI ROUTE	-	Metering Status
TYPE	LJ45	EDCT	-	36L Out of Metering 36R Out of Metering 27 Out of Metering
REV	-	GATE	WIL_G_26	
CID	-	APRO	-	
		RALT	31000	
BCR	0000	DEPARTURE ROUTE	N29/W	
PDT	1810	DEST	PIT	

CDQM Operational Field Testing

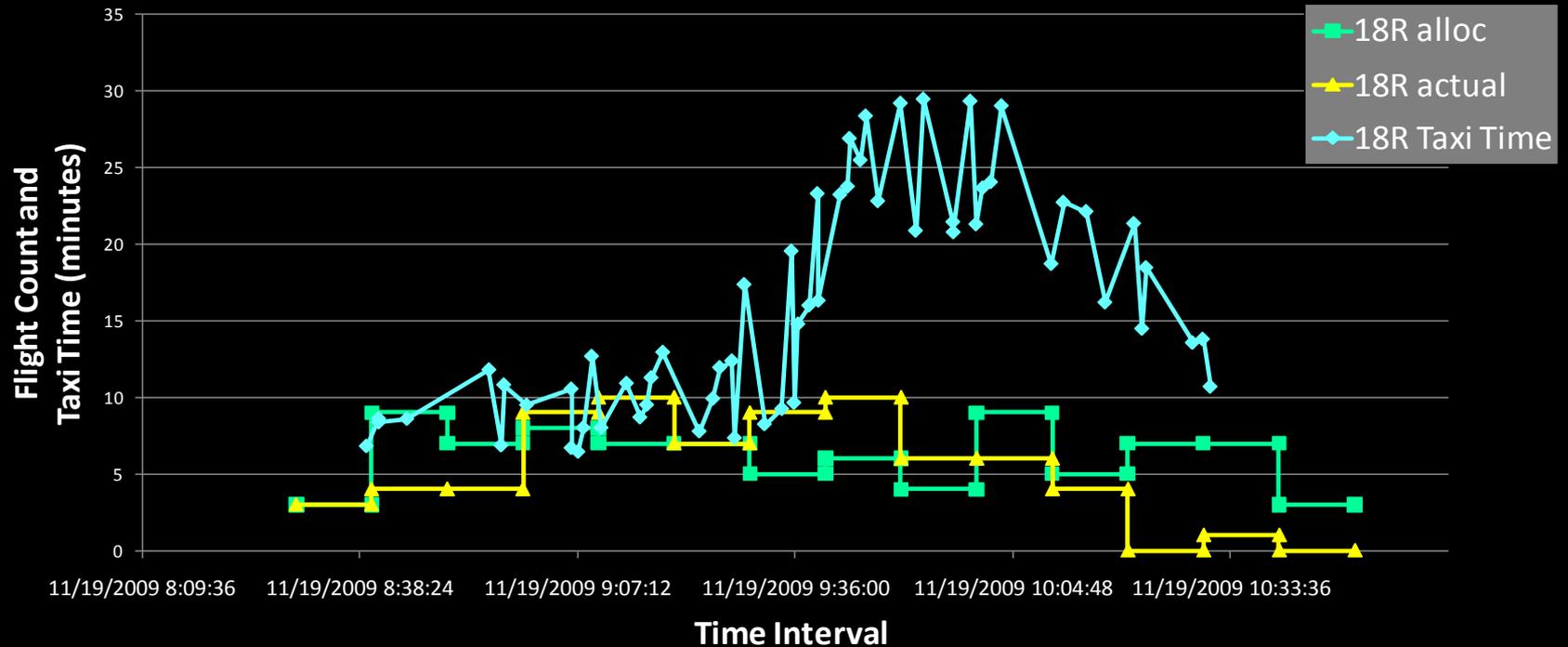
- Initial Operational Tests of CDQM were Conducted at the Memphis, Tennessee International Airport in September and November, 2009
 - Operations Limited to the FedEx Ramp Tower During the Overnight Departure Launch
- Further Operational Tests of CDQM have been Conducted at MEM Since May, 2010
- Objectives:
 - Evaluate CDQM Algorithm Performance in Management of Queue Length
 - Collect Data for Further Analysis and Refinement

CDQM Field Test Results



CDQM Field Test Results

18R CDQM Allocation, Actual and Taxi Time Analysis
Taxi Time Plotted at Spot Crossing Time



CDQM Next Steps

- Additional Testing in MEM Through November, 2010
 - Including Delta, FedEx and ATC Tower Coordinated Metering
- Data Collection and Analysis
- Concept Exploration and Requirements Analysis
 - Toward Technology Transfer into the Tower Flight Data Manager in 2011